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Nasal Carriage Status of Staphylococcus Aureus amongst People Working in the Diagnostic Microbiology Laboratory of a Coastal Karnataka Medical College

Ashwini Hegde¹, Rahiyyana T A², Mangala², Pooja Rao¹, Radhakrishna M¹
¹Associate Professor, ²Postgraduate Student, Department of Microbiology, Kasturba Medical College, Mangalore (a Constituent Unit of Manipal Academy of Higher Education, Manipal, India)

Abstract

Background: S. aureus is one of the most common human pathogens and is capable of causing a wide range of infections. Although primary S. aureus infections are not familiar, a great deal of the virulence from this bacterium occurs through cross-infection by spread from patient to patient in hospitals and other institutional settings. In contrast, healthy individuals can be carriers of the organism but have a minimal risk of contracting an invasive infection caused by S.aureus, but

Aims and Objectives: To determine the nasal carriage status of the people working in the microbiology diagnostic laboratory with emphasis on MRSA.

Materials and Method: Swabs of both anterior nares of consenting persons were taken with a sterile swab & processed within 2 hours. Swabs were inoculated on Mannitol Salt Agar. The organisms grown were identified as S.aureus by using standard tests. Antibiotic susceptibility testing was carried on by a modified Kirby-Bauer method, whereas cefoxitin (30μg) disc was used to know the MRSA.

Result: A total of 80 healthcare workers with the age range between 20 and 60 years were screened. Out of 80 participants, 25 were nasal carriers of S.aureus. The S.aureus isolates were 100% sensitive to Gentamicin, Teicoplanin, Vancomycin and Cefoxitin, 80% susceptible to Ciprofloxacin and Linezolid, and 76% to Amoxyclav, 96% resistant to Penicillin, 84% Erythromycin and 76% Ceftriaxone.

Discussion: Nasal carriage rate of S.aureus amongst people working in the diagnostic microbiology laboratory of our institution was 31.25%. Of the 25 isolates of S.aureus, none of them were MRSA. So overall MRSA carriage rate was 0%.

Keywords: Nasal Carriage, S.aureus, MRSA, healthcare workers

Introduction

S. aureus is one of the most common human pathogens and is capable of causing a wide range of infections. Although primary S. aureus infections are not familiar, a great deal of the virulence from this organism happens through cross-infection by spread from one patient to another patient in hospitals and other institutional settings. In contrast, healthy individuals who can be the carriers of S.aureus have a small risk of contracting an invasive infection caused by the same, but they can be carriers of the organism. Because its primary habitat is moist squamous epithelium of the anterior nares, most invasive S.aureus infections are assumed to arise from the nasal carriage. The incidence of community-acquired and hospital-acquired S. aureus
infections has been rising with the increased blooming of drug-resistant strains named methicillin-resistant S. aureus (MRSA).3,4 MRSA is a confirmed pathogen in most health care facilities. Initially limited to hospitals, MRSA infections have been progressively reported in the community.5,6 A recent meta-analysis of 27 studies on the occurrence of CA-MRSA among hospital patients that used clinical specimens, as opposed to surveillance cultures performed at the time of admission, yielded a predominance of MRSA of 30.2%.7 Various studies have examined community prevalence of nasal carriage of S. aureus in multiple subpopulations, such as college students, adult outpatients, health care workers, and injection drug users.8,9 The predominance of S. aureus varies from 20% to 45%, with an estimate of 1.3% of MRSA colonization from 10 community surveillance studies.10 However few studies have focused on which individuals are most possibly to be colonized with S. aureus and which are most likely to have MRSA specifically. These are tasks that may be very useful to the clinicians when trying to decide the possibility that a given patient has a staphylococcal infection and, if so, whether antibiotic coverage should be provided for resistant strains.11 No previous studies of S. aureus carriage in the healthy population in India have been reported. This study has been designed to see the nasal carriage status of people working in the clinical microbiology laboratory of our institution. As they have been exposed to S. aureus and MRSA in particular while processing the clinical samples, the possibility of colonization by the same can’t be ruled out. Further, in this study, we would like to probe to see the role of clinical laboratory personnel transmitting MRSA from hospital to community.

Materials and Method

The study was conducted in the microbiology diagnostic laboratory of a Coastal Karnataka Medical College, India. All consenting people working in a microbiology laboratory were recruited into the study. The study proposal was submitted to the ethical review committee of the Institution for approval. The age, sex, work category, designation, duration of stay in the laboratory, and other relevant information about the participants were obtained in a pro forma designed for this purpose. Swabs of both anterior nares of consenting persons were taken with a sterile swab stick moistened with sterile physiological saline. Processing of the samples was done immediately within 2 hours after collection. The swabs were cultured onto Mannitol Salt Agar (MSA), and the inoculated MSA were incubated at 37°C for 18-24 h. The growth of the organism was identified as S. aureus by using standard tests, such as colony morphology, Gram stain, catalase test, coagulase test, and DNase test.12 The isolated strains of S. aureus were screened for methicillin resistance by modified Kirby-Bauer method using cefoxitin (30μg) disc on Mueller-Hinton Agar (MHA).13 The MHA on which cefoxitin is placed were incubated aerobically at 37°C for 18 h. Isolates with inhibition zone diameter ≤21 mm around cefoxitin disc were considered as MRSA strains.14 Antibiotic sensitivity to all S. aureus isolates against other antibiotics like penicillin, erythromycin, clindamycin, chloramphenicol, co-trimoxazole, ceftriaxone, gentamicin, Amoxicillin/clavulanic acid, linezolid, teicoplanin, and ciprofloxacin was determined by modified Kirby-Bauer method. All inoculum was adjusted with a density equivalent to a 0.5 McFarland turbidity standard from pure isolates in Muller Hinton broth incubated for 4-6 hours. S. aureus ATCC 25923, MRSA ATCC 29213, MSSA ATCC 33591 were used as control. The antibiotic discs were procured from HiMedia Laboratories Pvt. Limited, India. Antibiotic sensitivity testing and result interpretation were done according to CLSI guidelines.15

Statistical Analysis

Results were compelled and tabulated, and all data were subjected to SPSS version 16.4 software statistical package for analysis.

Results

A total of 80 healthcare workers with the age range between 20 and 60 years were screened. Distribution of the participants was depicted in Table 1. Age-wise 42 (52.5%) of the participants were less than 25 years of age. Gender wise 65 (81.25%) were females. Designation wise 53 (66.25%) were students. The nature of the organisms isolated was depicted in Figure 1. Coagulase-negative Staphylococcus (CoNS) was the predominant organism isolated 58.75% (48) followed by S. aureus 31.25% (25). But none of the S. aureus was found to be MRSA. The antibiotic susceptibility pattern of S.aureus was illustrated in Figure 2. The strains were 100% sensitive to gentamicin, teicoplanin, vancomycin, and oxacillin. 80% sensitive to ciprofloxacin and linezolid. And the isolates were shown 96% resistant to penicillin,
84% resistant to erythromycin, 76% to ceftriaxone.

**Table 1: Distribution of participants**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;25</td>
<td></td>
<td>42 (52.5%)</td>
</tr>
<tr>
<td>25 -35</td>
<td></td>
<td>18 (22.5%)</td>
</tr>
<tr>
<td>35 -45</td>
<td></td>
<td>10 (10%)</td>
</tr>
<tr>
<td>45 -55</td>
<td></td>
<td>10 (10%)</td>
</tr>
<tr>
<td>Sex distribution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td>15 (18.75%)</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td>65 (81.25%)</td>
</tr>
<tr>
<td>Number of years in the laboratory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1</td>
<td></td>
<td>31 (38.75%)</td>
</tr>
<tr>
<td>1-5</td>
<td></td>
<td>24 (30%)</td>
</tr>
<tr>
<td>&gt;5</td>
<td></td>
<td>25 (31.25%)</td>
</tr>
<tr>
<td>Designation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching</td>
<td></td>
<td>10 (12.5%)</td>
</tr>
<tr>
<td>Nonteaching staff</td>
<td></td>
<td>17 (21.25%)</td>
</tr>
<tr>
<td>Students</td>
<td></td>
<td>53 (66.25%)</td>
</tr>
</tbody>
</table>

Discussion

The anterior nares of humans found to be the primary ecological niches of *S. aureus*16. The carriage patterns are of three types. Approximately 20% of the individuals almost always carry a kind of strain, and they are called persistent carriers. A large proportion of the population (60%) harbours *S. aureus* intermittently, and the strains change with varying frequencies. Such persons are called intermittent carriers. Finally, minorities of the people (20%) rarely carry *S. aureus* and they are called noncarriers. The reasons for these differences in the colonization patterns are unknown.17

It is necessary to detect the MRSA carriers among health care workers (HCWs). These individuals act as a potential source of infection to susceptible people, causing community-acquired and nosocomial infections. The best methods which can be used for controlling this are a regular screening of the HCWs and taking the appropriate preventive measures. The prevalence of MRSA varies between institutions and geographic areas. The differences in the study design, such as the sample size and the method which is employed for MRSA detection, may account for the disparity in the carriage rate.

Nasal carriage of *S. aureus* amongst people working in the diagnostic microbiology laboratory of a medical college of coastal Karnataka, India, according to the results of this study was 31.25%. Out of 25 isolates of *S. aureus*, none were MRSA positive. So the overall MRSA carriage rate was 0%. In contrast, 25 persons (31.25%) were nasal carriers for MSSA. The MRSA carriage recorded in this study was lower when compared to 1.8% obtained among healthcare workers in Southern India.18 We have effectively functioning Hospital Infection Control Committee policies, which may be
responsible for the absence of MRSA carrier state among the people working in the diagnostic microbiology laboratory in spite of handling vast numbers of MRSA as clinical isolates and hence the same practice should continue. The zero prevalence of MRSA nasal carriage in the healthy population appears to contrast with the diverse dissemination of MSSA.

Mannitol Salt Agar was found to be very useful for the quick identification of S. aureus. However, the option of using oxacillin blood agar for selective isolation of MRSA is always helpful. Usage of cefoxitin discs was found to be convenient over that of oxacillin discs for the determination of MRSA.

**Conclusion**

In conclusion, S. aureus carriage status of people of microbiology diagnostic laboratory in a medical college of coastal Karnataka was 31.25%. In that MRSA carriage rate was zero. The existing control policy in our hospital seems to be effective, and the same should be maintained.

**Conflict of Interest:** The authors declare no conflict of interest.

**Source of Funding:** None

**Acknowledgment:** We thank all the participants who consented to participate in this study.

**Ethical Clearance** was taken from the Institutional Ethics Committee, Kasturba Medical College, Mangalore.

**References**


Sanitation and Hygiene Practices and their Determinants among the Rural Population of Vikarabad

Chandrasekhar Reddy Bolla¹, A. Revanth Kumar², Rajeshwar Rao Alwala³, Pavani Tunga⁴

¹Associate Professor, orcid-0000-0001-5146-0566, ²Assistant Professor, orcid-0000-0002-6980-4088, Department of Community Medicine, Santosh Medical College, Ghaziabad, Uttar Pradesh, ³Professor & HOD, ⁴Under Graduate Student, Department of Community Medicine, Mahavir Institute of Medical Sciences, Vikarabad, Ranga Reddy, Telangana

Abstract

Background: Sanitation is the basic & fundamental requirement to maintain good health. Poor sanitation and hygiene are linked to various diseases like, communicable diseases, diarrheal disease, worm infestation, etc., which are preventable. A remarkable reduction in the nations mortality & morbidity rates are possible by adopting sanitation and hygiene practices by the people. Various interventions have been formulated in India to establish proper sanitation and measures to monitor level of awareness among the people and their active participation is very essential. Objectives: To know the Knowledge, Attitude and Practices regarding sanitation and hygiene and their determinants, to know the proportion of population with and without sanitary latrines and to find out the extent of Open-Air Defecation practices and its determinants in the study area.

Methodology: A household based cross-sectional study was conducted in the Rural field practice area of a Medical College, Vikarabad from February to July 2018. Out of 488 households in Gottimukla village, 97 houses were earmarked for the study by systematic Random sampling method and information was collected from any resident available at the household at the time of visit. A pretested semi-structured questionnaire was used for data collection. Results: Majority (61.9%) of the participants had knowledge about Swatch Bharat Abhiyan. About 64.9% had better knowledge regarding Sanitation and Hygiene. Nearly 74.2% felt that maintaining good hygiene is important to stay healthy and to be free form sickness. A greater proportion of the study participants (91.8%) were disposing the solid waste in open drains though they had good knowledge and willingness it was not reflected in their practice. Conclusion and Recommendations: The villagers had ample knowledge and positive attitude regarding sanitation and Hygiene, but failed to apply the same in their practice. It can be overcome with repeated Awareness programmes to the target population.

Keywords: Hand wash, Hygiene, Open air defecation, Sanitary Latrines, Sanitation, Swachh Bharat Abhiyan, Water storage.

Introduction

Sanitation is one of the basic determinants of quality of life and human development index.¹ It is a fundamental requirement to ensure safe health, environment and the overall wellbeing of the society. Unless proper, functional sanitation facilities are in use complemented with the right types of hygiene behaviors, communities will be vulnerable to recurrent incidences of water and sanitation related diseases.² Poor sanitation and hygiene have been linked to specific negative health outcomes, including diarrheal disease.³ Although preventable and treatable, diarrheal disease remains the second leading cause of death in children under age five worldwide, resulting in approximately 5,25,000 deaths annually.⁴ Furthermore, observational data has shown an association between childhood diarrhea and height; interventions that encourage fecal containment are associated with reductions in diarrheal...
Given the scale and scope of these adverse effects, the UN had included sanitation as one of its Millennium Development Goals. Approximately 15% of the global population – nearly about 1 billion people – openly defecates and in India alone nearly 60% of its population practices open defecation. The problem is most acute in rural regions and the northern states, where about 70% of them openly defecate. Unsafe drinking water, poor hygienic conditions and improper disposal of human Excreta and refuse is one of the prime concerns in India. Sanitation and hygiene practices are heavily influenced by people’s knowledge and attitude towards it. The effects of poor sanitation seep into every aspect of life – health, nutrition, development, economy, dignity and empowerment. The Government had implemented many programmes like Central Rural Sanitation Program (CRSP) Total Sanitation Program (TSP), Nirmal Bharat Abhiyan (NBA). The NBA campaign was short-lived, as new Prime Minister Narendra Modi replaced it in October 2014 with the Swachh Bharat Abhiyan (SBA) or “Clean India Mission.” Prime Minister Modi updated the goal, calling for an Open Defecation Free (ODF) India by 2019.

In a study done by Kishore Yadav et al., the knowledge regarding Swatch Bharat Abhiyan was among 62.2% among rural people of Nalgonda district.

Defecating in the open is a very ancient practice. In ancient times, there were more open spaces and less population pressure on land. With development and urbanization, open defecating started becoming a challenge and thereby an important public health issue, and an issue of human dignity. People may choose fields, bushes, forests, ditches, streets, canals or other open space for defecation. They do so because either they do not have a toilet at home or due to traditional cultural practices.

In a cross-sectional study in rural area of Maharashtra people were afraid of getting diseases by consuming contaminated food and water by the fecal matter due to open air defecation (34.7%).

The findings of the study by National Sanitation and Hygiene Knowledge, attitudes and Practices (KAP) survey - final report, the respondents associated sanitation and hygiene was, (i) hand hygiene/cleanliness (72.4%), (ii) clean, safe water (71.5%), (iii) food hygiene/cleanliness (45.3%), (iv) personal hygiene (35.7%), and (v) general hygiene/cleanliness (31.3%). In a study by Rafiq Mohd et al., 92.9% of the respondent’s perception of clean house was the criteria for good sanitation.

With this background, an endeavor was made to assess the knowledge, attitude and practices regarding sanitation and hygiene and their determinants among the residents, proportion of population with and without sanitary latrines and find out the extent of Open Air Defecation practices and its determinants in the study area.

Materials and Method

A cross-sectional study was conducted from February to July 2018 in Gottimukla village, which is the rural field practice area of a Medical College, Vikarabad, Telangana State. Out of 488 households in the village, every fifth house was selected using systematic Random sampling method and a total of 97 houses were earmarked for the study.

After obtaining approval from the Institutional Ethical Committee, a formal permission was taken from the concerned authorities in the selected locality. An informed written consent was taken from the participants prior. Mentally challenged persons and those not consenting were excluded.

Information on Socio-demographic characteristics and existing knowledge, attitude & practices regarding sanitation and hygiene (along with sewage disposal and disposal of human excreta) were collected using a pretested, semi-structured questionnaire.

The data was compiled and analyzed in IBM SPSS Vr. 16 (Trial) and results shown in the form of tabulation and graphs.

Findings

Table 1. shows demographic profile of the study participants. The mean age of the study participants was 35.28. Among them, majority were youth (62.9%) followed by middle aged participants (25.8%) and very few old aged participants (11.3%).

Most of the study participants were males (81.4%) and majority of them were Hindus (93.8%). Majority of the respondents (90.7%) were found to be unemployed suggesting those were the ones present at home during the data collection.
Greater number of the study participants were Literates (52.6%) and 24.7% of them were graduates. Socio-economic status of majority of the study participants (84.5%) was Medium to High class. Nearly 53.6% were from nuclear families and 46.4% from joint Families.

Most of the households had sanitary Latrines (83.5 %).

Table 2 shows knowledge Attitude & Practices among the participants:

Knowledge: Among the participants about two thirds of them (64%) had knowledge regarding the importance of Sanitation & Hygiene and 61.9 % had knowledge regarding the Swatch Bharat Abhiyan Programme. Nearly 44.3% had knowledge regarding environmental hazards of Open Defecation (OD).

Attitude: Greater number of the study participants (80.4%) was willing for the proper disposal of solid waste and faeces to maintain cleanliness in the house. Nearly 78.3% of the study participants had a positive attitude regarding hand washing before taking food and after defecation. Among the study participants 74.2% think that maintaining good hygiene is important to stay healthy and to be from sickness. Among the study participants very few (14.4%) had a positive opinion on pretreatment of water before drinking.

Practices: Majority of study participants (91.8%) were disposing the solid waste in open drains; though the participants appeared to have good knowledge and willingness but it was not reflected in their practices.

Nearly 89.7% were cleaning water stored containers daily or on alternate days and 85.6% of them were drinking water without any pretreatment where as 81.4% of the study participants were using sanitary latrines. Source segregation of solid waste was followed by 75.3% of the participants. Hardly 38.1% of the participants washed their hands with water with soap.

Table 3. shows association of various demographic variables with the participants’ practice of open defecation. Literacy, occupation, Age, Family Type and Socio-economic status were found to be determinants for Open Defecation. Higher literacy, occupation, nuclear family, higher class of SES were major deterrents for the practice of Open Defecation.

Table 1. Demographic Data of the Study Participants (n=97)

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (range):</td>
<td>35.28 (16-75)</td>
</tr>
<tr>
<td>Age Group:</td>
<td></td>
</tr>
<tr>
<td>Youth (15-35 Years):</td>
<td>61 (62.9)</td>
</tr>
<tr>
<td>Middle Aged (36-55 Years):</td>
<td>25 (25.8)</td>
</tr>
<tr>
<td>Old aged ($&gt;56$ Years):</td>
<td>11 (11.3)</td>
</tr>
<tr>
<td>Gender:</td>
<td></td>
</tr>
<tr>
<td>Male:</td>
<td>79 (81.4)</td>
</tr>
<tr>
<td>Female:</td>
<td>18 (18.6)</td>
</tr>
<tr>
<td>Religion:</td>
<td></td>
</tr>
<tr>
<td>Hindu:</td>
<td>91 (93.8)</td>
</tr>
<tr>
<td>Muslim:</td>
<td>5 (5.2)</td>
</tr>
</tbody>
</table>

Nearly 29.9% of the study participants were not using the sanitary latrines due to lack of provision of water. Some of the participants (25.8%) preferred not to answer the reason for not using the sanitary latrines, whereas 3.1% felt it’s an extra work for maintenance of sanitary latrine (Chart 1).

Nearly one third of the study participants (33%) responded that lack of money and space were the reasons for not constructing sanitary latrines. About 1% of the study participants responded that staying in rented house was the reason for not constructing sanitary Latrine (Chart 2).
Table 1. Demographic Data of the Study Participants (n=97)

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
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<tr>
<td>Occupation:</td>
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</tr>
<tr>
<td>Unemployed:</td>
<td>88 (90.7)</td>
</tr>
<tr>
<td>Unskilled:</td>
<td>4 (4.1)</td>
</tr>
<tr>
<td>Semiskilled:</td>
<td>3 (3.1)</td>
</tr>
<tr>
<td>Skilled:</td>
<td>2 (2.1)</td>
</tr>
<tr>
<td>Educational level:</td>
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</tr>
<tr>
<td>Illiterate:</td>
<td>46 (47.4)</td>
</tr>
<tr>
<td>Primary School:</td>
<td>10 (10.3)</td>
</tr>
<tr>
<td>Middle School:</td>
<td>3 (3.1)</td>
</tr>
<tr>
<td>High School:</td>
<td>14 (14.4)</td>
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<tr>
<td>Graduate:</td>
<td>24 (24.7)</td>
</tr>
<tr>
<td>Socio-economic Status:</td>
<td></td>
</tr>
<tr>
<td>Low:</td>
<td>15 (15.5)</td>
</tr>
<tr>
<td>Medium/High:</td>
<td>82 (84.5)</td>
</tr>
<tr>
<td>Family Type:</td>
<td></td>
</tr>
<tr>
<td>Nuclear:</td>
<td>52 (53.6)</td>
</tr>
<tr>
<td>Joint:</td>
<td>45 (46.4)</td>
</tr>
<tr>
<td>Sanitary Latrine present in the household:</td>
<td>81 (83.5)</td>
</tr>
</tbody>
</table>

Table 2. KAP among Study Participants on Sanitation and Hygiene (n=97)

<table>
<thead>
<tr>
<th>Variable (n=97)</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge:</td>
<td></td>
</tr>
<tr>
<td>On Swatch Bharat Abhiyan:</td>
<td>60 (61.9)</td>
</tr>
<tr>
<td>On environmental hazards of OD:</td>
<td>43 (44.3)</td>
</tr>
<tr>
<td>On Sanitation &amp; Hygiene:</td>
<td>63 (64.9)</td>
</tr>
<tr>
<td>Attitude:</td>
<td></td>
</tr>
<tr>
<td>Clean House &amp; proper disposal of Solid waste and faeces is important:</td>
<td>78 (80.4)</td>
</tr>
<tr>
<td>Maintaining good hygiene is important to stay healthy and to be free from sickness:</td>
<td>72 (74.2)</td>
</tr>
<tr>
<td>Hand washing must be practiced routinely:</td>
<td>76 (78.3)</td>
</tr>
<tr>
<td>Pre-treatment of water before drinking is necessary:</td>
<td>14 (14.4)</td>
</tr>
<tr>
<td>Practices:</td>
<td></td>
</tr>
<tr>
<td>Subjects using Sanitary latrines:</td>
<td>79 (81.4)</td>
</tr>
<tr>
<td>Participants drinking water without any pretreatment:</td>
<td>83 (85.6)</td>
</tr>
<tr>
<td>Families Cleaned Water containers regularly</td>
<td>87 (89.7)</td>
</tr>
<tr>
<td>Participants who washed hand with water only</td>
<td>60 (61.9)</td>
</tr>
<tr>
<td>Participants disposed solid waste in open drains</td>
<td>89 (91.8)</td>
</tr>
<tr>
<td>Participants segregated Solid waste in Dry &amp; wet bins</td>
<td>73 (75.3)</td>
</tr>
</tbody>
</table>
Table 3. Association of Open defecation with demographic profile among Study Participants

<table>
<thead>
<tr>
<th>Variable (n)</th>
<th>OD No. (%)</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (79)</td>
<td>11 (13.9)</td>
<td>0.25 (0.081-0.79)</td>
</tr>
<tr>
<td>Female (18)</td>
<td>7 (38.9)</td>
<td></td>
</tr>
<tr>
<td>Literacy:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate (46)</td>
<td>10 (21.7)</td>
<td>1.49 (0.53-4.18)</td>
</tr>
<tr>
<td>Literate (51)</td>
<td>8 (15.7)</td>
<td></td>
</tr>
<tr>
<td>Occupation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed (88)</td>
<td>17 (19.3)</td>
<td>1.9 (0.22-16.36)</td>
</tr>
<tr>
<td>Employed (9)</td>
<td>1 (11.1)</td>
<td></td>
</tr>
<tr>
<td>Age group:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 35 year old (61)</td>
<td>13 (21.3)</td>
<td>1.68 (0.54-5.17)</td>
</tr>
<tr>
<td>&gt; 35 year old (36)</td>
<td>5 (13.9)</td>
<td></td>
</tr>
<tr>
<td>Family type:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear (52)</td>
<td>13 (25)</td>
<td>2.66 (0.86-8.18)</td>
</tr>
<tr>
<td>Joint (45)</td>
<td>5 (11.1)</td>
<td></td>
</tr>
<tr>
<td>SE Status:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (15)</td>
<td>7 (46.7)</td>
<td>5.65 (1.7-18.7)</td>
</tr>
<tr>
<td>Medium/ High (82)</td>
<td>11 (13.4)</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

In the present study the knowledge on Swatch Bharat Abhiyan among the study participants was (61.9%) which correlates to the study done by Kishore Yadav et al., which was (62.2%) among rural people of Nalgonda district.

Nearly 35.1% of the study participants in the present study didn’t know the terms sanitation and hygiene and their importance and 20.6% of the study participants answered that sanitation and Hygiene reflects food hygiene and cleanliness. Some of the study participants felt that clean and safe water (14.4%), proper disposal of solid waste (11.3%), Hand Hygiene /cleanliness and safe disposal of waste (4.1%) reflects the sanitation and Hygiene. Among the participants 7.2% felt all the above variables can be considered for sanitation and Hygiene.

In contrary the findings of the study by National Sanitation and Hygiene Knowledge, attitudes and Practices (KAP) survey Final report, the respondents associated sanitation and hygiene with (i) hand hygiene/cleanliness (72.4%), (ii) clean, safe water (71.5%), (iii) food hygiene/cleanliness (45.3%), (iv) personal hygiene (35.7%), and (v) general hygiene/cleanliness (31.3%).

In the present study 80.4% of the study participants had positive attitude regarding clean house and proper disposal of solid waste and faeces is important, similar findings were observed in the study by National Sanitation
and Hygiene Knowledge, attitudes and Practices (KAP) survey Final report, to maintain good hygiene, 85% thought keep the house and 40% considered it was about disposing adult and infant faeces safely.

In the present study 41.2% of the study participants were not using sanitary latrines due to lack of awareness and 29.9% due to lack of water in contrary with the study by National Sanitation and Hygiene Knowledge, attitudes and Practices (KAP) survey Final report findings indicate that of the 3.8% who said that their latrines were not useable, the most common reasons given were (i) latrine was full (33.3%), (ii) broken or missing superstructure (22.2%) and (iii) other reasons (33.3%).

In the present study 33% of the study participant’s responded lack of money and space were the reasons for not constructing sanitary Latrines unlike the findings of the study by National Sanitation and Hygiene Knowledge, attitudes and Practices (KAP) survey Final report 70.4% of the household respondents did not have latrines mainly because they did not have money to buy one and the perceived cost of building a latrine as too high.

**Conclusion**

The present study was done to get the baseline information on the present knowledge, attitude and practices of sanitation and hygiene among the people of rural Vikarabad.

It was observed that even though the villagers had ample knowledge and positive attitude regarding sanitation and Hygiene, the researchers perceived failure in their practice. It can be overcome with repeated Awareness programmes to the target population.

Though the findings of the current study may not be exhaustive, yet, the villagers surveyed represent an important subgroup of the entire rural population and the information generated will be useful in the planning of future Sanitation and Hygiene education programmes in rural and urban slums.

**Conflict of Interest:** No conflict of interest.

**Ethical Clearance:** Taken from IEC, Mahavir Institute of Medical Sciences, Vikarabad, Telangana.

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**References**


Parental Alcoholism - Psychosocial Problems Faced by Adolescents

Chinnu Sebastian¹, Suja M.K²
¹PhD Scholar, ²Associate Professor, Department of Social Work, Amrita School of Engineering, Coimbatore, Amrita Vishwa Vidyapeetham, India

Abstract

Introduction: Alcoholism is a family disease; its affects everyone in the family. There are many psychosocial factors that are connected to alcoholism. Parental Alcoholism causes many family issues and the relationship between the family members is hampered due to this and in turn affects the psychological and social development of the children. Recently, schools have drawn attention on alcoholism of parents as one of the dominant factors for the psychosocial development issues of students. Parental drinking increases health risks in children and adolescents. Such risks include diminished intellectual capacity and development, increased neuroticism and a wide range of psychosocial and behavioural disorders.

Aim: This research work has made an attempt to study the psychosocial problems faced by adolescents due to parental alcoholism. This study sought to measure the level psychosocial problems and significant factors associated with psychosocial problem of adolescent students of Kottayam district of Kerala, India. Results: More than half of the respondents (57%) have moderate level of psychosocial problems. The study reveals that psychosocial problems are more in female children and religion has no significance in this matter. 27% of the respondents were severely affected by the parental alcoholism and out of this 87% were girls. Conclusion: This research gives us a clear picture of the consequences that could happen to the children of alcoholic parents. The researcher sees that alcoholic parents have strong influence on their children’s future. Physical, psychological, educational, economical, social and developmental issues can be counted as the major problems of the children of alcoholic parents. Children can’t do anything to control the alcohol consumption of their parents. Then only possible way in front of them is to discuss their issues with a trusted elder person. In school children a school counsellor can help them in offering good service, advice and self motivation practices to overcome the difficult experiences.

Keywords: Parental Alcoholism, Adolescents, Psychosocial problems.

Introduction

Alcoholism or alcohol dependence is defined by American Medical Association (AMA, 1956) as “a primary, chronic disease with genetic, psychosocial, and environmental factors influencing its development and manifestations”. In our country, alcoholic fathers outnumber alcoholic mothers. In Kerala it is socially accepted to drink alcohol during a public function, to appear drunk in public or the smell of alcohol is not considered as a serious matter¹. It is an accepted norm and no one cares about it as a social issue except when it affects the family and work. According to the National Council on Alcoholism and Drug Dependence (NCADD, 1987) alcoholism affects about 18 million adults in the U.S. Approximately 26.8 million children are exposed to alcoholism in the family and 6.6 million children age 18 and younger live in households with at least one alcoholic parent². These children are the unwilling victims of a disease which generally is the centre of their childhood existence and therefore shapes their personality and behaviour as adults.

Alcoholism is referred to as a family disease. Great awareness on the ill effects of alcoholism of different walks of life like job, health, family, mental and social status is being given and the awareness level is seemed to be increasing. From the researcher’s interaction with
the adolescents it was known that marital and family problems start due to alcoholism. It is also seen that children are more affected than the spouses since they are in the development phase. Children always suffer when they share a house with an alcoholic parent. There can be a real sense of shame and they always spend a lot of time living in fear. Many times the children of alcoholics have endured verbal abuse by way of harsh criticism and unfair judgement from a drunken parent. Children of alcoholic homes are at more risk to be a victim of physical, mental and sexual abuse. Parental alcoholism has a great impact on the overall development of a child and the living circumstances, where any one or both of the parents consume alcohol on a regular basis.

Adolescence is the transitional stage of development between childhood and adulthood, representing the period of time during which a person experiences a variety of physical, sexual, cognitive, social and emotional changes. Stanley Hall (1904) denoted this period as “Storm and Stress” and states “conflict at this developmental stage is normal”. During 10-19 years age group adolescents suffer from various forms of problems and conflicts. The behaviour of a child depends on social, biological and environmental factors and these variables contribute a lot to the growth and development of a child both mentally and physically. Children of alcoholic families develop a kind of behaviour which is disgusting to the adults and these children are also seen as introverts. Their adjustment pattern is very poor and most of them have a negative attitude towards life circumstances. Family support is the main factor for a child personality development. The quality and nature of the love, care and nurturing environment which the child receives is reflected in the whole life of that child. Schools also have a vital role in moulding a child because they spend most of their time in the school during their adolescent period. School is an organization where the overall development of a child happens because there he gets to mingle with the peers and teachers and he/she also learns the habit of social living. The “we feeling” and sharing mainly comes to his/ her mind from the school. Hence school plays a vital role in the overall educational, social and personality development of an adolescent.

Children of alcoholics are more likely than their peers to have problems in education, to be learning difficulty, lack of concentration & interest in studies, absenteeism, not getting desired marks, family economic problems and can’t submits school fees on time, restlessness and lack of aptitude for studies.

Parental alcoholism may have both short- and long-term negative consequences for adolescent’s psychosocial problems. Almost all adolescents from alcoholic families are at greater risk of poor psychosocial problems and adjustment. They experience an emotional consequence including mistrust, guilt, anger, shame, confusion, fear, insecurity, ambivalence, and stress, loss of self-esteem, anxiety, depression, suicidal thoughts and sexual conflict. This type of emotional experiences can led to eating disorders, bipolar disorders, drug or alcohol dependence and sociopathic, such as antisocial personality disorder. Social problems that adolescent’s faces are difficulty to mingle with opposite sex, poor peer relationships, no participation in culture activities, absence of good friends and lack of sociability.

The researcher visited a number of schools and interacted with school counsellors to get more knowledge about the effect of parental alcoholism in children. However it was difficult to find out the adolescents whose parents were addicted to alcohol. With the help of counsellors, researcher screened the students whose parents were addicted to alcohol. Researcher interacted and motivated them to participate in the study on “Parental Alcoholism - Psychosocial Problems faced by Adolescents”.

**Methodology**

This paper is based on the interview and discussions conducted with adolescent students in a school counselling centre of Kottayam district which belongs to rural area of Kerala, India in the year 2018. School counselling centre is a project under the psychosocial service scheme of the department of women and child development, Kerala Government. An interview schedule was used to collect data and the research is descriptive in nature. Total survey method is used to collect the samples. The criterion for selecting the respondents was that they were the beneficiaries of this counselling centre. They were facing various problems like abuse, parental issues, broken family etc. Among the 70 students 30 were having problems due to parental alcoholism. The researcher enrolled all 30 students for the study. It is otherwise known as Total population study. Analysis was done by simple percentage and Chi Square test.
**Major Findings:**

The simple percentage of socio demographic data reveals the following information. It is seen that 43% of the respondents are in the 13-15 years age group. 40% of the respondents are studying in high school classes and half of them are severely affected due to parental alcoholism. They were always conscious about their higher studies and future. The family issues or quarrel between the parents and physical abuse made them unable to concentrate in the studies. They also started to think about suicide.

53% of the respondents are female students, the study also identified that the severity of psychosocial effects of parental alcoholism in seen more in girls (87.5%). This huge difference in severity in the gender is due to the culture of restrictions on the activities of girls as they were in a puberty state and they didn’t have any way to release their feeling as their parent’s drink daily. Male children go out and play with their peer group, interact and involve in other social activities which helped them to reduce the burden of problems.

Nearly half of the respondents (40%) are in the first birth order and psychosocial problem is seen more in them as they have to take up alternate roles as mother or father to the younger siblings. Fathers of 33% of the respondents and mothers of 30% of the respondents have 10th standard education. The study revealed that the intake of alcohol and domestic violence were much higher in illiterate and matriculate parents than graduate parents. Half of the respondent’s fathers are coolie workers and mothers of 43% are unemployed. The researcher identified that only 2% of the mothers of the respondents were consuming alcohol and only during family celebrations. So mother’s alcohol consumption does not affect the psychosocial elements of the respondents. 57% of the respondent’s fathers are regular or daily drinkers. This lead to inability in playing school fee on time and this severely affected the student’s psychological wellbeing. They were unable to concentrate in their studies, worrying about their career, future. They also found it difficult to interact with classmates. Majority of the adolescents fathers (70%) quarrel at home after drinking. This affects their studies, they feel stigma to have social interaction and they also don’t have a healthy family atmosphere to flourish and grow.

Most of the adolescents (57%) are from nuclear family. These students are not able to spend good quality time with their family members mainly with their parents. This results in the lack of proper parenthood and related care. The role of grandparents is also very important in the development of a child. Earlier in joint families the unconditional love that was given by grandparents is not seen as the families because nuclear now a days. This care and love given by grandparents is also the main ingredient in the development of self esteem, self reliability, and efficiency and also contributes for the proper psychosocial development. Earlier it was joint families which helped a lot the family members to share the feelings with each other. The psychosocial problem faced by the adolescents is because of the fact that they are unable share their feeling. They also hesitate to share the feeling with their peer group. This causes loneliness and social isolation.

**Levels of psychosocial problems**

More than half of the respondents (57%) have moderate psychosocial problems. 27% have severe psychosocial problems and only 16% have mild psychosocial problems. The research throws light on the fact that psychosocial problems of majority of the adolescents are at the moderate level. A smaller group has severe psychological problems. This group has to be taken care of else this can lead to psychosocial maladjustments in the future.

The role school counsellor- The Kerala Social Welfare board has appointed qualified school counsellors in all government schools to give counselling and to conduct various awareness programs, to identify the psychosocial problems of children of all age groups. Secondly, parenting a child is an equal responsibility of a father and mother but if father is an alcoholic mother have to take more responsibility. This adds stress and strain on the mother and affects her psychological health also. Third, social support- peer support, local libraries, neighbours and religious support also plays an important role to overcome the psychosocial problems of adolescents due to parental alcoholism.

**Factors affecting the psychosocial problems**

The study reveals that psychosocial problems affect the female adolescents more than the male. There is no significant relation between age of children and
alcoholism in parents or religion and alcoholism. In the counselling session with the severely affected respondents it is seen that the family condition, income and family status of both girls and boys were almost similar, however the boys has more freedom in their home and society as compared to the girls. So the boys could go out and playing games talk with friends or share their feeling with close friends. In the case of girls they used to find solace in reading books, watching Television and playing indoor games with siblings. This shows that unwritten code of ethics imposed on girls by our society. Curtailed by the family as well as society to do the activities they like the girls keep their problems themselves and suffer in silence. Hence they spent more time in their home. It is also seen that the girls are facing harassment from their drunken father. The school counsellor is like a breath of fresh air to these girls. They find the counsellor as a person who would listen to them without bias.

Discussion and Conclusion

The study finds that the psychosocial problems of adolescent’s are at moderate level. But 27% of the respondents were severely affected with the parental alcoholism and out of this majority are girls. Students who were severely affected due to parental alcoholism are counselled frequently. Counselling sessions were conducted to the parents also. They were given awareness on the side effects of alcohol, health issues and psychosocial problems faced by children due to parental alcoholism. Counsellor refers the alcoholic parents to the de-addiction centre and gave necessary psychological support to the students. Legal interventions are also provided when required.

Children of alcoholic parents need attention and counselling and sometimes therapies to overcome their problems. The best therapy that can be given is emotional care and support. The school counsellor can contribute a lot in these areas and the counsellor can find appropriate resources for the child. Teachers also in other hand are the backbone of a child during his/her adolescent life. The teacher can also give moral and educational support and can give a special attention to these children. Classes and counselling session to be conducted in these groups and effective participation of the members to ensured. Other methods are practicing relaxation techniques (yoga, meditation), self-care (eating nutritious food, proper sleep, taking a warm bath) develop hobbies, involve in extracurricular activities, journaling to express thoughts and feelings and get regular physical activity. Successful interventions are most likely to be those which foster more effective communication among family members and reduce anxiety and depression through recapturing an atmosphere of cohesion and support.

Ethical Clearance- Taken from Human Ethics Committee, Dept. Of Social work, Amrita Vishwa Vidyapeetham, Coimbatore, Tamil Nadu, India.

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References


A Comparative SEM Study of the Effects of Hand Scaling, Diode Laser and Erbium, Chromium: Yittrium-Scandium-Gallium-Garnet (Er,Cr:YSGG) Laser on Root Surface

Sayantan Karmakar¹, Deepa G. Kamath², David Kadakampally³, Rashmi Nayak⁴, Meena Anand⁵

¹Postgraduate, ²Professor and Head of Department, ³Associate Professor, Department of Periodontology, Manipal College of Dental Sciences, Mangalore, Manipal Academy of Higher Education, Karnataka, India, ⁴Professor and Head of Department of Pedodontics, Director of Department of Laser Dentistry, ⁵Associate Professor, Department of Periodontology, Manipal College of Dental Sciences, Manipal, Manipal Academy of Higher Education, Karnataka, India

Abstract

Background: Various curettes and lasers are used in periodontal therapy. Although curettes and diode laser have their own shortcomings compared to Er,Cr:YSGG laser, adequate evidence comparing their effects on root surface morphology and change in root surface composition is lacking.

Materials and Method: 7 periodontally compromised teeth were extracted, cut into 27 specimens and divided into 3 groups. All the groups were instrumented by Gracey curettes and the other groups were irradiated by diode and Er,Cr:YSGG laser respectively. SEM was employed to check the presence or absence of smear layer, roughness of tooth surface and loss of tooth substance. EDAX software was used to check the compositional changes.

Results: SEM results show that the groups where Er,Cr:YSGG was used as an adjunct, showed the least presence of smear layer, the roughest surface and most loss of tooth substance. EDAX results show that the most inorganic content in the Er,Cr:YSGG group.

Conclusion: Er,Cr:YSGG causes greatest amount of surface alteration. Its ability to ablate the smear layer without causing any changes in the composition at the structural level makes Er,Cr:YSGG a safe and effective adjunct in non-surgical periodontal therapy.

Clinical relevance: Er, Cr:YSGG is an excellent treatment modality to gain new attachment.

Keywords: Scaling and Root Planing, curettes, Diode laser, Er,Cr:YSGG laser, Scanning Electron Microscope.

Introduction

The focus of periodontal treatment is to eliminate pathogenic microorganisms, thus halting disease progression. A successful treatment outcome necessitates a thorough removal of plaque, calculus and diseased cementum. Scaling and root planing (SRP) are fundamental treatment modalities to achieve a disease free periodontium [1]. Many different modalities have been implemented to perform SRP.

Curettes are still considered the gold standard for performing SRP [2]. However, the use of curettes is limited by their difficulty in instrumenting at areas with compromised accessibility such as furcation defects and deep periodontal pockets; patient discomfort; requirement of exemplary operator skill to achieve a...
favourable treatment outcome \(^2,^3\). A smear layer is also generated during manual scaling, which compromises periodontal tissues regeneration \(^4\).

Usage of ultra-sonic scalers are easy, drastically reduce the patient chair time thus improving the overall clinical efficiency and outcome. However, power driven instruments may cause transient sensitivity and the noise and vibration generated have reportedly caused acoustic discomfort to some patients \(^5\).

Various laser devices have been used in periodontal therapy \(^5,^6\). Areas in the periodontal pocket like furcation septae or the concave root which are inaccessible to manual and ultrasonic instrumentation can be irradiated by laser energy via flexible and thin fibers \(^7\). It has been reported that laser irradiation has bactericidal and detoxification effects without producing a smear layer; therefore, the laser-treated root surface may provide favorable conditions for connective tissue attachment \(^8\).

Several different wavelengths of lasers can be used in periodontics. These include such as Er,Cr:YSGG (2780 nm) and diode lasers (810nm). With wavelength of diode laser the penetration into biological tissues is relatively high, approximately 0.5-3 mm \(^9\). So any accidental contact of laser energy to the root surface can lead to severe and irreparable damage to the root surface morphology and the pulp. There is no concrete evidence of the root surface morphology after diode laser treatment.

In the latter half of 90s, various literature had found the wavelength of erbium, chromium: yttrium-scandium–gallium–garnet (Er,Cr:YSGG) laser to be beneficial in periodontal therapy as it can be safely and effectively used on both hard and soft tissues. Dental calculus can also be removed by Er,Cr:YSGG laser \(^6\).

Materials & Method

This study was conducted in-vitro. 7 single rooted teeth affected with severe periodontitis and which were determined to have hopeless prognosis were extracted. Atraumatic extraction was done with the root surface remaining intact. Immediately thereafter distilled water was used to clean the teeth. They were stored in phosphate buffered saline, pH 7.4 at 37\(^o\) C until further procedures were carried out.

The cervical 3rd of the roots were marked with 2 parallel grooves with the 1\(^st\) groove made at the Cemento-Enamel junction and the other 5 mm apically from the 1\(^st\). Using a slowly rotating diamond bur the roots were cut along the 2 grooves. The resultant disc formed was cut bucco-lingually and mesio-distally. This resulted in 4 specimens per tooth of a size averaging (2X2) mm.

Specimens were randomly divided into 3 groups of 9 specimens each:

**Group I**: specimens instrumented with gracey curettes

**Group II**: specimens instrumented with gracey curettes followed by diode laser application (810 nm) (Picasso, AMD lasers) in noncontact mode (approximately 1 mm away from root surface) in linear motion at the power setting of 2 W for the time period of 30 s. Laser beam was maintained parallel to root surface.

**Group III**: specimens instrumented with gracey curetes followed by Er,Cr:YSGG with wavelength of 2.78μm and a sapphire tip (size 600μm; length of 4mm) with a frequency of 20 hz and 1.0 W power irrigated with 15% water and 10% air for 30 seconds(Waterlase, Biolase). The surfaces were scanned at an angle of 30\(^o\) to the surface in non-contact mode.

After treatment, the specimens were immersed in 2.5% glutaraldehyde in 0.1 M phosphate buffer (7.4 pH) for 24 hours. Increasing concentrations of ethyl alcohol (30%, 50%, 70%, 90% and 100%) were used to wash and dehydrate the specimens. They were air dried for the next 48 hours. Silver was sputter coated on the specimens for a thickness of 30-40nm after fixing them to SEM stubs.

The whole test surface of every specimen was initially scanned with SEM (Figure 1) to get a general idea of the surface profile of each specimen.

Sites which depicted maximum changes were focused and photomicrographs were standardized by obtaining them at a magnification of ×100 and ×500 for each specimen. (Figure 2)
Compositional changes of the roots of teeth in each group are assessed using EDAX software.

The following parameters were examined for each specimen:
- Presence or absence of smear layer
- Loss of tooth substance index (LTSI) \[^{10}\]
- Roughness loss of tooth substance index (RLTSI) \[^{11}\]
- Gross composition of root
- Composition of root at atomic level

**Statistical Analysis**

The statistical analysis was carried out using SPSS version 21.0. The presence or absence of smear layer is evaluated by using the Chi-Square test. To assess the significance of differences between the 3 groups regarding LTSI, RLTSI & compositional changes, the ANOVA parametric test complemented by the post hoc Tukey test was used. \( P \leq 0.001 \) is set for statistical significance.

**Results**

Figure 3 reveals that Group I showed the most amount of smear layer formation, while group III demonstrated the least.

Figure 4 reveals that Group III had the most loss of tooth substance as well as roughest surface of all.

Figure 5 reveals that Group III had the highest levels of calcium and phosphorous. Concurrently it’s been observed that the levels of carbon in that same group are the least across all groups.

Figure 6 reiterates the findings of figure 4A at the microscopic level.
Discussions

In this study the effects of manual scaling, diode laser & Er,Cr:YSGG laser on root surface have been evaluated. Parameters such as (i) presence or absence of smear layer (ii) roughness of tooth surface (iii) loss of tooth substance (iv) gross composition of root & (v) changes at atomic level have been analyzed.

In manual scaling gracey curettes have been used. The power of the diode laser was kept at 2W and root surfaces were instrumented for 30 seconds as Kreisler et al (2002)\cite{12} had analyzed the effects of diode laser irradiation at different power settings and time intervals and concluded that 2W is the threshold level at which carbonization occurs. The power setting of Er,Cr:YSGG laser is kept at 1W at 30 ° angulation for 30 seconds as Oliveira et al (2015)\cite{13} confirmed this is the optimum setting at which least alteration of the tooth surface occurs.

Analysis of the presence or absence of the smear layer (Figure 3) reveal that although there isn’t any significant differences between 3 groups but group III has quite a lower percentage of smear layer. These findings are similar to the results obtained by Theodoro et al (2006)\cite{14} and Oliveira et al (2010)\cite{15}.

Mechanical instrumentation causes smear layer formation. This is because the mineralized tissues are shattered to produce considerable amount of debris which instead of being shredded or cleaved, get spread over the surface to form the smear layer. Smear layer contains bacteria, their by-products and necrotic tissue and it acts as a substrate for bacteria to grow and survive. It also hinders periodontal attachment.

The diode laser acts by photothermic mechanism. Since the diode laser energy is poorly absorbed, only the surface temperature increases which ranges from 100°C to 400°C. This temperature rise removes the water & the organic matrix which are responsible for smear layer formation.

Er,Cr:YSGG laser acts by photoablative mechanism. The water molecules present between the hydroxyapatite crystals absorb the Er,Cr:YSGG laser energy better than diode laser. So both surface and the subsurface layer get superheated leading to controlled micro-explosions thus eliminating smear layer.

Analysis of the values of LTSI & RLTSI (Figure 4) reveal that Group II had the smoothest surface while Group III had the roughest. The results are similar to the outcomes got by Hakki et al (2010)\cite{16} and Oliveira et al (2010, 2015)\cite{13, 15} who analyzed the effect on root surface between manual scaling and irradiation by Er,Cr:YSGG using different power settings and angles thus concluding that the latter causes significantly more surface roughness and substance loss.

The curette removes a layer of root surface by scraping motion causing scratches, irregular roughness & flat notches on root surface which increases as the force and the number of strokes increase.

Diode laser has photothermic interaction with the mineralized tissue. The diode laser energy isn’t well absorbed by water or hydroxyapatite. This energy is converted to heat which increases the root surface temperature. The first chemical compound lost upon heating a tissue is water. Maximum degradation of collagen is seen around 320°C resulting in a relatively smoother surface.

The Er,Cr:YSGG laser photomechanically ablates dental tissue. This type of laser energy is well absorbed by water molecules present in the interprismatic substance which causes their rapid evaporation leading to controlled tissue microexplosions. Thus hydroxyapatite crystals are removed at much lower temperatures than their melting point. Following this, the ablated hydroxyapatite crystals coalesce together undergoing micro-recrystallization. This microablation and micro-recrystallization cycle is responsible for the formation of gross concave and convex surfaces. This rough surface is believed to help in the attachment of fibroblasts during resolution of periodontal pocket.

SEM-EDAX examination revealed that the
quantities of calcium and phosphorous (% weight & atomic weight %) increased from Group I to Group III while the quantity of carbon decreased (Figure 5 and 6). Although statistically not significant the increase in calcium and phosphorous weight % is thought to result due to evaporation of the organic components. Due to temperature increase substituent changes in the tissues are believed to occur.

The findings of this study are in accordance to a study by Kimura et al (2001) [17] who compared the calcium and phosphorous weight % between a control group and an Er,Cr:YSGG laser group. However the results of the present study aren’t in line with Hakki et al (2010) [16] who found that both calcium & phosphorous weight % had statistical significant differences when compared among the groups as well as when compared to a control. This maybe attributed to the fact of difference in the SEM-EDAX machines because even under the strictest conditions, the energy levels recorded by the detector is determined by the amount of interaction of the electron beam. The relative increase in the amount of calcium and phosphorous can be advantageous in reducing the solubility of hard dental structures. Hossain et al (2001) [18] had reported the increase in resistance to acids upon irradiation by Er,Cr:YSGG laser.

Progressive increase Ca/P ratio (weight as well as molar) is seen from Group I to Group III. This is because atoms other than Calcium decreased due to evaporation. But the increase being statistically non-significant it can be concluded that no chemical changes occurred at the molecular level. The findings are similar to the results obtained by Kimura et al [17] and Hakki et al [16].

Conclusion

The results of this study show that manual instrumentation generates highest amount of smear layer whereas Er,Cr:YSGG generates the least. The roughness and loss of tooth surface is highest when Er,Cr:YSGG laser is used adjunctively with manual instrumentation. There are no statistically significant changes in the gross composition as well as at the molecular level for all the 3 modes of instrumentation and hence it can be said that they don’t cause any structural damage.

So it can be concluded that although Er,Cr:YSGG causes greatest amount of surface alteration but its ability to ablate the smear layer without causing any changes in the composition at the structural lever makes Er,Cr:YSGG a safe and effective adjunct in non-surgical periodontal therapy.

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Informed consent: in-vitro study.

References


Animal Bite Surveillance Data Quality at Primary Health Centres of Hassan District

G.M. Venkatesh1, C.R. Hiraniah2, M. Sundar3

1Associate Professor, Department of Community Medicine, Hassan Institute of Medical Sciences, Hassan, 2District Surveillance Officer, District Surveillance Unit, District Health System, Hassan, 3Professor & Head, Department of Community Medicine, Hassan Institute of Medical Sciences, Hassan

Abstract

Introduction: As animal bite surveillance provides the first step in identifying the need to prevent animal bite and rabies in humans, this study is undertaken to explore the quality of surveillance data available at primary health centres.

Material and Method: A Cross sectional study was carried out among the primary Health Centres of Hassan District, which has 8 talukas and 134 Primary Health Centres. Seven Primary Health Centres from each of the eight talukas across the district were visited and data was collected through record review and interview from the designated staff on a predesigned Proforma.

Findings: All 57 (100%) of the Primary Health Centres recorded the demographic information. None recorded the place of bite, 53(92%) recorded the animal biting the victim and 1(2%) of them tried to understand if the biting animal was rabid. However, 19(33%) of the centres classified the wound into 3 categories. Only 2(3%) of centres advised wound wash at the centre and 12(21%) offered antiseptic application but all 57(100%) the provided vaccine irrespective of category of bite and rig administration were done in none. Completion of PEP prescription was observed only in 35% of records. No action was taken to reduce the animal bite incidence at the population within the preview of Primary Health Centres

Conclusion: District Health Authorities should take measures to improve data collection for action and appropriate treatment of animal bite cases at primary health centres.

Key Words: Rabies, Animal Bite, Surveillance, Primary Health Centres

Introduction

Rabies is an acute encephalitis caused by a lyssavirus infection and is almost always fatal once clinical signs appear.2 3 The incubation period of the majority of cases is 1–3 months, 4 however an incubation period longer than 1 year has also been documented.3 Rabies viruses belong, the Rhabdo viridae family and is an un segmented, single-stranded, negative sense, enveloped RNA virus.6 All mammals are susceptible to infection by the rabies virus (RABV). Transmission of RABV by dogs is responsible for up to 99% of human rabies cases in rabies-endemic regions, with a small proportion due to transmission via wildlife (such as foxes, wolves, jackals, bats, racoons, skunks or mongoose).7 Globally an estimated 59 000 human deaths and over 3.7 million disability-adjusted life years (DALYs) are lost every year.8 An estimated 20,000 rabies deaths and 17.4 million exposures to animal bite occur every year in India.9 Rabies occurs mainly in underserved populations, both rural and urban, with approximately 40% of cases in children aged <15 years.10 The comparatively long incubation period provides an opportunity for highly effective PEP. Also thorough wound washing with soap or detergent and

Corresponding Author:
Dr G.M. Venkatesh,
Associate Professor, # 66 Doctors Quarters, HIMS, Hassan. PIN; 573201
e-mail: drvenkateshgm@gmail.com
water and/or viricidal agents reduces the viral inoculum at the wound site. Antibodies induced by post exposure vaccination lower the risk of RABV entering peripheral nerves after a bite from a rabid animal. Additionally, timely administration of RIG neutralizes RABV at the wound site. Prompt PEP following severe exposures is 100% effective in preventing rabies. However, delay in seeking PEP, improper wound care, unnoticed wounds, direct nerve inoculation, and lack of patient compliance with vaccination schedules, among other factors, contribute to PEP failure and subsequent death. Prevention of rabies relies heavily on the awareness of at-risk populations about the disease. Efforts to promote awareness should include education, engagement with relevant sectors on animal bite prevention, responsible dog ownership and prompt first aid after exposure. WHO and its partners have endorsed a target of Zero Human Rabies Deaths from dog-transmitted rabies by 2030 (Zero by 30). Which requires accurate data for setting regional, national and local priorities for control programmes. Surveillance covering rural and marginalized populations, with emphasis on improving PEP utilization and patient compliance with PEP regimens should be available at Primary Health Centres as animal bite patients report to primary health centres for PEP.

Need for the Study

Also, primary health centres record and report surveillance information to IDSP for action. As animal bite surveillance provides the first step in identifying the need to prevent animal bite and rabies in humans, this study is undertaken to explore the quality of surveillance data available at primary health centres.

Material and Method

A Cross sectional study was carried out among the primary Health Centres of Hassan District to examine the surveillance data recorded / captured at the centres. Hassan District has 8 talukas and 134 Primary Health Centres. The no of centres to be included was calculated using a sample size calculator at 80% Confidence Interval using the Sample size formula of \( n = \frac{\text{DEFF} \times N \times p(1-p)}{\left(\frac{d^2}{Z^2}\left(1-\alpha/2\right)\right) + p(1-p)} \), the calculated number was 57. We selected 7 Primary Health Centres from each of the eight talukas across the district. After enumerating the number of centres to be visited, based on the feedback of animal bite case load that was available at the district IDSP office, these centres were visited along with district IDSP officer, and data was collected through record review and interview from the designated staff on a predesigned Proforma. After obtaining the information the data was entered excel format and analysed and expressed as percentages. Ethical Approval was taken from the Institutional Ethics Committee.

Findings: A total of 57 (100%) units were enrolled into our study. The mean population covered by these Health Centres were 14715, SD 9927. All the units had animal bites reported and managed. The mean annual dog bite cases reported in these centres was 103, SD 181. All 57 (100%) of the units recorded the demographic information such as name, age and sex of the bite victim and address of the victims. None recorded the place of bite and 53(92%) recorded the animal biting the victim and details of biting animal was of interest to only 10(17%) and only 1(2%) of them made an attempt to understand if the biting animal was rabid. None of the centres recorded the wound site and characteristic of the wound as aberration and laceration and only 19(33%) classified the wound into 3 categories. Only 2(3%) of centres advised wound wash and 12(21%) offered antiseptic application but all 57(100%) the centres provided vaccine irrespective of category of bite and rig administration were done in none of the bite victims but were referred to district hospital. Completion of PEP prescription was observed only in 35% of records. No action was taken to reduce the animal bite incidence at the population within the preview of Primary Health Centre.
Table 1: Distribution of Primary Health Centres according to Surveillance Data

<table>
<thead>
<tr>
<th>SLNo</th>
<th>Surveillance Data</th>
<th>No. of Centres N=57 (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Name</td>
<td>57( 100)</td>
</tr>
<tr>
<td>2</td>
<td>Age</td>
<td>57 (100)</td>
</tr>
<tr>
<td>3</td>
<td>Sex</td>
<td>57( 100)</td>
</tr>
<tr>
<td>4</td>
<td>Education</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Occupation</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Place of Bite</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>Biting Animal</td>
<td>53(92)</td>
</tr>
<tr>
<td>8</td>
<td>Type of Animal Stray/Pet/Wild</td>
<td>10(17)</td>
</tr>
<tr>
<td>9</td>
<td>Provoked / Unprovoked Bite</td>
<td>2(4)</td>
</tr>
<tr>
<td>10</td>
<td>Fate of Animal. Killed /Alive/Sick/ Not Traceable</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>Classification of Animal</td>
<td>1(2)</td>
</tr>
<tr>
<td></td>
<td>Suspected Rabid</td>
<td>1(2)</td>
</tr>
<tr>
<td></td>
<td>Conformed Rabid</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Wound description</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No of Wound</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Site</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Type</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>Classification of Bite</td>
<td>19(33)</td>
</tr>
<tr>
<td>14</td>
<td>Treatment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wound Wash</td>
<td>02(3)</td>
</tr>
<tr>
<td></td>
<td>Antiseptic</td>
<td>12(21)</td>
</tr>
<tr>
<td></td>
<td>Vaccine</td>
<td>57(100)</td>
</tr>
<tr>
<td></td>
<td>RIG</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>Vaccination</td>
<td>57(100)</td>
</tr>
<tr>
<td></td>
<td>Day 0</td>
<td>57(100)</td>
</tr>
<tr>
<td></td>
<td>Day 3</td>
<td>52(92)</td>
</tr>
<tr>
<td></td>
<td>Day 7</td>
<td>47(82)</td>
</tr>
<tr>
<td></td>
<td>Day 28</td>
<td>20(35)</td>
</tr>
<tr>
<td>16</td>
<td>Action Taken</td>
<td>None</td>
</tr>
<tr>
<td>17</td>
<td>Annual number of Animal Bites</td>
<td>Mean =103</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sd ( 108)</td>
</tr>
</tbody>
</table>

Discussion

A total of 57 units were enrolled into our study. All the units had animal bites reported and managed. Animal bite management is important and should be available at our Primary Health Centre. A study done in 2004 estimated that the incidence of animal bites as 17.4 per 1000 population. However, 7 Animal bite cases per 1000 population in 2018 reporting to public health care facilities and the remaining got reported to private providers as revealed by Masti et al.\textsuperscript{18}
All 57 (100%) of the units recorded the demographic information such as name, age and sex of the bite victim and address of the victims but none recorded the place of bite, where as in a similar study conducted by Tapas Ranjan Behera et al, the place of bite was recorded in 30% of cases. This may be because the importance of the place is not known.

53(92%) recorded the animal biting the victim and details of biting animal was of interest to only 10(17%) and none of them tried to understand if the biting animal was rabid. However, Ramesh Masti et al in their study on rabies exposure through contact tracing in Bengalure reported that 69.5% of the bites were by stray dogs. This means that major proportion of animal bite are by dogs which are stray. only 1(2%) of them tried to understand if the biting animal was rabid, whereas Masti et al recorded 7.2% of their bite victims had exposure to 3 probable rabid dogs and 1 probable rabid cat. As animal with a sizable number are rabid documenting animal characteristics are important to eliminate rabies in India and globally.

None of the centres recorded the wound site and characteristic of the wound as aberration and laceration and only 19(33%) classified the wound into 3 categories. Whereas characterisation of wound is important for appropriate advice and prevention of rabies deaths.

Kaplan MM et al. (1962) recommended, vigorous wound wash with soap and water followed by local infiltration of wound with immunoglobulin to prevent rabies. However, only 2(3%) of patients received wound wash and 12(21%) wound care with antiseptic at our centres which is a poor practice compared to the practice in PHC/CHC of Orissa where 21% were advised wound wash and 50% received antiseptic application.

No action has been taken to reduce the animal bite incidences among the population with animal bite reporting. Though Hampson K et al. reported that the greatest impact on variation in estimated human rabies deaths were bite incidence, followed by the probability of receiving complete post exposure prophylaxis after a rabid animal bite.

Strength. A unique approach to understand the gaps in health system which can help us strengthen the health system and population health at large. Limitation: A cross sectional study.

Conclusion

This study revealed higher incidence of animal bite in the study setting. District Health Authorities should take measures to improve surveillance data at primary health centres and train Medical Officers to categorise the wound and use appropriate treatment modality and reduce the incidence of animal bite through community engagement initiatives.

Conflict of Interest – None

Source of Funding- self

Ethical Clearance –Ref No: IEC/HIMS/RR18/2-11-2018

References


17. Who: Weekly epidemiological record, no 16, 20 April 2018


Quality of Life of Retired and Employed Post – Retirement Professionals

Divi Tara¹, Mamata Mahapatra²
¹Ph.D Research Scholar, Amity Institute of Psychology and Allied Sciences, Amity University, Noida, Uttar Pradesh, ²Professor, Centre Head For Organisational Psychology Amity Institute of Psychology and Allied Sciences, Amity University, Noida, Uttar Pradesh

Abstract

The advent of global modernisation presents itself with multitudes of challenges for the growing elderly population one of which is the challenge of productive aging which inadvertently affects their overall quality of life. Many senior citizens are now engaging in work either in paid form or in volunteer work. Aligned to this view the present research was conducted in the Delhi/NCR region to study the quality of life of persons who are formally retired from work organisations and those who have attained re-employment post-retirement. The study consisted of a sample of sixty elderly persons aged between 58-80 years. The study applied a t- test to assess the average difference in the scores. The findings of the study revealed a significant difference in the quality of life of persons who were retired and for those employed post-retirement.

Keywords: Quality of life, Retirement, Post- Retirement Employment

Introduction

Global modernisation has put the society in a state of a constant flux with changing value systems and systems of family, profession, workplace and workplace culture. Adapting to these changing systems is still easier for the young, but for those who are set in their ways such as the silver citizens of the country it may pose a greater challenge. Quality of life as defined by the WHO is “an individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.”¹ A report jointly brought out by UNFPA (United Nations Population Fund, 2007)² and Help Age India stated “India has around 100 million elderly at present and the number is expected to increase to 323 million, constituting 20 per cent of the total population” (Tara D, 2017)³. Although many processes have been set in motion to help the aged cope with the today world, ageing still remains a natural and a gradual process bringing with it several complexities. These complexities may vary from physical ailments and suffering to mental and emotional changes in the state of mind of an individual.

Many organisations both in the private and government sectors are now extending the age of retirement age for their experienced and seasoned employees. In India big entrepreneurial organisations such as Reliance telecommunication group initiated this trend by increasing the retirement age of its employees from 58 years to 65 years (Gupta, 2013)⁴. Government bodies such as the All India Institute of Medical Sciences through their faculty association also reported a retirement extension from 58 years to 70 years (Sharma P., 2017)⁵. According to the United Nations 55 countries expect their older population (65 and above) to constitute to 20% of the total population, India being among them. Additionally, statistical reports have also estimated that the world’s population aged 65 & above will increase from 7.6% to 16.2% by 2050, implying that it would be double (Preeti Tarkar, 2016)⁶. Released by the (Central Statistics Office Ministry of Statistics and Programme Implementation Government of India, 2016)⁷ the latest reports show that 8.6% of the total population is of elderly persons in India, that is, any person aged 60 and above.

A news report drawing from the Census of India (2011) suggested that the percentage of nuclear families existing in India is about 70%. Along with this, the report
also suggested a 33% increase in the number of single person households, which is anticipated to be greater than even the overall population growth (John Samuel Raja D, 2014)\(^8\).

Such situations have also brought about a change in the attitude of the elderly people of India. Many elderly suffer from ailments such as of heart, liver and lung apart from loss of vision and impairments in hearing, loss of control of motor activities etc. which leads to a feeling of loss in self – confidence, control and autonomy with age, which are directly related factors to the quality of life as it is a perception of one’s position in life. Thus the overall Quality of life for the elderly has been deteriorating despite the numerous medical advancements and technological achievements. Lack of government amenities and incapable institutions that are present in functioning for the elderly have compelled the senior citizen society to tackle this situation by involving themselves in engaging activities where they feel positive about themselves and that which boosts their self- esteem. Many elderly are often seen engaging in community welfare and development or joining clubs with fellow members of that age group. A report on the status of elderly people in India (Government of India, 2016)\(^4\) revealed that 28.5% of the total urban elderly population of India is also employed in formal sector jobs. Off- late the elderly are also seen joining work post- retirement either as an employee or even as a trustee/ volunteer/ supervisor.

**Review of Literature**

Discussed in the following part are some of the significant literature studies conducted on similar lines as the present research.

A health related quality of life survey was done among the elderly in northern India. The cross sectional survey consisting of hundred elderly from the urban area and hundred elderly from the rural areas were taken as sample. The study used the HRQOL and the Perceived health inventory (PHI). The results revealed that those in the lower age group, literates and urban residents held a higher quality of life. In addition to this those with a high personal income and living in larger households also had a higher quality of life than those who did not (Kamalesh Joshi, 2003)\(^9\). The preceding research sheds light on some more demographic factors affecting the quality of life of an elderly in India. Having a stable source of income even in old age also affects the quality of life led by the elderly.

A study analysis on the changing modern society and its impact on social life and mental well-being of elderly women was done on a sample of 120 women from six cities or urban Punjab. The study took into consideration both the positive and negative impacts of the changing scenario. The results of the study revealed the positive impacts on their social life were better communication systems and transport facilities. While the negative impact of the changing times on mental well- being were expressed through views of loneliness and a sense of alienation and lack of moral support (Bakshi, 2004)\(^10\).

Another research conducted in Hong Kong among the older Chinese population was aimed at understanding the demographic and psychological differences between older Chinese volunteer workers and non- volunteers (Anise M.S Wu, 2005)\(^11\). The results of the research showed that Chinese volunteers had higher educational attainment and reported better physical health, higher self-efficacy, greater life satisfaction and less psychological distress. Re- ensured self- efficacy through work and the perceived rewards of the work indicated a higher life satisfaction among the older Chinese volunteers as opposed to the non- volunteers.

A research paper based on the geriatric health in India; its concerns and solutions drew out the harsh reality of policy making and programme implementations by the Indian government over the last few years which has been overtly focussed on population stabilisation, disease control and maternal health. The researcher highlights that though these are important and crucial problems, the aging population also needs some changed reforms and policies to enable better living conditions rather than simply prolonging life expectancy (Gopal K Ingle, 2008)\(^12\).

An article highlighting the issues and problems of the elderly in India by HelpAge India in (2011)\(^13\) addressed the various challenges faced by the elderly population in India. It highlighted health facts about the Indian elderly such as that over 10% of the elderly population in India suffers from depressions. 6.5 million Elderly in India are blind due to cataract. Economic insecurity and lack of proper health and sanitation facilities are also a packaged problem faced by the elderly in India. In the urban areas elderly abuse was brought to light as a major
challenging factor faced by a majority of the elderly. In such stances autonomy and health and independence were also contributing factors to deteriorating quality of life among the elderly.

A study conducted among Canadian retirees was aimed at understanding the determinants to post-retirement employment. The study addressed the factors associated with post-retirement employment. The results indicated an increasing incidence of post-retirement employment. It was unveiled that higher education, age and the timing of initial retirement were determinant factors wherein persons who held a higher education degree were more inclined to joining work post retirement. Similarly persons who were sixty and close were more likely to be employed again as compared to persons aged seventy as above. Financial gains were other factors affecting the post-retirement employment (Hiscott, 2013).

A study conducted on the quality of life satisfaction and physical health determinants was conducted in Varanasi (Dharma raj, Prafulla kumar Swain et.al, 2014). The mean scores of quality of life satisfaction score dependent on various factors under the area of Physical Health, Interpersonal life, Economic status, Physical Environment were calculated. An aggregate of 166 elderly were incorporated into this investigation. Out of 166 elderly 121(72.89%) were Males and remaining were females. Loss of sight is the most prominent issue among the older. 61.45% of the elderly had a normal quality of life, where as 24.10% and 14.45% elderly had a poor and good quality of life individually. In conclusion there is a pressing need of social security in type of guaranteeing old age pension and obligatory medical coverage.

Another research aimed at understanding the factors affecting adjustment to retirement among retirees was done in Egypt. The study sampled two hundred and ten retired elderly who had been retired since one year and more. The data was collected using Retirement adjustment scale and retirement resources inventory. The results of the study concluded that adjustment to retirement was affected by the gender, marital status, level of education, type of job before retirement, job condition and place of work. In addition, adequate resources as physical, financial, social support and mental capacity were associated with a better adjustment to retirement (Fadila, 2016).

An analysis on post retirement intention to work was conducted examining the predictability of job related factors on future prospects of retirees in terms of their intention to work after retirement. The results indicated that intimacy with co-workers has the largest effect on the attitude of retirees towards work. Availability of jobs prospects also, full time and part time had a significant effect on the intention to work after retirement (Aruna Dhamija, et.al, 2016). It can be concluded from these findings that a positive attitude and acceptance of co-workers towards the retirees are dependent factors for retirees to re-gain employment.

A news article released by the All India Press Trust of India (Shekhar, 2018) on the lines of employment opportunities for the elderly community was published. The article claimed that during the course of the research 22% of the elderly interviewed cited a lack of gainful employment/engagement opportunity as the biggest problem to the declining health of the elderly. The respondents also stated being a burden and lack of autonomy and financial independence discouraged them. Amidst such negative feelings, it is not hard to comprehend a bleak future for the elderly of India.

Research Methodology

Objectives:

1) To study the Quality of Life of unemployed retired & employed post-retirement professionals.

Hypotheses:

There will be significant difference in Quality of Life of unemployed retired & employed post-retirement professionals.

Sample Size and Description:

A sample of sixty retired and employed post retirement professionals was taken from different communities and neighbouring societies and senior citizens welfare association groups & from different work organisations.

Procedure of data collection:

The researcher personally gave the questionnaires to the respondents after verbally taking informed consent and any queries that the Respondents had were clarified and explained by the researcher wherein the time convenience and schedule was selected by the
respondent.

**Tools Applied:**

The Quality of life measuring CASP-19 is a questionnaire developed by Richard D. Wiggins (2004) to measure the quality of life of the elderly. The questionnaire is based on four domains namely:

- Autonomy
- Control
- Pleasure
- Self-Realisation.

The capacity of a person to settle on his own choices and be free from the undesirable obstruction of others can be comprehended as ‘Autonomy’. ‘Control’ refers to the capacity of a person to effectively intercede in his condition. ‘Pleasure’ is a functioning procedure of being human. As such it very well may be comprehended as inferring joy and fulfilment. ‘Self-realisation’ alluding to Maslow can be characterized as the capacity of a person to utilize his full close to home potential and accomplish a condition of satisfaction. In otherworldly terms it very well may be comprehended as ‘satisfaction without anyone else of the conceivable outcomes of one’s character.’

**Results and Discussion**

The data was analysed in a two-step procedure. First the average for thirty responses in each of the groups was calculated. Then a T-test was applied to obtain the level of significance and the difference.

Table. 1 Displays the average and the significant difference of the data N=60

<table>
<thead>
<tr>
<th>Average</th>
<th>Quality of Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed Post- Retirement</td>
<td>46.3</td>
</tr>
<tr>
<td>Retired</td>
<td>41</td>
</tr>
<tr>
<td>t-test scores</td>
<td>0.029</td>
</tr>
</tbody>
</table>

*The results are significant at .01 level

**The results are significant at .05 level**

The results conclude that there is a significant difference in the quality of life of persons who are re-employed post retirement and unemployed retired persons. Persons who are working again after retirement seem to have a significantly better quality of life.

Being employed may give a sense of autonomy over the life choices and lifestyle one has lived in and with pressing ailments any change in that lifestyle of an elderly individual may lead to a feeling of helplessness which may further lead to bleaker path. Thus employment post retirement may give a feeling of autonomy and independence in a both physical and economic sense. In comparison to those individuals who are retired taking up an employment opportunity may also give a sense of control and can help in alleviating the stress of modern day life and challenges. Having attained a sense of financial, physical and social independence it leaves room for a person to enjoy the joys of life and gain more pleasure in life. Employment opportunities at an age where one’s social roles may be confusing and the norms of the society are laid down, it can help one gain perspective about their life and may lead to a more self-fulfilling life. It may encourage one to do more to the best of their capabilities.

Thus the quality of life or personal satisfaction may be dependent on external factors such as financial security, attaining perfect health or having a social environment but are also dependent on the way one perceives his or her own life in the midst of these external influencers.

**Conclusion**

The results help make a fair assumption that having a work role indeed has helped define social and personal identities of the aging citizens and have in fact made better the quality of life of these citizens.

**Ethical Clearance** - Amity Institute of Psychology and Allied Sciences, Amity University

**Source of Funding** - Self

**Conflict of Interest** - Nil

**References**


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Neha Mishra¹, Sheela Misra²
¹Research Scholar, ²Professors & Head Department of Statistics, University of Lucknow

Abstract

Introduction: Mortality rates not only reflect a country’s health status, level of socio-economic development and quality of life. Child mortality is considered as both, a health indicator and also as a fundamental measure of human development. The levels of under-five mortality have been very high in India. Over past few decades the country witnessed reductions in mortality rate at almost all ages. Under-five mortality rate (U5MR) declined from 200 per 1000 live births in 1960’s to the level of 118 in 1990, 49 in 2013 and 50 in 2015 of India. However in Empowered Action group states of India U5MR not declining as much we needed to achieve sustainable development goals of U5MR for India.

Material & Method: Data has been taken from National family Health Survey (NFHS-4) for Empowered Action group (EAG) states of India. Our objective of this study to estimate average survival time of under-five children of EAG states of India. For the estimation of mean survival time we have used Kaplan Meier survival product limit estimation method. Distributions among different mean survival time were compared by log rank test.

Results: This analysis was includes 157358 live births of EAG states of India. We were found highest mean survival time in Jharkhand 549.92 (95% CI: 543.72-556.12), Odisha 549.72 (95% CI: 543.79-555.65), Bihar 549.45 (95% CI: 545.61-553.29), Assam 545.88 (95% CI: 540.61-551.15) and Uttarakhand 545.98 (95% CI: 537.59-554.36). However low mean survival estimates were observed in state Uttar Pradesh 537.76(95% CI: 534.84-540.68), Chhattisgarh 536.79 (95% CI: 530.67-542.90) and Madhya Pradesh 539.79 (95% CI: 535.27-544.32). A significant difference was found among survival distributions associated determinants of under-five mortality (p=<0.0001).

Conclusion: The reduction of under-five mortality and achieve the sustainable development goals we would enhance the child survival programmes in empowered action groups states of India. It will help to increase the survival time of under-five children.

Keywords: EAG, U5MR, NFHS, child survival.

Introduction

India, the largest democracy of the world, is also largest number of children in the world. About 1.83 million children die annually in India before completing their fifth birthday and most of them die due to preventable causes¹. Although at national level U5MR has declined, there are many states whose U5MR is greater than the national average. Though the mortality in India has been declining over the last few decades, the rate of reduction is not fast enough. India still contributes to more than 20% of child deaths in the world². The Millennium Development Goals (MDG), in the year 2000, world leaders agreed to set of 8 goals and 48 indicators; one of them was to reduce the under-five...
mortality and infant mortality rate by two-third at the end of 2015. The global under-five mortality per 1000 births has been declined from 91 in 1990 to 43 in 2015\(^3\). In the year 2016 world leaders adopted 17 Sustainable Development Goals (SDG) and 169 indicators to achieve by 2030 with an agenda of sustainable development. The third goal of Sustainable Development Goals focuses to ensure healthy lives and promote well-being at all ages. In these goals, there are wide range of indicators indicating the quality life and one of the indicator is to reduce under-five mortality to as low as 25 per 1000 live births by the year 2030\(^4\). According to National Family Health Survey (NFHS) fourth round it is estimated that under-five mortality of India is 50 per 1000 live birth in the year 2015-16\(^5\). Even though the after MDG the acceleration of under-five mortality has increased but with the current rate of decline India, may not meet their current goals of SDGs. As per data of NFHS-4 some states including Union Territories (UTs) like Goa, Kerala, Manipur, Tamil Nadu and Andaman are already near to SDGs but Empowered Action Group (EAG) States Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttarakhand and Uttar Pradesh are still far away from the goal of SDGs. In order to meet the required goal and to achieve the SDGs agenda by year 2030, the under-five mortality in India has to be critically studied. Under-five mortality is a leading indicator of child health and overall development of a nation, as it reflects the social, economic, environmental conditions in which children live, including their healthcare\(^6\). The present study which was based on for estimation of average survival time of under-five children EAG states of India.

**Material & Method**

**Data Management:** The present study used data from fourth round of National Family Health Survey EAG states of India\(^6\). NFHS-4 was taken information on 1,315,617 children born of 699,686 women in 601,509 households with a response rate of 98%. The NFHS-4 provides information on fertility, mortality, family planning, and important aspects of nutrition and health. For this study we used live births of preceding five years which has been extracted from birth history of children EAG states of India.

**Objectives:** For this study our primary objective is to estimate mean and median survival time for the determinants which is directly and indirectly affect the under-five mortality EAG states of India. Secondary objective is to compare all survival distributions of different determinants of under-five mortality.

**Dependent variables:** Under five mortality as the probability of dying children before the fifth birthday.

**Independent variables:** considered were mother’s age at the time of child birth (15-19, 20-29, 30+ yr), gender of the child (female /male), birth order (1, ≥2 ), mothers education (illiterate, literate); place of residence ; (rural / urban ), wealth status (poor/ rich); sanitation facility (unsafe /safe); cooking fuel (unsafe /safe); drinking water (unsafe /safe).

**Statistical Analysis:** We have taken failure or dependent variable as death of children before completing five years of age. Independent covariates were assumed on the basis of Mosley and Chen framework of socio demographic determinants for child survival\(^9\). For the estimation of mean and median survival we have used Kaplan Meier Survival product limit estimation method\(^10\). Here, we estimated survival time in century month code (cmc) which was based on birth history of preceding five years of live births. In this study we have observed more censored events occurred so we could not able to estimate median survival estimates for some covariates of under-five mortality of children. After that for comparison of their survival distribution of different covariates of under-five mortality used Log rank test\(^11\). For the survival probability graphs for some covariates we also used Kaplan Meier method. Nelson Aalen method used for the cumulative hazard estimates plot which shows hazard of under-five mortality EAG states of India. All statistical Analysis was performed on STATA 13.0 version\(^12\). A p value is less than 0.05 has been taken as a statistical significant.

**Results**

A total of 157358 live births were included in this study from EAG states of India. Out of them 8654 number of events (under-five mortality) occurred in preceding five years of birth history. Firstly we found mean survival estimates with 95 % CI for determinants of under – five children. We observed mean survival range (537.76-545.98) of children. Majority of states had mean survival of under – five children more than 545. Highest mean survival 549.92 (95 %CI: 543.79-555.65) was reported in state Odisha however minimum mean survival 537.76 (95 %CI: 534.84-540.68) was found.
in Uttar Pradesh. Mean survival range of the children under-five whose mothers were aged 20-29 years, was 353.05 (95 % CI: 352.90-353.19), less mean survival range 237.51 (95 % CI: 237.34-237.68) was found in the children of the mothers aged 15-19 years and mothers who were above 30 years had 560.39 (95 % CI: 558.65-562.13).

Higher survival mean was reported in the female children 560.39 (95 % CI: 558.65-562.13) as compared to male children 544.22 (95 % CI: 541.90-546.54). Children who were residing in urban place had higher mean survival estimates 551.01 (95 % CI: 546.05-555.98) as compared to children living in rural areas 542.93 (95 % CI: 541.14-544.73). On comparison of the educational status of the mothers, children whose mothers were literate had more mean survival rate 545.57 (95 % CI: 543.68-547.45) than children of the illiterate mothers 543.11 (95 % CI: 538.76-547.46). Less mean survival rate was reported in the children who had first birth order 518.44 (95 % CI: 514.53-522.35) and comparatively higher mean survival rate 550.90 (95 % CI: 549.07-552.73) was noted in the children of second birth order.

Children whose mothers were severe anemic had less mean survival rate 521.84 (95 % CI: 510.32-533.35) which followed by moderate anemia 539.79 (95 % CI: 535.73-543.84), mild anemia 547.95 (95 % CI: 545.33-550.57) and non-anemic 542.62 (95 % CI: 539.96-545.27) mothers.

Lower mean survival rate 543.11 (95 % CI: 541.25-544.97) was reported in poor children as compared to the rich 545.34 (95 % CI: 541.26-549.42).

We also found mean survival estimates for environmental factors like water facility, toilet facility and type of fuel have been used in households. Less mean survival 541.90 (95 % CI: 542.90-546.45) was reported in the children who had unsafe water facility as compared to using safe facilities 544.68 (95 % CI: 542.90-546.45). Similarly, we found less mean survival in children who were using unsafe toilet facility and type of fuel.

However, more censored events occurred in this study we could not find out median survival estimates of few variables. We also found highest median survival in state Odisha 594 (95 % CI: 564.07-623.92) and lowest in state Assam 585 (95 % CI: 566.39-603.61).

Lower mean survival rate was found in the mothers aged 20-29 years as compared to the mothers who were above 30 years 594 (95 % CI: 587.98-600.02). Lower median survival rate 589 (95 % CI: 581.96-596.04) was found in male children as compared to the females 594 (95 % CI: 587.19-600.81). Due to excessive censoring, we could not estimate median survival for Urban children and for rural children median survival time was 589 (95 % CI: 584.34-593.66).

On comparing the educational status of the mothers, higher median survival 590 was found in the educated mothers however comparatively less median survival was observed in the illiterate mothers 586.

Children who were born with first birth order had less median survival 560 and higher median survival was found in the children with second or more birth order 595. Poor wealth children had less median survival 589 (95 % CI: 583.17-594.83) as compared to rich wealth children 594 (95 % CI: 571.57-616.42). Among environmental factors, water facilities, toilet facilities and safe practices of using fuel had higher median survival for children. Distributions among different mean survival time were compared by log rank test.

A significant difference (p <0.0001) was found on comparing the survival distributions of EAG states of INDIA such as age-Group of the mothers (In Years), gender of child, place of residence, educational status of mothers, birth order, anemia levels of mothers, wealth status, water facility, toilet facility and type of fuel.
Discussion

In this present study we have estimated average survival time of under-five children EAG states of India. Few EAG states were found very poor child survival time. We have observed that mother’s age is most prominent factor to affect the survival time of children. In both the estimation mean and median mother’s age 15-19 age were found least child survival time as compared to other age-groups. First birth ordered children also having less survival time compared to other second and more order of birth. This study also found children living in household with poor wealth status were less mean survival than those living in rich wealth status. Median survival time of male and female children also found dissimilar. Similar studies were observed with same findings of under-five mortality. In environmental factor we had seen that limited access safe water, safe toilet facility, and safe fuel were affecting factors of under-five mortality. Furthermore, children living in rural areas were found with less survival time than those living in urban places. Most of previous studies were based on identify the risk
of under-five mortality of associated determinants of mortality. However present study was focused only non-parametric method Kaplan Meier survival estimation and Log rank test. We can conclude that proper steps can be taken both at individual family and community levels in any planning for child survival programmes in all EAG states of India.

**Ethical Clearance:** The study is based on an anonymous publicly available NFHS -4 data; no ethics statement is required for this study.

**Funding:** No funding was available for this study.

**Competing Interest:** No competing interest exists.

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Neurobehavioral Effects of Losartan on Rotenone Induced Parkinsonism in Rats

Prakash KG1, Bannur BM2, Madhavrao C3, Saniya K4

1Professor and Head, Department of Anatomy, Azeezia Institute of Medical Sciences and Research, Kollam, Kerala, India, 2Professor and Head, Department of Anatomy, BLDEU’s Shri B M Patil Medical College, Vijayapura, Karnataka State, BLDE University, Bijapur, 3Professor, Department of Pharmacology, Azeezia Institute of Medical Sciences and Research, Kollam, Kerala, India, 4Assistant Professor, Department of Anatomy, Azeezia Institute of Medical Sciences and Research, Kollam, Kerala, India

Abstract

Background and Objectives: Reticular activating system is increasing implicated as new target for therapeutic approaches in Parkinsonism. The objective of the present study was to evaluate the neurobehavioral effects of losartan in rotenone rat model of Parkinson’s disease.

Methodology: Adult Wistar albino rats were divided into four groups of six each. Parkinsonism was induced with rotenone (3 mg/Kg intraperitoneal) in three groups. One group (positive control) was treated with levodopa (12 mg/Kg) and Benserazide (3 mg/Kg). Other group (losartan group) was treated with losartan (90 mg/Kg). Motor functions were evaluated by rota rod test and spontaneous locomotor activity. Exploratory behaviour was evaluated by hole board test. Depression influences on behaviour was studied with forced swim test. Elevated plus maze test was used for analysing anxiety influences on behaviour.

Results: The mean time of losartan pre-treated rats that stayed in the accelerating rota rod was significantly shorter compared the control, rotenone and levodopa group. Locomotor activity as measured by actophotometer was significantly decreased in the losartan group rats. The time spent by losartan group rats as immobile in water was significantly higher than the other groups. Losartan group rats had significantly higher number of head dipping in the hole board test. There was no significant change in the open arm activity both in duration and in number of entries among rats treated with levodopa and losartan.

Conclusion: Losartan improves neurobehavioral indicators in rotenone rat model of Parkinson’s disease.

Key words: angiotensin receptor blocker; parkinsonism; renin angiotensin system; behavioural study

Introduction

The progressive degeneration of dopaminergic neurons in substantia nigra pars compacta is the established neuronal change in the Parkinsonism. Neuroinflammatory processes accelerate the process of neuronal loss, oxidative injury resulting in alterations in mitochondrial membrane permeability, enzyme metabolism and mitochondrial genome changes.1 the symptomatic triad of bradykinesia, tremors-at-rest, and rigidity occur. Progressive neurodegeneration may also impact non-DA neurotransmitter systems including cholinergic, noradrenergic, and serotonergic, often leading to the development of depression, sleep disturbances, dementia, and autonomic nervous system failure. L-DOPA is the most efficacious oral delivery treatment for controlling motor symptoms; however, this approach is ineffective regarding nonmotor symptoms. New treatment strategies are needed designed to provide
neuroprotection and encourage neurogenesis and synaptogenesis to slow or reverse this disease process. The hepatocyte growth factor (HGF In addition to these mechanisms the brain renin angiotensin system (RAS) maintaining the body water balance, blood pressure, sexual behaviours and pituitary glandular secretions with influences in the learning and memory functions of the brain has been repeatedly established.2 This brain RAS system plays a role in pathogenesis of certain neurodegenerative disorders like Alzheimer’s disease1 and Parkinson’s disease.5,6 Angiotensin II acts on the certain areas of the brain influencing the drinking behaviour and natriuresis.6 It stimulates the vasopressin release, modulate the sympathetic outflow and decrease the baroreceptor reflex.7 It is postulated that most of these effects are through AT1 receptors. Animal studies have added the necessary evidence to the notion that AT1 receptor influences the cell proliferation, water intake and blood pressure.7,8 Angiotensin II can stimulate catecholamine release through AT1 receptor stimulation.9 Rodent studies have also shown that angiotensin receptor binding in substantia nigra pars compacta and bring about presynaptic effects in the dopaminergic neurons in the region.10–12

Studies have shown that losartan, the antagonist of AT1 receptor, protects dopaminergic neurons against 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) toxicity both in primary ventral mesencephalic cultures as well as in the substantia nigra pars compacta of mice.13 Few interventional trials in atypical Parkinsonism have also ascribed promising role for losartan in neuroprotection.14 Effects of losartan on midbrain dopaminergic neurons against rotenone-induced cell death has been positive.15 Another AT1 receptor blocker, candesartan, has shown promising results in rotenone rat model of Parkinson’s disease.16 However, the neuroprotective role of losartan in rotenone rat model has not been established.

The objective of the present study was to evaluate the neurobehavioral effects of losartan in rotenone rat model of Parkinson’s disease.

Methodology

Animals and groups

Healthy adult Wistar albino rats of either sex weighing 180-250g were selected and divided into four groups. All rats were obtained from animal house, BLDEU’s Shri B M Patil Medical College, Vijayapura, Karnataka state & KMCH College of Pharmacy, Coimbatore, Tamil Nadu. Institutional animal ethics committee, BLDEU’s Shri B M Patil Medical College, Vijayapura, Karnataka state, (with CPCSEA, India registered) (approval letter number: 33/16, dated-16.01.2016) and also Institutional animal ethics committee, KMCH College of Pharmacy, Coimbatore, Tamil Nadu, (approval letter number: KMCRET/PhD/21/16-17, dated-22.02.2016) approved the study before the start of the study.

Table 1: Four groups (each having 6) of rats that were used in the study (n=36).

<table>
<thead>
<tr>
<th>Groups</th>
<th>Group specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>Control group - Equivalent normal saline i.p</td>
</tr>
<tr>
<td>Group 2</td>
<td>Negative control: Rotenone [3 mg/Kg BW i.p]</td>
</tr>
<tr>
<td>Group 3</td>
<td>Positive control: Levodopa [12 mg/Kg] and Benserazide [3 mg/Kg BW i.p] + Rotenone [3 mg/Kg BW i.p]</td>
</tr>
<tr>
<td>Group 4</td>
<td>Losartan 90 mg/Kg BW i.p + Rotenone [3 mg/Kg BW i.p]</td>
</tr>
</tbody>
</table>

Parkinson’s disease induction with end points

All rats were divided into four groups having six each (table 1). Three groups underwent Parkinsonism induction with rotenone. The Rotenone (Sigma Chemicals, Mumbai) solution was freshly prepared at 3 mg/kg. The Rotenone was dissolved in dimethylsulfoxide and adjust to pH 7.4 with potassium hydroxide. Rotenone injected i.p at the dose of 3 mg/kg body weight, 7 days. The solution was used immediately after preparation as it was stable only for a period of 24 hours at 25°C. All the rats were monitored with a check list twice daily for the appearance of parkinsonian features, bradykinesia, postural instability, gait disturbance and rigidity.

Animals that died after the intraperitoneal injection were excluded from the analysis. Animals that failed to experience the parkinsonian symptoms were also excluded.

Animals that died within minutes of an injection and that did not experience parkinsonian symptoms were excluded from analysis.
Group 4 rats were given losartan (90mg/kg body weight) intraperitoneally for 7 days. All animals that did not survive 7 days of intraperitoneal injections were excluded from the study.

**Behavioural Analysis**

Motor functions were evaluated by rota rod test and spontaneous locomotor activity. Exploratory behaviour was evaluated by hole board test. Depression influences on behaviour was studied with forced swim test. Elevated plus maze test was used for analysing anxiety influences on behaviour.

Rotarod test\(^2\) largely replacing rats as the behaviorist’s animal of choice. Before aspects of behavior such as emotionality or cognition can be assessed, however, it is vital to determine whether the motor capabilities of e.g. a mutant or lesioned mouse allow such an assessment. Performance on a maze task requiring strength and coordination, such as the Morris water maze, might well be impaired in a mouse by motor, rather than cognitive, impairments, so it is essential to selectively dissect the latter from the former. For example, sensorimotor impairments caused by NMDA antagonists have been shown to impair water maze performance\(^2\) . Motor coordination has traditionally been assessed in mice and rats by the rotarod test, in which the animal is placed on a horizontal rod that rotates about its long axis; the animal must walk forwards to remain upright and not fall off. Both set speed and accelerating versions of the rotarod are available. The other three tests described in this article (horizontal bar, static rods and parallel bars): Motor co-ordination test was conducted by placing the rats on the horizontally placed rotating rod. The time taken by animals to fall from the rotating rod was noted. The length of time (duration) the animal stay on the rod without falling, gives a measure of their coordination, balance, physical condition and motor-planning.

**Spontaneous locomotor activity**\(^1\). Spontaneous horizontal activity was measured using actophotometer that operates on photoelectric cells connected with a counter. All the rats were placed individually in the activity cage for 3 min to habituate them before starting actual locomotor activity task for the next 3 min. the basal activity score was noted. Counts per ten min is used as an index of locomotor activity.

**Hole board test**\(^1\). Rats were placed on a 25 cm elevated wooden board (40 cm X 40 cm) with 16 holes. A head dipping is counted when the animal introduces its head into any hole of the box up to the level of the ears. Decrease in anxiety shows increased exploration of the holes.

**Forced swim test**\(^\text{20}\): Rats were forced to swim in a glass cylinder (20 cm height, 14 cm diameter) containing 10 cm depth of water. Animal were considered to be immobile, when they made no further attempts to escape except the movements necessary to keep their heads above the water. The time spent by the rat as immobile in water represented the measure of depression – like behaviour.

**Elevated plus maze test**\(^\text{21}\): The rats were placed at the junction of the maze with four arms, facing an open arm. The duration in each arm were recorded by a video tracking system and by an observer simultaneously for 5 minutes. The duration of the test period was 10 minutes, the number of entries into the open arm, number of entries into the closed arm, the time spent in open arm, and closed arm were noted.

**Statistical analysis**: The data obtained was expressed as mean ± standard deviation. Comparison of the data was done by one way ANOVA, followed by Dunnett comparison. P value of less than 0.05 was taken as significant.

**Results**

Table 2 shows the tabulation of all the parameters observed. Motor co-ordination and balancing was tested with rota rod test. The mean time of losartan pre-treated rats that stayed in the accelerating rota rod was significantly longer compared the control, rotenone and levodopa group. Particularly, the latency to the fall in losartan group was increased gradually as early as 7 days of losartan treatment. Locomotor activity as measured by actophotometer was significantly increased in the losartan group rats. The time spent by losartan group rats as immobile in water was significantly lower than the other groups. Indicating the drug used in the rats has taken away depression like behaviour. Losartan group rats had significantly higher number of head dipping in the hole board test, indicating the decrease in anxiety among these rats. There was no significant change in the open arm activity both in duration and in number of entries among rats treated with levodopa and losartan.
Table 2: Neurobehavioral effects of losartan among various groups of rats; mean ± standard deviation from each group of six rats each. *** p <0.001 and *p<0.01

<table>
<thead>
<tr>
<th>Groups</th>
<th>Control group</th>
<th>Rotenone group</th>
<th>Rotenone + levodopa group</th>
<th>Rotenone + losartan group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rota Rod test (in seconds)</td>
<td>Before</td>
<td>166.5 ± 3.4</td>
<td>172.5 ± 2</td>
<td>167.5±3.2</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>164.8 ± 4.5</td>
<td>103.67±8.20***</td>
<td>159.3±2.2</td>
</tr>
<tr>
<td>Actophotometer (number of counts/10 min)</td>
<td>Before</td>
<td>502.3 ±19.3</td>
<td>494.3 ± 13.1***</td>
<td>444.5 ± 15*</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>469 ± 8.1</td>
<td>184 ± 9</td>
<td>436.8 ± 18***</td>
</tr>
<tr>
<td>Forced swimming test (in seconds)</td>
<td>Before</td>
<td>149.3 ± 2</td>
<td>151.8 ± 3.1</td>
<td>151.8 ± 3.5</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>151.6 ± 1</td>
<td>92.5 ± 4.6 ***</td>
<td>156.3 ± 2.1</td>
</tr>
<tr>
<td>Hole board test (number of times head dipping in the hole / 4 min)</td>
<td>Before</td>
<td>16.1 ± 1.5</td>
<td>16.1 ± 1.3</td>
<td>15.6 ± 0.5</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>14.6 ± 0.9</td>
<td>10.5 ± 0.6 ***</td>
<td>23.8 ± 1.2</td>
</tr>
<tr>
<td>Elevated plus maze test (number of entries in open arm)</td>
<td>Before</td>
<td>132.3 ± 5.8</td>
<td>121.1 ± 8</td>
<td>118 ± 3.1</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>114.3 ± 3.6</td>
<td>80.1 ± 3.6***</td>
<td>149.8 ±7.5</td>
</tr>
<tr>
<td>Elevated plus maze test (time spent in open arm)</td>
<td>Before</td>
<td>183 ± 4.03</td>
<td>152.1±17.7</td>
<td>149.67±6.6</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>178.5 ± 11.4</td>
<td>124.3±3.3*</td>
<td>153.5 ± 3.1***</td>
</tr>
</tbody>
</table>

Discussion

Animal studies and clinical trials using losartan reported to have variable effects on dopaminergic function in substantia nigra pars compacta. 22 Physiological and functional studies suggest that the brain renin-angiotensin system (RAS) is constant addition of evidence to establish a stronger association of brain RAS system with neurodegenerative disorders. 1,4,14,16,22 The symptomatic triad of bradykinesia, tremors-at-rest, and rigidity occur. Progressive neurodegeneration may also impact non-DA neurotransmitter systems including cholinergic, noradrenergic, and serotonergic, often leading to the development of depression, sleep disturbances, dementia, and autonomic nervous system failure. L-DOPA is the most efficacious oral delivery treatment for controlling motor symptoms; however, this approach is ineffective regarding nonmotor symptoms.

New treatment strategies are needed designed to provide neuroprotection and encourage neurogenesis and synaptogenesis to slow or reverse this disease process. The hepatocyte growth factor (HGF) on the contrary, a case report highlighted worsening of Parkinson symptoms with losartan. 23 However, the angiotensin receptor blockers are here to stay and continue to be experimented for the possible neuroprotective roles.

In the present study, the behavioural changes were observed even with a seven day administration of losartan to the rats that were induced with parkinsonism with rotenone. Rota rod rest and spontaneous locomotor activity evaluated motor functions. The losartan treated rats showed significant improvement in the motor functions. Similar improvement in the motor actions were noted in rats treated with Pseudoginsenoside in MPTP model. 24
Hole board test evaluated exploratory behaviour in rats. Losartan treated rats had significantly higher head lowering exploratory activity indicating decrease in anxiety. Depression influences on behaviour was studied with forced swim test. Elevated plus maze test was used for analysing anxiety influences on behaviour. In the present study, the elevated plus maze test has no significant differences among rats treated with levodopa and losartan.

Overall, as there was significant improvement in the neurobehavioral activity among rats treated with losartan. Similar neuroprotective role is seen with candesartan and Azilsartan. Our study results are in line with many previous studies using captopril, perindopril, enalapril and moexipril in neuroprotective actions.

**Limitations of the study**: administration of losartan for more duration would have resulted in more pronounced and equivocal neurobehavioral changes. A study design to note the specific nigrostriatal loss of neurons, either microscopic evaluation or molecular evaluation of apoptotic indicators would have resulted in unambiguous outcomes with regard to neuroprotection.

**Conclusions**

Losartan improves neurobehavioral indicators in rotenone rat model of Parkinson's disease

**Acknowledgement**: The authors thank the animal house in-charge of BLDEU’s Shri B M Patil Medical College, Vijayapura, Karnataka state and also the animal house, KMCH College of Pharmacy, Coimbatore, Tamil Nadu.

**Conflict of Interest**: Authors declare no conflict of interest

**Funding**: Nil

**Ethical Clearance**: Institutional animal ethics committee, BLDEU’s Shri B M Patil Medical College, Vijayapura, Karnataka state, (with CPCSEA, India registered) (approval letter number: 33/16, dated-16.01.2016) and also Institutional animal ethics committee, KMCH College of Pharmacy, Coimbatore, Tamil Nadu, (approval letter number: KMCRET/PhD/21/16-17, dated-22.02.2016) approved the study before the start of the study.

**References**


An Ensemble Model for the Prediction of Gestational Diabetes Mellitus (GDM)

Prema N S¹, Pushpalatha M P²

¹Associate Professor, Department of Information Science and Engineering, Vidyavardhaka College of Engineering, Mysuru-02, India, ²Professor, Department of Computer Science and Engineering, Sri Jayachamarajendra College of Engineering, Mysuru-06, India

Abstract

Diabetes is the common chronic disease and a major health challenge in all population. Gestational Diabetes Mellitus (GDM) is a type of diabetes developed in women at the time of pregnancy. Our study is about predicting GDM by considering various risk factors using ensemble classification techniques. In this paper different ensemble learning models are used for prediction of GDM. A new ensemble model is proposed where ensemble stacking is done for the results of k-means clustering. Where clustering is done by excluding the class attribute of the data set. The data samples used for testing the model is collected from the local hospitals of Mysuru, Karnataka state, India. The performance of the classifiers have been measured and compared in terms of accuracy.

Keywords: Gestational Diabetes Mellitus, SMOTE, Ensemble, Stacking, k-means. KNN, RandomForest, Logistic Regression

Introduction

It is estimated that complications of pregnancies by diabetes mellitus is one out of every 200 and in every 200 pregnant women five will develop GDM. Globally prevalence of diabetes is increasing and India is no exception. Four million women have GDM in India alone. So it is important to identify the GDM at the earliest; else it threatens lives of mother and baby¹.

The factors for increasing prevalence of GDM in India are;

- The age of the women
- Obesity
- Lack of physical activity
- Modern lifestyles, smoking, alcohol consumption etc.

Diagnosing a pregnant woman with GDM is very important because diabetes mellitus is associated with significant metabolic alterations, increased perinatal mortality and morbidity, maternal morbidity and exaggerated long span illness among the mothers and their off springs². Since there is a scarce of healthcare resources and medical practitioners and patient’s ratio is low, providing value care is very challenging task.

To meet the trial of saving lives we provide a combined e-health solution – using Clinical Decision Support System (CDSS) which is based on data mining, which analyzes the patient’s data and classifies as either normal or high risk.

Data mining is the process of extracting useful knowledge from large data repository. Medical data mining is one of the applications of data mining, where analysis of medical data is done using different data mining techniques. Medical data mining approaches are applied for the following tasks: diagnosis, treatment, prognosis, monitoring and management. The aim of medical data mining is to help and assist physicians, improve public health and support patients.
The main two approaches of data mining are prediction and description. Prediction includes classification and regression whereas description includes cluster analysis and association analysis. Applications of both in the field of healthcare can be found in literature.

In most of the work referred in this paper, the data set used is the Pima Indian diabetes data set from UCI machine learning repository which contains data about female patients. Many classification algorithms are applied on Pima diabetes data set. Their objective is to classify the data into either diabetic or non-diabetic and they have considered only Type-I and Type-II diabetes they have not taken gestational diabetes into consideration.

To mention few, Alexis et al., proposed diagnosis of type II diabetes by applying artificial metaplasticity on multilayer perceptron, the data set used is Pima Indians diabetes. Patil et al., have proposed a hybrid prediction model for the diagnosis of Type II diabetes, which uses k-means clustering and C4.5 classification algorithm. Similarly Nahla and his team have used support vector machines (SVMs) for the prediction of diabetes.

In literature we could find many works related to maternal healthcare data, to mention few; Jamal Afridi and Muddassar Farooq presents a novel data mining model for the classification of high risk pregnant women. The four major risk factors considered are hypertension, hemorrhage, septicemia and obstructed labor. They have developed an intelligent tool called OG-Miner, for the classification of risk factors and they have obtained about 98% of accuracy for their data set. They have used different feature selection techniques and combined various data mining algorithms.

Aparna Gorthi et al, proposed a machine learning approach for early determination of the risk category of pregnancy based on patterns extracted from profiles of known clinical parameter. Here classification techniques are applied just to identify the severity of risk like low, medium and high. Mário et al. compared two Bayesian classifiers to classify hypertensive disorders in pregnancy care. In Longfei Han work, support vector machines are used for screening diabetes, and SVM decisions are converted into rules by adding ensemble learning which helpful for solving imbalance problem. Results on data (China Health and Nutrition Survey) shows that the proposed methods generates rule sets with weighted average precision 94.2% and weighted average recall 93.9% for all classes. Further, the hybrid system can be used as a tool for diagnosis of diabetes, and supports for lay users as a second opinion.

The classification of diabetes is done by using two step approaches. First effective attributes are selected using feature weighting methods. In the second step Gradient Boosted Trees, Random forest, AdaBoost ensemble learning methods are used. The result shows that the prediction accuracy of the combination of Stability Selection method and AdaBoost learning algorithm is a little better than other algorithms.

Ensembling learning methods with Synthetic Minority Over-sampling Technique (SMOTE) is proposed for predicting diabetes using cardiorespiratory fitness data and an improved the prediction accuracy to AUC = 0.922 is obtained.

In our previous work we have used SVM and logistic regression for the diagnosis of preterm birth in the pregnant woman having either diabetes mellitus or GDM, the highest accuracy obtained is 86%.

The purpose of this work is to apply data mining techniques in the early detection of gestational diabetes by using limited identified risk factors of the pregnant woman.

**Materials and Method**

There is no dataset of pregnant women having gestational diabetes exists; therefore, we have made an attempt to create a new dataset which contains information about diabetes in pregnancy. The data used in this experiment are collected from local hospitals of Mysuru, Karnataka state, India. The medical records are taken after removing the identity of patients in order to ensure confidentiality. The data set has been developed by keeping obstetrics and gynaecology consultants in a feedback loop. We have collected about 1352 pregnant women details. The final GDM data set is developed using the following methods dataset.

**Relevant Feature selection:** The data taken from hospital contains more than 20 attributes. The reduction of features is done manually by taking the help of gynaecologists. As a result, only 10 relevant features are retained that consultants use to detect gestational diabetes.
Data cleaning and transformation: This step is very important in developing a complete data set which can be used further in any machine learning techniques. It was very challenging task to extract useful information from a manually entered medical record, as the entry was made manually there was lots ambiguity for entering the values of some of the attributes for example for the attribute number of time pregnant (Gravida) some have entered in numbers and some have specified as multigravida etc. In order to have a meaningful dataset, we applied data cleansing and transformation cycle. Once we have the meaningful attributes, the datasets is finalized on the basis of short listed 10 attributes. Most of the attributes the values will be of type nominal and values will be either yes or no.

GDM data set has totally 10 attributes, they are

1. Age
2. Past history of fetal loss (abortion or IUD)
3. Congenital anomalies in previous pregnancy
4. Macrosomia in previous pregnancy
5. Family history of Diabetes mellitus
6. Obesity
7. Past history of Pre-eclampsia
8. Number of times pregnant
9. Unexplained neonatal loss
10. Previous history of GDM

Age is the major risk factor of GDM, older the age more chances of developing gestational diabetes. It is found that women with age more than 25 are having more chances of development of GDM.

Many attribute are about previous pregnancy, they might be the cause for GDM, the selected attributes for this study are history of fetal loss by abortion or IUD, Congenital anomalies, GDM, unexplained neonatal loss, Macrosomia and Pre-eclampsia. Macrosomia is the situation where the birth-weight is over 4,000 g and is not depending on gestational age. Macrosomia affects about 3-15% pregnancies\(^1\). (16)

Family history of diabetes can also be the reason for developing GDM, in the used dataset there about 138 cases where family history of diabetes is positive in that more than 90% cases we can see the development of GDM. Obesity is the common risk factor for many deceases, for GDM also it can be considered as the major risk factors. The dataset contains about 95 obese women details where 95% of them have gestational diabetes.

Class imbalance problem: Data used is imbalanced; imbalanced classification is a supervised learning problem where one classes out numbers other class by a large proportion. In medical datasets high risk patients tend to be the minority class, so the cost of miss predicting the minority class will be more. Therefore, there is a need of a good sampling technique for medical datasets\(^1\). The technique used for oversampling is SMOTE; here the oversampling is done with minority calluses by creating synthetic samples instead of going for duplicate entries. Minority class samples are generated blindly without considering majority class samples and may thus cause over generalization\(^1\).

Ensembling Model

Combining two or more models of similar or dissimilar type (base learners) is ensembling, which makes a more robust system by incorporating the predictions from all the base learners. It is the best method for improvement of the accuracy of the model and best suited for most the cases.

Types of ensembling techniques

- Averaging: Here the average of the predictions is taken from the multiple models.
- Majority vote: Here prediction is done by taking majority vote or major recommendation from multiple models.
- Weighted average: Here models output is given importance by using weights then average of predictions is taken.
- Bagging: Here multiple models are built using different subsamples of the training dataset.
- Boosting: Here fixing of the prediction errors of the models is done by learning multiple models of same type.
- Stacking: Here the multiple classifiers are combined through Meta classifiers\(^1\).
We have used Random Forest, Logistic Regression and KNN classifier for ensembling.

**Stacking with clustering:**

Clustering is an unsupervised techniques of grouping the data into different groups, the clustering methods considering here is k-means, it is a type of partition clustering, where the objects are grouped into k number of clusters by taking centroid of the clusters as reference.

Here we applied k-means by taking k as 2. Ensemble Stacking is done for the individual clusters, later the stacking is done for the results of the individual clusters. The complete process is shown in Fig.1.

The outcome of the classifiers is combined using Averaging, majority voting and weighted average. The accuracy obtained is respectively 86%, 86.9% and 87%. The accuracy obtained using boosting and stacking are as shown in Fig.2.

k –means clustering of the dataset is by considering only the dependent attributes (after removing the class attribute)by taking k=2.Cluster-0 contains 54% of instances where as Cluster-1 covers 46% of the instances. The clusters are evaluated by referring the class-label; it is observed that 19% of the instances are wrongly clustered.

Conclusion

We have proposed a new ensemble model by combining clustering with ensemble stacking for the prediction of GDM. The classifiers achieve higher accuracy of 94% for the balanced data. The data is balanced by applying SMOTE; the various ensemble techniques results are compared with results of the proposed model.

**Source of Funding-** Self

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**Table.1 Accuracy measures of the classifiers**

<table>
<thead>
<tr>
<th>Classification method</th>
<th>KNN</th>
<th>Random-forest</th>
<th>Logistic Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>91.7</td>
<td>93.8</td>
<td>90</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>91.5</td>
<td>93.6</td>
<td>88.3</td>
</tr>
<tr>
<td>Specificity</td>
<td>91.8</td>
<td>93.9</td>
<td>91</td>
</tr>
</tbody>
</table>

**Fig.1: Steps in the proposed model**

**Results and Discussions**

The classifiers namely Random Forest, Regression and KNN are trained using 70% of the data then they are tested for remaining 30% of the data. The criteria taken for our comparison of classifier are Accuracy, Sensitivity and Specificity. For calculating these criteria we used the confusion matrix in our calculation process.

The Accuracy of the classifiers are shown in Table.1.
Conflict of Interest – NILL

Ethical Clearance: This research was supported by CSI-Holdsworth memorial hospital (HMH), Mysuru, by providing health record details.

References

“Gypsy” Narikuravar Community: Problems in Accessing Health Care Services

R. Kanthiah Alias Deepak¹, C. Velaudham², M. Manivannan³

¹Assistant Professor, Department of Business Administration, G.Venkatashwamy Naidu College, Kovilpatti,
²Assistant Professor, Department of Business Administration, Joseph Arts & Science College, Thirunavalur, Tamilnadu, ³Assistant Professor, Department of Business Administration, Nazareth College of Arts & Science, Avadi, Chennai

Abstract

The importance of the research was to identify the Narikuravar community: problems in accessing health care services. Snowball sampling technique was adopted to collect primary data. The sample size was 750 women Narikuravars. Path analysis was assumed for primary data analysis. Path analysis found that there is no influence of socio economic condition and education/literacy level of Narikuravar community has influence on Discrimination in society. It is also identified that there is influence of discrimination in society on health care access towards Narikuravar community both from an urban and a rural setting, Tuticorin and Tirunelveli and districts of Tamil Nadu. Hence, it is concluded that the Appropriate action campaigns should be drained for the analysis of Narikuravar community through health awareness programs and provided that health education opportunities. The Narikuravar community is normally flat to health hazards. Hence, they need correct medical facilities as well as insurance in the health sector.

Keywords: Narikuravar community, health care access, health awareness, Tamil Nadu.

Introduction

The present research intends to review the intersection of gender, socio-economic status, education, nomadism, and discrimination and its imoact on health-seeking behaviour, health care utilization and health care access of the Narikuravar community. The Narikuravars are a “GYPSY”, semi nomadic society that falls across borders, but mostly live in Tamilnadu of India. They are acknowledged to face inequity that transforms into low socio-economic status, low education level and lack of suitable access to health care. The tribal population of India constitutes nearly eight percentage of the total population. Among them the Narikurava community is playing a significant role. The Narikurava is a native community from Tamil Nadu state of India. The major profession of the people, who initially belong to the indigenous family, is hunting. But as they were forbidden access into the forests to follow this livelihood, they were compulsory to obtain other options such as selling beaded ornaments to live. Hence, they journey from place to place to discover a marketplace for their beads. Children convoy the adults wherever they go, which means they not at all get chance to attend the school. The major issues confront Narikurava are illiteracy, poverty, discrimination and diseases.

Statement of Problem

Tamil Nadu is believed to be one of the mainly advanced Indian states in terms of health outcomes. The Tamilnadu state’s health care organization comprises a primary health system comprised of Health Sub-Centers and Primary Health Centers, a secondary health system that consists of Taluk Hospitals, District Head Quarters Hospitals, Dispensaries, Women and Children Hospitals, Mobile Hospitals etc., and a tertiary healthcare system that comprises multi-speciality hospitals (Government of Tamil Nadu 2017)¹. However, the complex health care structure and the good statistical averages of health

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Corresponding Author:
R. Kanthiah Alias Deepak
Assistant Professor, Department of Business Administration, G.Venkatashwamy Naidu College Kovilpatti.
results do not replicate the circumstances of marginalized categories that don’t have access to health care, financial problems, because of structural issues, socio-cultural mismatches, or stigma and discrimination. One such susceptible group that faces problems while trying to get health care is the Narikuravar community. Generally acknowledged as containing a low socio-economic level, the Narikuravars are struggle with admission to public services like pathetically enough and healthcare. Without getting awareness about how to lead their life, children become young parents. Poverty, social setup and lack of citizenry rights deny them access to basic healthcare.

Significance of the Study

The formulation of a health policy was in 2013 onwards by the state with special emphasis on low-income, disadvantaged communities alongside efficient implementation of The Tamil Nadu Health Systems Project (TNHSP). Moreover, the economic growth of the state, low literacy rate, gender inequality in the last few decades brings importance to this study. Government of Tamil Nadu decided to provide round the clock services in the primary health centres to offer outpatient services in the evening hours and also to improve the access to women for routine emergency and essential obstetric care, meanwhile the range of services provided by the primary health centres and sub centres were also expanded. Also, Tamil Nadu included the practice of indigenous system of medicine in its health care service at a very early stage. This rapid implementation must reach “Gypsy” Narikuravar Community.

Review of Literature

Boorah2 (2004) concluded that girls are more likely to be neglected than boys, through an Indian-wide econometric analysis. However, the treatment of girls is closely linked to the level of literacy of mothers: while illiterate mothers engaged in gender discrimination for access to health, literate mothers did not discriminate between genders; the literacy of the father had no effect on reducing gender discrimination.

Acharya3 (2017) discusses the concept of unfair exclusion, “the complete exclusion of a group of people from availing some services for caste-based reasons”, while the state health care system is meant to provide services to all citizens without discrimination. She therefore identifies access, availability, self-perception and utilization as the key for assessing differences in opportunities.

Devansenapathy4 et al. (2016) boys are likely to be 2 to 5 percentage points more immunized than girls. Gender disparities are an important factor affecting access to health care. Gender gaps have been highly prevalent in India, which can be noted from the immunization rate by gender.

United Nations5 (2015) the “reduced inequalities” and “well-being and good health” are two major aims of the United Nations Sustainable Development Goals, providing suitable and reasonable health care access for susceptible populations is a worldwide priority.

Mathew6 (2012) undergoes a systematic review of the existing literature on the inequities in childhood vaccination and their social and demographic causes: there are correlations between the level of child vaccination and factors related to the individual (such as gender and birth order), family (such as wealth, area of residence, parental education), demography (caste and religion) and the society (community literacy level and access to health-care) characteristics. Mathew emphasizes that inoculation rates are lower among newborns with mothers with no or low literacy, and families where women are not empowered.

Sachdev7 (2012) study reveals semi-nomadic tribal populations in Rajasthan reveals their main challenges in accessing care: lack of appropriate infrastructure, lack of accessibility to hospitals and clinics, the discrimination and poor treatment by the public sector medical staff, their reluctance to seek allopathic medical treatment, as well as their inability to afford it.

Research GAP

Although there has so far not been any research assessing the influence of different social factors, such as socio-economics status, discrimination, gender bias and education, on the access to health care of the Narikuravar community, previous studies on vulnerable or impoverished populations represent a good starting point for creating a theoretical framework. The current literature conveys the effects of education, gender, poverty and nomadism on healthcare-seeking behaviour and access to care in India, finding a strong correlation between them and discussing both causes and their implications. However, no research had been earlier
done on the community’s health admittance and health behaviours.

**Objectives of the Study**

1. To know the influence of Socio economic condition and education/literacy level of Narikuravar community has influence on Discrimination in society.

2. To identify the influence of discrimination in society on health care access towards Narikuravar community both from an urban and a rural setting, Tuticorin and Tirunelveli and districts of Tamil Nadu.

**Hypotheses of the Study**

There is no influence of Socio economic condition and education/literacy level of Narikuravar community has influence on Discrimination in society.

There is influence of discrimination in society on health care access towards Narikuravar community both from an urban and a rural setting, Tuticorin and Tirunelveli and districts of Tamil Nadu.

**Methodology**

**Frame work of the study**

The study has been framed with the scope of analysing the dependent variable namely ‘health care access of Women in Narikuravar community’. The Socio-economic status, Education/literacy level has taken as independent variable, while Discrimination acted as a mediate variable.

**Data Collection**

The study employs both primary and secondary data. The primary data will be collected through face-to-face interview method using well-structured and pre-tested interview schedule. Secondary data have been obtained from Book, Website, Census Report, District Report and Tribal Department, Government of Tamil Nadu and India. The interviews will be conducted with women above 18 years old from the Narikuravar community, both from an urban and a rural setting, Tuticorin and Tirunelveli and districts of Tamil Nadu. The interviewer will travel to the community’s settlements or work places, and the interviews will be taken place in public spaces.

**Sampling Method**

Although they currently present across the state of Tamil Nadu, a huge part of the population contained on 8,500 families, or 30,000 individuals, live in Tamil Nadu (Dragomir, 2017). In the above stated population with an assumption of half of the population are women. In that proposition five percent of population that is 750 women from Narikuravar community will be taken as sample for the purpose of the study. The snowball sampling method has been considered for this study because the Narikuravar community in Tamil Nadu has Nomadic nature of life style. The researcher shall apply snowball sampling method of non-probability sampling method for selection of sample in the study area.

**Analysis and Interpretation**

**Table 1: Model Fit Indication**

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Observed Value</th>
<th>Recommended Value (Velaudham and Baskar, 2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>3.164</td>
<td>---</td>
</tr>
<tr>
<td>P</td>
<td>0.206</td>
<td>Greater than 0.050</td>
</tr>
<tr>
<td>GFI</td>
<td>0.944</td>
<td>Greater than 0.090</td>
</tr>
<tr>
<td>AGFI</td>
<td>0.989</td>
<td>Greater than 0.090</td>
</tr>
<tr>
<td>CFI</td>
<td>0.982</td>
<td>Greater than 0.090</td>
</tr>
<tr>
<td>NFI</td>
<td>0.985</td>
<td>Greater than 0.090</td>
</tr>
<tr>
<td>RMS</td>
<td>0.056</td>
<td>Less than 0.080</td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.001</td>
<td>Less than 0.080</td>
</tr>
</tbody>
</table>

**Source: primary data**

The above table shown in outline of the model fit, which contains the RMS score, was 0.056 RMSEA score was 0.001 were well nearby the recommended limit of less than eight percent suggested by Saminathan, et al. (2019). The chi-square value was 3.164 and probability value was 0.084 as against the recommended level and suggested by Premapriya, et al. (2016). In this model,
the research has obtained GFI, AGFI, CFI and NFI were greater than 90 percent as against the recommended level and suggested by Velaudham and Baskar \textsuperscript{11} (2015). All the goodness of fit indicators falls into best level of fit as suggested by Velaudham and Baskar \textsuperscript{12} (2016).

**Table 2: Regression Weights**

<table>
<thead>
<tr>
<th>DV</th>
<th>IV</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>Beta</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>discrimination in society</td>
<td>socio economic condition</td>
<td>0.133</td>
<td>0.078</td>
<td>1.718</td>
<td>0.148</td>
<td>0.086</td>
</tr>
<tr>
<td>discrimination in society</td>
<td>education/literacy level</td>
<td>0.092</td>
<td>0.069</td>
<td>1.326</td>
<td>0.114</td>
<td>0.185</td>
</tr>
<tr>
<td>health care access</td>
<td>discrimination in society</td>
<td>0.987</td>
<td>0.125</td>
<td>7.918</td>
<td>0.558</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Source: Primary data

**H\textsubscript{1}**: Socio economic condition of Narikuravar community has influence on Discrimination in society.

Influence of socio economic condition of Narikuravar community on discrimination in society computed CR value was 1.718 and the probability value was 0.086. Hence, the framed null hypothesis was accepted. The computed standard regression weight was 0.148. It shows that the one unit increase of socio economic condition of Narikuravar community leads to increase of 14.8 percent on discrimination in society. Hence, it is finished that there is no influence of socio economic condition of Narikuravar community on discrimination in society towards Narikuravar community both from an urban and a rural setting, Tuticorin and Tirunelveli and districts of Tamil Nadu.

**H\textsubscript{2}**: Education/literacy level of Narikuravar community has influence on Discrimination in society.

Influence of Education/literacy level of Narikuravar community on discrimination in society computed CR value was 1.326 and the probability value was 0.185. Hence, the framed null hypothesis was accepted. The computed standard regression weight was 0.114. It shows that the one unit increase of education/literacy level of Narikuravar community leads to increase of 11.4 percent on discrimination in society. Hence, it is finished that there is no influence of education/literacy level of Narikuravar community on discrimination in society towards Narikuravar community both from an urban and a rural setting, Tuticorin and Tirunelveli and districts of Tamil Nadu.

**H\textsubscript{3}**: Discrimination in society has influence on Health care access.

Influence of Discrimination in society on health care access computed CR value was 7.918 and the probability value was 0.001. Hence, the framed null hypothesis was accepted. The computed standard regression weight was 0.558. It shows that the one unit increase of discrimination in society leads to increase of 55.8 percent on health care access. Hence, it is finished that there is influence of discrimination in society on health care access towards Narikuravar community both from an urban and a rural setting, Tuticorin and Tirunelveli and districts of Tamil Nadu.

**Table 3: Covariance**

<table>
<thead>
<tr>
<th>IV</th>
<th>IV</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>R</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio Economic Condition</td>
<td>Education/Literacy Level</td>
<td>5.668</td>
<td>1.924</td>
<td>2.946</td>
<td>0.258</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Source: Primary data
H$_{0}$: Socio economic condition of Narikuravar community has significant positive relationship with education/literacy level.

Co-varience between socio economic conditions of Narikuravar community with education/literacy level computed CR value was 2.946 and the probability value was 0.003. Hence, the framed null hypothesis was rejected. The computed co-variance weight was 0.258. It shows that the one unit increase of socio economic condition of Narikuravar community leads to increase of 25.8 percent on education/literacy level. Hence, it is finished that there is significant relationship between socio economic condition of Narikuravar community and education/literacy level towards Narikuravar community both from an urban and a rural setting, Tuticorin and Tirunelveli and districts of Tamil Nadu.

**Findings**

Path analysis found that there is no influence of Socio economic condition and education/literacy level of Narikuravar community has influence on Discrimination in society.

It is also identified that there is influence of discrimination in society on health care access towards Narikuravar community both from an urban and a rural setting, Tuticorin and Tirunelveli and districts of Tamil Nadu.

**Recommendations**

The Government should play a major role in converting the lives of Narikuravar community through enhanced participatory communication and development programs.

Appropriate action campaigns should be drained for the analysis of Narikuravar community through health awareness programs and provided that health education opportunities. The Narikuravar community is normally flat to health hazards. Hence, they need correct medical facilities as well as insurance in the health sector.

The NGOs and educational institutions have an enormous social responsibility of shifting the attitude of the Narikuravar community and inspiring them to become the champion of human rights and safety life of Narikuravar community.

**Conclusion**

The importance of the research was to identify the Narikuravar community: problems in accessing health care services. Snowball sampling technique was adopted to collect primary data. The sample size was 750 women Narikuravars. Path analysis was assumed for primary data analysis. Path analysis found that there is no influence of socio economic condition and education/literacy level of Narikuravar community has influence on Discrimination in society. It is also identified that there is influence of discrimination in society on health care access towards Narikuravar community both from an urban and a rural setting, Tuticorin and Tirunelveli and districts of Tamil Nadu. Hence, it is concluded that the Appropriate action campaigns should be drained for the analysis of Narikuravar community through health awareness programs and provided that health education opportunities. The Narikuravar community is normally flat to health hazards. Hence, they need correct medical facilities as well as insurance in the health sector.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**Ethical Clearance:** Since the study “GYPSY” NARIKURAVAR COMMUNITY is open social science research we may not to take any clearance from any of authority.

**Reference**


Implications of Low-Carbohydrate -High Fat Diet on Weight Management

Kanagala Anusha, Anuradha Averineni

Assistant Professor, Department of MBA, Koneru Lakshmaiah Business School, Guntur, A.P.

Abstract

The leading concern in terms of public health today is primarily obesity or weight management. Because of the fact, people in the countries being obese there is a rise in a number of weight loss diets programs. Especially, the low carbohydrate diets were attracted by public as the results in this particular diet are rapid. Evidence indicates the advent of media today is not letting the public to take appointment with the registered dieticians. Public through audio-visual aids are trying to participate in veeramachaneni low carbohydrate-high fat diet. The diet is resulting in reduction of weight (in kgs). In this article we discuss the current practical implications on the efficacy of high-fat, low-carbohydrate dietary patterns for weight loss, and their potential action in execution of the diets further.

Keywords: Ketogenic Diet, Weight Loss, Public Health, Dietary Promotions.

Introduction

Obesity is an excessive fat accumulation that is prevailing in health problems, especially in non communicable diseases such as diabetes, cardiovascular disease and even some type of cancers. India is becoming obese. National family health survey states, women and men of 15-49 years are obese. The overweight is higher in urban areas compared to rural areas.

Obesity is also observed in children, it causes hypertension, breathing issues, increased risk of fractures. In later life they might have high chances of diabetes and premature death, by making the choice of heartier food, overweight can be prevented.

In a life course, healthy diet consumption helps in prevention of malnutrition and a wide range of non communicable diseases. A balanced healthy diet may vary depending on the individual needs; a healthy diet consists of energy rich foods (Carbohydrates and fats), body building foods (proteins), and protective foods (minerals and Vitamins).

For any individual, it is very important to understand that diet varies depending on different stages of life. Diet is very important for all round development of individual. One should be conscious of getting a balanced diet.

Ketogenic diet that became viral in Andhra Pradesh: A low carbohydrate diet being well known as keto diet today, in this diet the body produces ketones in the liver that in turn converted as energy, it is referred under different names as low Carbohydrate, High fat, low carbohydrate diet, ketogenic diet etc.

Recently the social media and television channels have introduced a new diet Regime by Veeramachaneni Ramakrishna who is Charted Accountant turned Nutritionists.

Liquid diet plan:

He took a diet plan based on 4 things and called them 4 pillars.

Consumption of 70-100 grams of fat

3 lemons

4 liters of water

1 multivitamin tablet a day.

The diet recommends to consume coconut oil orally or to be used for cooking for effective weight loss.

Diet plan has been introduces in an effective manner stating that it is going to cure, PCOD, kidney, diabetics,
and many more.

General rule of the diet is different for vegetarians and non vegetarians.

**Solid diet plan:** The day to be started with warm water with lemon recommended diet first, boiled eggs with vegetables before lunch, a clear soup with recommended fats, then a multivitamin supplement, curries suitable for lunch included are chicken, fish or vegetarian curry prepared with olive oil, dinner is with soup with fat,. The daily recommendation of fat intake is mandatory.

**Eat only when you are hungry**

**Foods allowed** in the diet are meat, chicken, fish, eggs, tomatoes, carrot, cabbage, cauliflower, Almonds, garlic, chilies, turmeric, coconut oil, butter, cheese, ghee, olive oil, blueberries, raspberries, strawberries.

**Foods not allowed** are whole wheat, Rice, sugar, all other fruits.\(^1\)

**Marketing of Low Carbohydrate-high fat diet**

The process of marketing involved in promoting a dietary service by veeramachaneni is mentioned below:\(^2\):

### Dietary services management process

<table>
<thead>
<tr>
<th>Dietary Services</th>
<th>Mediators</th>
<th>Diet</th>
<th>Diet related outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge on food component and its benefit. (Low carbohydrate and High fat)</td>
<td>Benefits and preferences of public through dieticians/nutritionists.</td>
<td>Efficacy and safety implications</td>
<td>Weight loss, decrease in diabetics and neurological disorders and cardio vascular.</td>
</tr>
</tbody>
</table>

Media Strategies used in promotion of Ketogenic Diet:

The Nutritionist held Public Meetings and penetrated the diet and the process. Later chosen, television, social Media strategies as Youtube, Wats app, Facebook etc. The penetration of diet was high it was participated by thousands of public. Later even the restaurants and small business have also took the diet and made it available at the counters.\(^3\)

Marketing techniques used currently are:

<table>
<thead>
<tr>
<th>Findings</th>
<th>Strategy</th>
<th>need for research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td>Access to healthy ketogenic diet</td>
<td>Availability of healthful diet</td>
</tr>
<tr>
<td><strong>Price</strong></td>
<td>Price vary from customer subgroups</td>
<td>Reduce prices within categories for healthier items eg ,meat, eggs , fruits, vegetables</td>
</tr>
<tr>
<td><strong>Place</strong></td>
<td>Promoting products in stores</td>
<td>Make visible place, low carb, and high fats foods in visible and accessible location</td>
</tr>
<tr>
<td><strong>Promotion</strong></td>
<td>Most promotions of keto diet are for obese are through media and registered nutritionists.</td>
<td>Increase promotion of keto foods through online marketing and through use digital space</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Demonstration projects with nutritionists</td>
</tr>
</tbody>
</table>
Review of Literature

Fred Brouns (2018)\(^4\), suggested that low carb diet results in reduced energy intake which certainly results in metabolic and functional changes which leads to weight loss, lifestyle intervention in people is a determinant factor in choosing of the diet. Cara B. Ebbeling (2018)\(^\)\(^5\), stated that a low Carb diet is effective in weight loss maintenance for patients with high insulin secretion. According to Detlev Boison (2017)\(^8\), ketogenic therapy for the treatment of epilepsy shown a broad benefits of suppressing Seizures. Sunymo (2017)\(^9\), conducted a study and revealed. Initially hunger feelings for 3 weeks were high, once the participants were into keto diet 10-17% of weight loss is not associated with increased appetite. Hyun-Scung Rhyu (2014)\(^10\), The study is conducted for 3 weeks on 20 taekwondo athletes, the fatigue resistance capacity and aerobic capacity was improved after the diet. Kriesten E .D.Anci (2009)\(^11\), reveals that memory impairment is recorded in low carbohydrate diet, also suggest a better vigilance and confusion, while undertaking a low carbohydrate diet to be taken in having an impact on cognitive behavior. Alexandra M John stone (2008)\(^12\), studied in altering macro nutrient composition of diet observed on 17 men for a trial and identified in a short term low carbohydrate diet reduces hunger and lower food intake, compared to high protein diet. Hussain M Dashti (2004)\(^13\), studied obese patients with high glucose and cholesterol levels, monitored for 16 and 24 weeks and found a decrease in cholesterol and reveals the diet is beneficial. C. Tissa, Kappagoda (2004)\(^14\), states that the diet cannot be recommended to be safe because of the absence of long-term data and advocates low fat diets have established a record of safety and efficacy. Stephen B Sondike (2000)\(^16\), concluded that the diet is effective for short term weight loss in obese and adolescence.

Research Gap: Keto Diet is considered as a mechanism to reduce weight. Public have participated in this diet voluntarily. The ketogenic diet is capable of reducing weight, PCOD and diabetes. As a result, loss in weight is recorded but the marketing of diet is so intense that they come to know about the diet through audio-visual aids rather from a nutritionist/dietician. The present study is undertaken to know the implications of low carbohydrate diet in weight management and the respective side effects if any.

Research Methodology: The study is descriptive and the data is collected from 76 Employees who have practiced in Veeramachineni keto diet of KL deemed to be University, Guntur. The primary data is collected through a questionnaire; the sampling design for the research is simple random sampling method. The data is collected from the employees before the diet (weight in Kgs) as well after 3 months of the diet their weights (in kgs) are interpreted to draw conclusion using SPSS.

Research Objective:

1 To examine the effectiveness of low carbohydrate diet by veeramachineni on weight of the respondents.

2 To analyze the gender and age of the respondents in managing keto-diet.

3 To analyze the mode of awareness and side effects (if any) in personnel weight management.

Findings and Discussion

The study is conducted on the public who have undergone with low carbohydrate diet. Their distribution of weights in Kilograms is shown below

<table>
<thead>
<tr>
<th>S.No</th>
<th>Respondents Opinion</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Before Weight</td>
<td>82.17</td>
<td>12.03</td>
</tr>
<tr>
<td>2</td>
<td>After Weight</td>
<td>79.90</td>
<td>11.74</td>
</tr>
</tbody>
</table>

Wilcoxon Signed Ranks Test: The test is performed to test for Null Hypothesis: There is no impact of weights (in kilograms) after the diet.
Alternative Hypothesis: There is an impact of weights (in kilograms) after the diet

**Table no: 2 Test for Significance**

<table>
<thead>
<tr>
<th>Test</th>
<th>Z</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>After Weight-Before Weight</td>
<td>-5.003</td>
<td>&lt;0.001**</td>
</tr>
</tbody>
</table>

The p value is <0.001** less than 0.05. The null hypothesis is rejected. Therefore it is found that there is a significant impact of diet on weight management.

**Graph: 1 Mean Weights of male and females before and after the diet**

From the above chart it is observed the mean weight of males before the diet is 83.00 whereas the mean weight of males after the diet is 80.89. The mean weight of females before the diet is 81.34 whereas the mean weight after diet is 78.92. The mean differences of weights of male, female respondents is 2.11, 2.42 respectively.

**Table no: 3 Respondents among different age groups**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Respondents Opinion</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20-30 years</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>2</td>
<td>31-40 years</td>
<td>21</td>
<td>27.6</td>
</tr>
<tr>
<td>3</td>
<td>41-50 years</td>
<td>32</td>
<td>42.1</td>
</tr>
<tr>
<td>4</td>
<td>51-60 years</td>
<td>19</td>
<td>25.0</td>
</tr>
<tr>
<td>5</td>
<td>Above 60 years</td>
<td>3</td>
<td>3.9</td>
</tr>
</tbody>
</table>

**Graph: 2 Mean Weights of Respondents on basis of age their weights before and after the diet**

The above chart shows the means of weights of different age groups before diet and after diet. The mean weight of 20-30 years age group before and after the diet is same this implies that the keto diet does not have any impact on this age group. Considering the age group of 31-40 years it is observed that the mean weight before the diet is 80.00 kgs and the mean weight after the diet is 77.48 kgs. The mean weight for age group 41-50 years before the diet is 84.50 and after diet is 82.38 kgs. The mean weight for age group of 51-60 years before diet is 81.37 kgs and after diet is 79.00 kgs. The mean weight of respondents of age group above 60 years before the diet is 76.67 kgs and after diet is 74.67 kgs.

**Table no: 4 Respondents and their consultations for weight management**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Respondents Opinion</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Audio-visual</td>
<td>58</td>
<td>76.3</td>
</tr>
<tr>
<td>2</td>
<td>Dietician</td>
<td>18</td>
<td>23.7</td>
</tr>
</tbody>
</table>

**Graph: 3 Mean Weights of Respondents and their consultation for weight management**
From the above chart it is observed that the mean weights of respondents before considering the audio-visual aids is 80.81 Kgs and after following diet as per audio visual aids is 78.52 Kgs. The mean weights of respondents, before consulting dietician is 86.56 Kgs and after consulting the dietician is 84.39 Kgs.

Conclusion

From the discussions it is observed that the mean differences of weights after the diet decreased. But, the mean difference of weights decreased before and after the diet had very slight change. States that most of the public participated in the diet were not directed by the Nutritionist himself. They were taking up this diet through nutritionist directions which are present on social media videos, at public meetings and word of mouth. The respondents were into the diet mostly to manage their weight and diabetes. But the average weight loss was minimum and could not retain it and also faced certain side effects such as giddiness, kidney related problems. Finally, the ketogenic diet is in need for promoting to one to one solution because the problem of obesity is different from one person to another.

Ethical Clearance - NIL

Source of Funding - SELF

Conflict of Interest - NIL

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The Behavioural Risk Factors Contributing to Non-Communicable Diseases among Women

Sheeba S1, R. Rima2, Parvathy Suresh2
1Assistant Professor, Department of Community Health Nursing, Amrita College of Nursing, Amrita Vishwa Vidyapeetham, Kochi, Kerala, India, 2Fourth Year B Sc Nursing students, Amrita College of Nursing, Amrita Vishwa Vidyapeetham, Kochi, Kerala, India

Abstract

Objective: To assess the prevalence of behavioural risk factors for non-communicable diseases in working and nonworking women.

Materials and Method: Quantitative approach with descriptive survey design and convenience sampling technique was used. The study conducted among 70 working and 70 nonworking women above the age of 20 years, residing at Nayarambalam Panchayath, Ernakulam district. Data were collected by house-to-house survey using World Health Organization STEP-instrument for the surveillance of noncommunicable disease risk factors (WHO-STEP 1 & STEP 2 questionnaires). Descriptive statistics and Chi-square test were used for analysis.

Result: Majority of the working women (71.4%) and non working (61.4%) was in the age group of 31-50 yrs. The mean age was 44.7 years for working and 41.32 years for nonworking women. Overweight was found high among (41.42%) working women, when compared to (21.42%) nonworking women. Abdominal obesity is found high 34.28% and very high 11.42% among working women when compared to 10% and 7.14% among nonworking women. It was found that non working women had inadequate vegetable intake compared to working women ($x^2 = 34.392$, df = 5, $p = 0.000$) and also fruit intake was higher among working women compared to non working women ($x^2 = 14.3313$, df = 3, $p = 0.002$). Working women (52.85%) had low physical activity when compared to nonworking women (22.85%). It was also found that diabetes mellitus was diagnosed among working women compared to nonworking women during the study ($x^2 = 5.1853$, df = 1, $p = 0.023$) and dyslipidemia was higher among working women ($x^2 = 6.2693$, df = 1, $p = 0.012$).

Conclusion: Behavioural risk factors like overweight, obesity, abdominal obesity and low physical activity were higher among working women. There is an urgent need of community based screening and health promotional activities to reduce the burden of non communicable disease.

Key Words: Behavioural risk factors, Noncommunicable diseases, Working women, Non working women.

Introduction

Global burden of disease has continued to shift from communicable to non-communicable diseases and from premature deaths to years lived with disability. Non-communicable diseases (NCDs) kill 41 million people each year, equivalent to 71% of all deaths globally. 4 groups of disease (cardiovascular diseases, respiratory
diseases, cancers and diabetes mellitus) account for over 80% of all premature NCD death. In the year 2015, 56.4 million global death occurred among that 39.5 million occurred due to non-communicable diseases out of that 30.7 million occurred in low and middle income countries. As India is a developing nation it is under the rising burden of NCDs causing significant morbidity and mortality. India State Level disease burden initiative done along with global burden of diseases study 2016 showed high rate of NCDs in states like Kerala, Goa and Tamil Nadu.

Behavioural risk factors play an important role in causation of NCDs. Ischemic heart disease and stroke are projected to increase further by 2020, and developing countries will experience the highest burden. Non-communicable disease behavioural risk factors such as tobacco smoking, heavy alcohol consumption, physical inactivity, and unhealthy eating are socially patterned in high-income countries, with individuals of low socioeconomic status generally experiencing a higher burden of risk factors.

India is in the grip of an epidemic posed by non communicable diseases and a rising trend is even being witnessed in low socio-economic urban areas. Two in every three deaths among women are caused by non-communicable diseases-largely heart disease, stroke, cancer, diabetes and chronic respiratory diseases. Risk factors for heart disease and stroke are the leading cause for death in women. Factors such as age and family history play a role, but the majority of CVD deaths are due to modifiable risk factors such as tobacco use; diets high in fat, salt, and sugar; high blood pressure; high cholesterol; obesity; and diabetes. The epidemiological risk factors for cervical cancer are early age at marriage, multiple sexual partners, multiple pregnancies, poor genital hygiene, malnutrition, use of oral contraceptives, and lack of awareness. A multipronged approach is necessary which can target areas of high prevalence identified by registries with a combination of behavior change communication exercises and routine early screening.

Recent findings Systems for control of noncommunicable diseases (NCDs) in the low-income contexts are poorly developed and health services are often overwhelmed with high levels both of NCD and communicable disease. Multidisciplinary and holistic approaches to disease management are often lacking in these settings. Developing an integrated primary care approach to NCD management is increasingly recognized as a key strategy and this should include palliative care.

Prevalence of risk factors varies among working and non working women. Therefore it is important to detect the presence of risk factors among women at the earliest to reduce the prevalence of NCDs. Hence the investigator is interested to assess the prevalence of behavioural risk factors contributing to non communicable diseases among working and non working women.

**Materials and Method**

A community based descriptive study was conducted to assess the behavioural risk factors contributing to noncommunicable diseases among 70 working and 70 nonworking women above the age of 20 years, residing at Nayarambalam Panchayath of Ernakulam district. Subjects included were women residing at Nayarambalam panchayath and who are mentally fit without debilitating disease or bedridden. Convenience sampling technique was used. The researcher explained the purpose of the study and obtained an informed consent from each subject. World Health Organization-Step instrument surveillance of noncommunicable disease risk factors (STEP 1 & STEP 2) Version 3.0. WHO-STEPS instrument covers three different levels of steps of risk factor assessment. These steps include questionnaire (STEP-1), physical measurements (STEP-2) and biochemical measurements (STEP-3). For the purpose of our study WHO-STEPS questionnaire 1 (history of risk factors) and 2 (simple physical measurements) were suitably modified and translated to local language to collect data from subjects. WHO step 1 tool includes Demographic information and behaviorameasurements (details regarding tobacco use, alcohol consumption, diet, dietary salt, physical activity, history of raised blood pressure, history of diabetes, history of raised total cholesterol, history of cardiovascular disease, lifestyle advice, history of cervical screening) and WHO step 2 includes physical measurements (Blood pressure, height, weight and waist circumference). Standard procedures were followed for anthropometric and BP measurements. Calibrated aneroid BP apparatus and personal weighing scale was used. Data analysis was done by using descriptive statistics and Chi-square test.
**Table 1 : Frequency and percentage distribution of Behavioural risk factors for Noncommunicable diseases among subjects**

<table>
<thead>
<tr>
<th>Behavioural risk factors</th>
<th>Working women (n = 70)</th>
<th>Non working women (n = 70)</th>
<th>Total n = 140</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percentage</td>
<td>Number</td>
</tr>
<tr>
<td>Vegetable intake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate</td>
<td>19</td>
<td>27.14%</td>
<td>7</td>
</tr>
<tr>
<td>Inadequate</td>
<td>51</td>
<td>72.86%</td>
<td>63</td>
</tr>
<tr>
<td>Fruit intake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate</td>
<td>13</td>
<td>18.57%</td>
<td>0</td>
</tr>
<tr>
<td>Inadequate</td>
<td>57</td>
<td>81.42%</td>
<td>70</td>
</tr>
<tr>
<td>Physical activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate</td>
<td>33</td>
<td>47.9%</td>
<td>54</td>
</tr>
<tr>
<td>Inadequate</td>
<td>37</td>
<td>52.85%</td>
<td>16</td>
</tr>
</tbody>
</table>

Data presented in Table 1 shows that majority of the non working women (90%) had inadequate vegetable intake daily when compared to working women (72.86%) and nonworking (100%) had inadequate fruits intake when compared to 81.42% of working women. Working women (52.85%) had low physical activity when compared to nonworking women (22.85%). None of them were using tobacco or alcohol.

**Table 2 : Comparison of health status of working and non working women**

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>WORKING WOMEN n = 70 (%)</th>
<th>NON WORKING WOMEN n = 70 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean weight</td>
<td>58.7</td>
<td>55</td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;18.5kg/m²(underweight)</td>
<td>3 (4.28%)</td>
<td>11 (15.71%)</td>
</tr>
<tr>
<td>18.5-24.9kg/m²(normal)</td>
<td>30 (42.8%)</td>
<td>38 (54.28%)</td>
</tr>
<tr>
<td>25-29.9kg/m²(overweight)</td>
<td>29 (41.42%)</td>
<td>15 (21.42%)</td>
</tr>
<tr>
<td>&gt;/=30kg/m²(obese)</td>
<td>8 (11.42%)</td>
<td>6 (8.57%)</td>
</tr>
<tr>
<td>Mean systolic BP(mm of Hg)</td>
<td>115.7%</td>
<td>118%</td>
</tr>
<tr>
<td>Mean diastolic BP (mm of Hg)</td>
<td>76.14%</td>
<td>74.28%</td>
</tr>
<tr>
<td>Common health problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>11 (15.71%)</td>
<td>3 (4.25%)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>6 (8.57%)</td>
<td>0</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>8 (11.42%)</td>
<td>0</td>
</tr>
<tr>
<td>Hypotension</td>
<td>2(2.85%)</td>
<td>0</td>
</tr>
<tr>
<td>Abdominal obesity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>10(14.2%)</td>
<td>26(37.14%)</td>
</tr>
<tr>
<td>High</td>
<td>24(34.28%)</td>
<td>7(10%)</td>
</tr>
<tr>
<td>Very high</td>
<td>8(11.42%)</td>
<td>5(7.14%)</td>
</tr>
</tbody>
</table>
Data presented in Table 2 shows that mean weight of working and nonworking women was 58.7kg and 55kg respectively. Overweight was found among 41.42% working women, when compared to 21.42% nonworking women. Obesity was present among 11.42% working women, when compared to 8.57% of nonworking women. Hypertension (15.71%) was higher in working women compared to (4.25%) nonworking women. Diabetes mellitus (8.57%) dyslipidemia (11.42%) hypotension (2.85%) was found in working women. Abdominal obesity is found high in its classification of high (34.28%) and very high (11.42%) among working women when compared to high (10%) and very high (7.14%) of nonworking women.

Table 3: Association of working status and presence of behavioural risk factors for noncommunicable diseases

<table>
<thead>
<tr>
<th>Behavioural risk factors</th>
<th>Working women(n=70)</th>
<th>Nonworking Women(n=70)</th>
<th>X²</th>
<th>df</th>
<th>P value</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable intake</td>
<td>Adequate</td>
<td>19(27.14%)</td>
<td>7(10%)</td>
<td>34.392</td>
<td>5</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Inadequate</td>
<td>51(72.86%)</td>
<td>63(90%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit intake</td>
<td>Adequate</td>
<td>13(18.57%)</td>
<td>0</td>
<td>14.331</td>
<td>3</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>Inadequate</td>
<td>57(81.42%)</td>
<td>70(100%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical activity</td>
<td>Adequate</td>
<td>33(47.9%)</td>
<td>54(77.14%)</td>
<td>13.390</td>
<td>1</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Inadequate</td>
<td>37(52.85%)</td>
<td>16(22.85%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>Present</td>
<td>5(7.14%)</td>
<td>0</td>
<td>5.185</td>
<td>1</td>
<td>0.023</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>65(92.85%)</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>Present</td>
<td>6(8.57%)</td>
<td>0</td>
<td>6.269</td>
<td>1</td>
<td>0.012</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>64(91.42%)</td>
<td>70(100%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salt restriction</td>
<td>Present</td>
<td>4(5.72%)</td>
<td>0</td>
<td>4.118</td>
<td>1</td>
<td>0.042</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>66(94.28%)</td>
<td>70(100%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restriction of fatty foods</td>
<td>Present</td>
<td>6(8.57%)</td>
<td>0</td>
<td>6.269</td>
<td>1</td>
<td>0.012</td>
</tr>
<tr>
<td></td>
<td>absent</td>
<td>0</td>
<td>70(100%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data presented in Table 3 shows that non working women had inadequate vegetable intake compared to working women (X² = 34.392, df = 5, p = 0.000) and also fruit intake was higher among working women compared to non working women (X² = 14.3313, df = 3, p = 0.002). Physical inactivity was higher among working women when compared to nonworking women (X² = 13.390, df = 1, p = 0.000). It was also found that diabetes mellitus was diagnosed more in working women as compared to nonworking women during the study (X² = 5.1853, df = 1, p = 0.023) and dyslipidemia is higher in working women (X² = 6.2693, df = 1, p = 0.012) than nonworking women.
women.

Discussion

The findings of the present study revealed that Majority of the working women (71.4%) and non working (61.4%) was in the age group of 31-50yrs. Overweight (41.42%) and obesity (11.42%) was found higher among working women, when compared to nonworking women. Abdominal obesity is found higher among working women when compared to nonworking women. Working women (52.85%) had low physical activity when compared to nonworking women (22.85%). It was found that non working women had inadequate vegetable intake compared to working women ($x^2 = 34.392, df = 5, p = 0.000$) and also fruit intake was higher among working women compared to nonworking women ($x^2 = 14.3313, df = 3, p = 0.002$).

A similar study was conducted among 400 women (200 working and 200 nonworking women) of urban slums at Karnataka in the age-group of 30-45 years on a voluntary basis, using WHO-STEP 1 and 2 questionnaires shows that 49% women were in the age-group of 30-35 years, with 60.5% belonging to Class IV socioeconomic status. 11% women were newly diagnosed with hypertension. 92.5% were not in a habit of consuming fruits adequately. Most of the women also opined that they consume junk food once in 7 days. It was found that 350 (87.5%) were physically inactive. Overweight was found among 17.5% working women, and 14% nonworking women. Obesity was present among 12% working women, and 6% of nonworking women.

A similar study was conducted among 130 apparently healthy women of age 20-60 years in randomly selected wards of Eloor municipality, Kochi, Kerala. WHO STEPS instrument was administered to eligible subjects. Their anthropometric measurements were also taken using standardised tools. The mean age of the women surveyed was 38.9 years (SD 10.2). Majority (71%) of the study participants were home makers. Majority (97.2%) consumed less than 5 servings of fruits and vegetables a day. Of them, 79.3% were in the low physical activity category. Around 55% of the women were either overweight or obese.

Conclusion

In our study prevalence of behavioural risk factors for non communicable diseases were high among women. Behavioural risk factors like overweight, obesity, abdominal obesity and low physical activity were higher among working women. But they have adequate fruits and vegetable intake when compared to nonworking women. Presence of diabetes mellitus, hypertension, dyslipidemia were higher among working women. There is an urgent need of community based screening and health promotional activities to reduce the burden of non communicable disease.

Conflict of Interest: There is no conflict of interest among the authors.

Source of Funding: Self

Ethical Clearance: Ethical clearance was obtained from the institutional ethical committee at Amrita institute of medical science and Research centre, Kochi.

References


Mental and Physical Wellbeing of Elderly

Sunitha P P, Surya M Nair, Swapna S Nair

1Lecturer, 2IV year B.Sc. Nursing Students, Amrita College of Nursing, Amrita Vishwa Vidyapeetham, Kochi, Kerala

Abstract

Background of the Study: Elderly person constitutes growing section of population. Today the society emphasizes the importance of physical activity to maintain and enhance the strength and function of the body.

Objectives: To identify the relation between mental and physical wellbeing of elderly and its association with selected demographic and clinical variables.

Materials and Method: Descriptive design was adopted for this study. The study conducted among 45 young old people attending Geriatric OPD using convenience sampling. The data collected using structured questionnaire on socio-demographic and clinical data, Rapid Assessment of Physical Activity questionnaire (RAPA) to assess the physical wellbeing and Warwick Edinburgh Mental Wellbeing Scale (WEMWBS) to assess the mental wellbeing of elderly.

Results: The results showed that the mean RAPA-1 score of the samples were sub optimal (3.47 ± 1.57) whereas the mean mental wellbeing score was high (64.44 ± 6.66). There was no significant relation between mental wellbeing and physical wellbeing \( r=0.175 \). And also found that there is a significant association between physical wellbeing and presence of co-morbidities \( p=0.042 \).

Conclusion: The study concluded that physical wellbeing and mental wellbeing is not related.

Key words: Mental wellbeing, Physical wellbeing, elderly

Introduction

Age is not merely a biological function of the number of years one has lived, or of the physiological changes the body goes through during the life course. Age represents the wealth of life experiences that shape whom we become\(^1\). Ageing involves physical, cognitive, social and familial losses and brings with it an increased incidence of disability and the need for assistance with activities of daily living\(^2\).

The world’s population is ageing rapidly. Between 2015 and 2050, the proportion of the world’s older adults is estimated to almost double from about 12% to 22%. This is an expected increase from 900 million to 2 billion people over the age of 60. Older people face special physical and mental health challenges which need to be recognized. Older adults, those aged 60 or above, make important contributions to society in different roles such as family members, volunteers and as active participants in the workforce\(^3\).

Mental wellbeing is an integral part of overall health. It responds to life’s ups and downs\(^4\). The World Health Organization describes mental well-being as a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community\(^5\).

Corresponding Author:
Sunitha P P
Department of Medical Surgical Nursing
Lecturer, Amrita College of Nursing
Amrita Vishwa Vidyapeetham, Kochi-41
Kerala. Mob.: 9496225313
E mail: sunithapp@aims.amrita.edu

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According to studies, elderly patients have a reduced performance status and more co-morbid illnesses. Today’s society often emphasizes how important it is for people to be physically active in order to maintain and enhance the body’s strength and function. Older adults continue patterns of physical activity throughout their lifetime, but with adaptations due to age-related limitations.

While there is a lot of emphasis on the physical well-being of older people, the same emphasis or importance has not been placed on their mental health and wellbeing. Promoting successful ageing is an important part of maintaining physical and mental wellbeing in the elderly. Evidences shows that adults’ participation in self-care activities such as leisure time physical activity and walking are positively related to mental wellbeing whereas total levels of free living physical activity are not.

Materials and Method

This descriptive study was conducted in Geriatric OPD, AIMS, Kochi. The study included 45 samples selected using convenience sampling method. The tool for data collection were structured questionnaire on demographic and clinical data, Warwick Edinburgh Mental Wellbeing Scale (WEMWBS) to assess the mental wellbeing which is a 14 item scale of mental wellbeing in which all items are worded positively and address aspects of positive mental health. The scale is scored by summing responses to each item on a 1 to 5 Likert scale. The minimum scale score is 14 and the maximum is 70. The Rapid Assessment of Physical Activity (RAPA) questionnaire was used to assess the physical wellbeing. In the present study the physical wellbeing denotes the physical activity of the elderly. The RAPA questionnaire was a nine item questionnaire with the response options of yes or no to questions. The questions covering range of levels of physical activity from sedentary to regular vigorous physical activity (RAPA-1) as well as strength training and flexibility (RAPA-2). A score of 6 or above signifies optimal physical activity and below 6 indicates suboptimal physical activity.

Procedure for data collection: The ethical clearance was obtained from Institution Review Board and Head of the Department for conducting the study. The purpose of the study was explained and informed consent was taken from the samples. The data was analyzed using descriptive and inferential statistics.

Results

Section A: Sociodemographic characteristics of the samples

Out of the 45 samples, 62.2% (28) were males. Majority (97.8%) were married and 32% were residing in rural area. More than half of the samples (57.8%) belongs to nuclear family.

Table 1: Distribution of samples based on clinical data

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of Comorbidities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Yes</td>
<td>35</td>
<td>78</td>
</tr>
<tr>
<td>b. No</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Yes</td>
<td>11</td>
<td>24</td>
</tr>
<tr>
<td>b. No</td>
<td>34</td>
<td>76</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Yes</td>
<td>17</td>
<td>38</td>
</tr>
<tr>
<td>b. No</td>
<td>28</td>
<td>62</td>
</tr>
<tr>
<td>Presence of any physical disability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Yes</td>
<td>01</td>
<td>02</td>
</tr>
<tr>
<td>b. No</td>
<td>44</td>
<td>98</td>
</tr>
</tbody>
</table>

Table 1 depicts that out of 45 samples, 78% (35) of samples were having comorbidities and among this 11 and 17 samples were having hypertension and diabetes mellitus respectively. Majority (98%) were having no physical disability. Two patients were affected with hyperthyroidism, minority represents other comorbidities.

The frequency and percentage of samples answers to each question on mental well being scale shows majority of the samples answers positively to all the questions.
n=45

Fig. 1. depicts that most of the samples 41 (91%) were belong to the suboptimal level of physical wellbeing according to RAPA-1 score. One sample doing muscle strength increasing activities according to RAPA-2 score of 1 and five samples were doing activities to improve flexibility according to RAPA-2 score of 2.

Table 2: Mean standard deviation and confidence interval of Age, Mental wellbeing and Physical wellbeing.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean ± standard deviation</th>
<th>95% of Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower bound</td>
</tr>
<tr>
<td>Age</td>
<td>65.02 ± 2.84</td>
<td>64.77</td>
</tr>
<tr>
<td>Mental wellbeing</td>
<td>64.44 ± 6.66</td>
<td>62.44</td>
</tr>
<tr>
<td>Physical wellbeing</td>
<td>3.47 ± 1.57</td>
<td>3.07</td>
</tr>
</tbody>
</table>

Table 2 shows that the mean age of the patients was 65.02 ± 2.84, mean mental wellbeing score was 64.44 ± 6.66 and mean RAPA-1 score was 3.47 ± 1.57. The mean WEMWBS score indicated that most of the patients are in a category of higher mental wellbeing, whereas the mean RAPA-1 score was suboptimal.

Table 3: The correlation between mental wellbeing and physical wellbeing

<table>
<thead>
<tr>
<th>Physical wellbeing</th>
<th>n</th>
<th>Mental wellbeing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>r value</td>
<td>0.175&lt;sup&gt;ns&lt;/sup&gt;</td>
<td>0.251</td>
</tr>
</tbody>
</table>

Table 3 shows Pearson correlation between mental and physical wellbeing is 0.175, which shows no statistical significance. Therefore there is no relationship between mental and physical wellbeing.
Table 4: The association between physical wellbeing and clinical variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>RAPA &lt;6</th>
<th>RAPA ≥ 6</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of co morbidities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>34(83%)</td>
<td></td>
<td></td>
<td>01(25%)</td>
</tr>
<tr>
<td>No</td>
<td>07(17%)</td>
<td></td>
<td></td>
<td>03(75%)</td>
</tr>
</tbody>
</table>

Table 4 shows that there is an association between physical wellbeing and presence of co morbidities at 0.05 level.

Discussion

The present study aimed to assess the relationship between mental wellbeing and physical wellbeing of elderly. According to the study, 91% of samples were in the suboptimal level of physical wellbeing according to RAPA-1 (mean score was 3.47 ± 1.57) and the mean score of 64.44 ± 6.66 for mental wellbeing indicates high mental wellbeing.

One study conducted using RAPA questionnaire showed that the mean RAPA-1 score of samples categorized into two were suboptimal (group 1: 2.514 ± 0.901 and group 2: 3.215 ± 1.257)\(^9\). In another study of physical activity and mental wellbeing in a cohort aged 60-64 years showed the mean WEMWBS score was 51.6 ± 7.9\(^8\). The difference in mean value may be the result of less sample size of the present study.

The result of the present study also revealed that there is no relationship between mental and physical wellbeing of elderly (p=0.251). Contradictory to this results, a study conducted to assess the relationship between physical inactivity and mental wellbeing, showed there is a weak positive correlation between physical activity and mental wellbeing (rs(1684)=0.316, p<0.001)\(^9\). Another study to assess the physical activity level and wellbeing in older adults illustrated that light physical activities were positively associated with wellbeing among the retirees over 60 years of age\(^11\). The possible reason for this two results could be the less sample size.

Limitation of the study: The limitation of the study was that long term assessment of wellbeing was not done and the generalization of findings was limited due to small sample size.

Conclusion

From the result, we found out that the physical wellbeing of elderly was suboptimal but they maintain a high mental wellbeing state. And also concluded that there does not exist a relationship between mental wellbeing and physical wellbeing. Therefore the study identifies the need for regular assessment of physical activity as well as mental wellbeing for the elderly not only at the institutional level but also at the community level so that more findings could be elicited.

But there is an association between physical wellbeing and presence of comorbidities. So one of the reason for not actively participating in the physical activities by the elderly may be the disease cascade. Therefore it is very important to emphasize the type of light activities that can be done by them in order for maintaining better physical wellbeing.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Consideration: Permission had obtained from the Research Committee of Amrita College of Nursing and Institution Review Board (IRB) of AIMS, Kochi.

References

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Effects of Birth Order on Morbidity of Under-5 Children in Rural Tamil Nadu

V. Samya¹, A Meriton Stanly², Ramesh Harihara Iyer³

¹Assistant Professor, ²Professor, Department of Community Medicine, SRIHER, Chennai

Abstract

Background: The health and well-being of under-five children depends on various factors including maternal age, birth order, etc. Birth order is a significant predictor of the under-five mortality and morbidity. This study was carried out to evaluate the impact of birth order on the morbidity of under-five children in rural Tamil Nadu.

Method: This cross sectional study was carried out on 370 under-five children residing in the rural field practice area of our institution for a period of three months. A structured interview schedule was used to obtain information regarding the obstetric history, birth history and medical history of the participants.

Results: Children whose birth order was more than 2 were at a higher risk of getting more than 3 episodes of diarrhea (OR 3.5, p<0.05) Overcrowding and under nutrition were also significantly associated with increased birth order (p<0.05).

Conclusion: Although the prevalence of birth order beyond three children has drastically come down in the recent decades, it is continues to persist in rural pockets and groups with low socio economic status. There is a need for revisiting the family welfare strategies in order to minimize the birth order.

Key words: Acute diarrheal diseases, Birth order, malnutrition, overcrowding, under-five mortality

Introduction

The health policies addressing the health issues of the people in India as designed by the Ministry of Health and Family Welfare focuses on strengthening the maternal and child health. Child health is determined by various mortality and morbidity indicators including infant mortality rate, under five mortality rate etc. Under-five age group is the age between birth (0 months) and up to five years of age, which corresponds to 60 months. The health and wellbeing of this age groups determines the growth and development of the child in the future years. Several physical, mental, social and economic factors play a major role in determining the health and well-being of these under five children. There has been a considerable drop in the under-five mortality rate all over the world, more so in developing countries like India. From 52.4 deaths per 1000 live births in 2012, India has significantly lowered the rates to 39.4 per 1000 live births in 2017¹. According to the World Health Organization, at risk under-five children have been identified as the vulnerable populations who are prone to an increased risk of diseases, growth retardation, mental illness and physiological problems in the adulthood. There are several criteria which determine the at risk status of these children, including low birth weight less than 2.5 kg, early initiation of artificial feeding, presence of twins, weight below 70% of the expected weight, birth order etc².

In order to ensure that the wellbeing of the under five children, it is essential to address the issues concerning

Corresponding author:
Dr V. Samya,
Assistant Professor, Sri Ramachandra Institute of Higher Education and Research. ph: 9003027485.
the maternal health and health services provided to
the mothers during pregnancy. A healthy mother is
a guarantee for a healthy child. Birth order is a subtle
indicator of the well being of both the mother and child.
It not only determines the health status of the child, but
also reflects the attitudes of the parents towards family
planning and contraception. Birth order significantly
influences the risk exposures of the child towards the
physical and socio economic conditions at home; it also
signifies the amount of care given by the parents which
is indirectly influenced by the health status of the mother.

Several studies have been undertaken in the
western world to elucidate the impact of birth order
on the cognitive abilities, psychosocial development
and predictive risk for certain diseases during the adult
hood\(^3\). Several psychological studies have implicated
birth order with the IQ level of the children. Although
birth order does not exert any biological influence, the
relationship between the birth order and socio economic
status of the household plays a key role in determining
the exposure of the child to certain experiences and these
in turn are the risk factors for several psychological
issues. In developing country like India where the socio
economic situation is diverse and varied, birth order a
plays a key role in determining the access to health care
and better living conditions. A typical rural middle class
family with an increased birth order has greater risk for
communicable diseases, parasitic infections, nutrition
deficiencies and as a result of these they are prone for
substance abuse, social behavioural problems and other
non communicable diseases during the adulthood.
It is important to evaluate the birth order and risk
factors associated with birth order in order to get a vivid
picture of the impact of a family planning programmes
and initiatives taken by the Government in this regard.
Although several studies have been carried out in the
developed countries, very few studies have been done
in India especially in the rural sector to explore the
pattern and impact of the birth order on the childhood
morbidities.

**Objectives**

1. To evaluate the effects of birth order and certain
   morbidities among under-5 children in a rural
   area.

2. To analyze the sociodemographic and
   environmental risk factors influencing the birth
   order.

**Methodology**

**Study setting and participants**

This population based cross sectional study was
carried out in the rural field practice area of our tertiary
teaching institution for a period of three months. All the
under five children residing in the field practice area
formed the study population. A total of 2373 children
were present in the study area during the study period.

**Sample size and sampling**

Based on intensive literature review, the lowest
prevalence of risk factors in under-five children was
found to be 9% for diarrhea, according to NFHS-3
statistics\(^4\). At 95% level of significance and 3% absolute
precision, the sample size was calculated as 349.43.
Accounting 5% for non response, the sample size was
calculated as 366.9 and was rounded off to 370. The
entire list of under five children residing in the study
area was procured from the Village Health Nurse. The
required sample size of 370 was selected from the total
of 2373 children by simple random sampling based on
computer generated random numbers.

**Ethical approval and informed consent**

Approval was obtained from the Institutional Ethics
Committee prior to the commencement of the study.
Each participant’s mother was approached and explained
in detail about the study. Informed consent was obtained
from each participant prior to the commencement of data
collection.

**Data collection tools**

A structured interview schedule was used to
obtain information regarding the sociodemographic
characteristics, birth history and presence of risk factors
and morbidities among the study participants.

**Data analysis**

Data was entered and analyzed using SPSS version
16 software. The prevalence of risk factors was expressed
in percentages. Chi square test was used to analyze the
statistical significance between the birth order and risk
factors.

**Results**

Overall, majority of the participants were first born
(48.9%) followed by second born (42.9%). Among the
first born, majority of the participants belonged to 13-24 months, while among the second and third born, majority of the participants were 37-48 months old (24.5% and 36% respectively). Among the fourth born, majority belonged to 49-60 months old (40%). (Fig. 1)

Majority of the participants were males (51.3%). Majority of the males belonged to birth order four (60%) while majority of the females belonged to birth order three (56%). Overcrowding and nutritional status were important risk factors for increased birth order in this study. Participants with moderate under nutrition (6.2%) were at increased risk for increased birth order compared to those with mild (1.4%) or severe (4.4%) undernutrition. (Table 1)

There was a significant association between the birth order and risk for diarrheal diseases and infections. It was observed that the children whose birth order was more than 2 had a 3.5 times increased risk of having more than 3 episodes of diarrhea (OR 3.5, 95% CI 1.4-8.5, p 0.03). Details given in table 2. Birth order of four was at increased risk of low birth weight (40%) compared to first born (12.2%) and second born (13.2%) children. This difference was statistically significant (p<0.05). (Table 3)

There was a significant association of birth order of 2 or more and exclusive breastfeeding of the children. (OR 4.2 95% CI 1.2-4.5). (table 4)

**Discussion**

Birth order is significant predictor of mortality and morbidity among the infants and under five children. Majority of the participants in our study were first born or second born. However there was prevalence of 6.7% who belong to birth order three and 1.35% belong to birth order four. Overall birth order greater than three was prevalent in 8.1% of the study participants. The key risk factors which were associated with birth order of more than three included overcrowding under nutrition substantiated by low mid arm circumferences. These factors were associated with birth order of more than three and this association was statistically significant (p value <0.05). While we analyzed the impact of birth order on the morbidity of these under five children it was observed that birth order beyond three had an increased risk of diarrheal infections, increased episodes of diarrhea with the frequency of more than three episodes and this observation was statistically significant (p value < 0.05). Similarly the birth weight of these participants was less than 70 percent of the expected birth weight for children of birth order beyond three. This observation was also statistically significant (p value <0.05).

According to nationwide data generated, the sex of the child, mother’s age at birth, birth order and previous birth interval were predominant risk factors for infant mortality, child mortality and under-five mortality. Among these birth order had a severe impact on these mortality rates. As per NFHS data, birth order beyond three children was associated with an under-five mortality of 62 per 1000live births and as the birth order increased to seven and above, the under-five mortality rate shot up to 116 per 1000 live births. Similarly increase in the birth order beyond two children increased the risk for infant mortality rate to 62 per 1000 live births. Increase in the birth order significantly impacted the neonatal mortality, thereby highlighting that apart from external socio economic factors, birth order inherently induced risk for mortality at the time of delivery.

Gender differences play a major role in determining the morbidity and mortality of the under five children. In our study majority of the children beyond second birth order were females (53.3%) compare to males. Large scale nationwide surveys have shown that gender differences are increasingly linked to infant mortality, especially those with higher birth order. This association has not been influenced by socio economic factors. The study done by Victoria et al has shown that a girl has 40% increased chances of dying between a first and fifth birth days compared to a boy child and this increases as the birth order increases.

Malnutrition is a perennial problem developing economies and India continues to struggle to combat malnutrition especially among under five children. There are several factors which influence malnutrition of which birth order is a significant one. Our study has demonstrated a statistically significant association between malnutrition and increased birth order. A study done by Sagu S.K et al also showed similar findings. Similarly, combating acute diarrheal diseases and infections in under five children has been the goal of several national programmes. Although the etiology of acute diarrheal diseases is predominantly viral, extraneous socio economic factors including birth order have also been implicated. In our study, we found an increased risk of diarrheal diseases among children of
higher birth order compared to their first born or second born counterparts. In a study done by Mihrete T.S et al a bivariate analysis showed that higher birth order was significantly associated with childhood diarrhea. It is also worth mentioning that prolongation of these risk factors not only increases the morbidity of the patient, but also increases the risk of malnutrition and chronic diseases both direct and indirectly predisposed by increase birth order.

Table 1: Association of birth order>3 and demographic, socioeconomic and environmental factors

<table>
<thead>
<tr>
<th>S. no</th>
<th>Particulars</th>
<th>Birth Order</th>
<th>Odds ratio</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&gt;3 n(%)</td>
<td>&lt;3 n(%)</td>
<td>OR</td>
</tr>
<tr>
<td>1.</td>
<td>Overcrowding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>10(6.3)</td>
<td>147(93.7)</td>
<td>157</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>1(0.4)</td>
<td>212(99.6)</td>
<td>213</td>
</tr>
<tr>
<td>2.</td>
<td>Degree of under-nutrition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>0(0)</td>
<td>170(100)</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>Mild</td>
<td>2(1.4)</td>
<td>137(98.6)</td>
<td>139</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>1(6.2)</td>
<td>15(93.8)</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>2(4.4)</td>
<td>43(95.6)</td>
<td>45</td>
</tr>
<tr>
<td>3.</td>
<td>Mid-arm Circumference (N=336)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;12.5 cm</td>
<td>3(7.1)</td>
<td>39(92.9)</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>&gt;12.5 cm</td>
<td>2(0.6)</td>
<td>292(99.3)</td>
<td>294</td>
</tr>
</tbody>
</table>

Table 2: Impact of birth order on diarrheal diseases and infections:

<table>
<thead>
<tr>
<th>S. No</th>
<th>Episodes of diarrhoea</th>
<th>Birth order</th>
<th>OR</th>
<th>Chi sq</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>More than 2</td>
<td>Less than 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>More than 3</td>
<td>8 (20)</td>
<td>32 (80)</td>
<td>3.5</td>
<td>8.51</td>
</tr>
<tr>
<td>2</td>
<td>Less than 3</td>
<td>22 (6.7)</td>
<td>308 (93.3)</td>
<td>1.4-8.5</td>
<td></td>
</tr>
</tbody>
</table>

*statistically significant
Table 3: Impact of birth order on birth weight of the study participants:

<table>
<thead>
<tr>
<th>S. No</th>
<th>Birth Order</th>
<th>Birth weight</th>
<th>Chi sq</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Low n(%)</td>
<td>Normal n(%)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>22(12.2)</td>
<td>159(87.8)</td>
<td>9.9</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>21(13.2)</td>
<td>138(86.8)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>8(32)</td>
<td>17(68)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>2(40)</td>
<td>3(60)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Impact of birth order on exclusive breast feeding

<table>
<thead>
<tr>
<th>S. No</th>
<th>Exclusive breastfeeding</th>
<th>Birth order</th>
<th>OR</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2 or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Yes</td>
<td>63 (63)</td>
<td>37 (37)</td>
<td>4.2</td>
<td>1.2-14.5</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>4 (28.6)</td>
<td>10 (71.4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

Overall birth order has been emphasized as a significant risk factor for several communicable and non-communicable diseases in the under-five age group. It is essential that note that birth order indirectly reflects on the reach of family planning programmes that have been implemented at the nationwide level. Although the prevalence of birth order beyond three children has drastically come down in the recent decades, it is continues to persist in rural pockets and groups with low socio economic status. This study also indicates that the there has been significant gap in the implementation of family welfare strategies and interventions. Therefore there is an emergent need to revisit the strategies of family planning interventions in order to expand the strategies to an inclusive one so as to minimize the birth order up to three children thereby improving the health and quality of life of children.

Conflict of Interest – Nil

Funding – Nil

Ethical approval – Obtained

References


[4] International Institute for Population Sciences (IIPS) and ORC Macro, 2001, National Family Health Survey (NFHS-3), India, 2005-06


Influence of Poverty on Health among Tribes in Nilgiris District, Tamilnadu: Pattern of Diseases and Health Care Practices

Kanagaraj S.1, V. Priya2, Krishna Gayathri3
1Ph.D Scholar; 2Assistant Professor, Dept. of Social Work, Amrita School of Engineering, Coimbatore, Amrita Vishwa Vidyapeetham, India, 3Social Worker, Chennai

Abstract
Tribes are one of the major contributors for the diversified culture of India and their development is essential for country’s development. This study aims to understand the pattern of diseases among tribes in Nilgiris district and their health care practices. This study emphasizes on Survey research and non-probability sampling is applied in which respondents are selected using convenient sampling. The study was conducted among 94 respondents from Gudalur taluk, Pandalur taluk and Kotagiri block of Nilgiris district. The data was collected using semi-structured interview schedule and analysed. The findings of the study shows that more than half (55.5%) of the respondents are affected by non-communicable diseases and 44.5% are affected by chronic diseases. More than half of the respondents (56.4%) defecate in open and majority (87.7%) of the respondents have the habit of using substances and 80.9% of the respondents are not having the knowledge of the disease they are suffering.

Keywords: word; Tribes, Health, Communicable diseases, Non –communicable diseases, Health care

Introduction
The ancient epics such as Mahabharata, Ramayana, and Silapathigaram speak volumes about the tribal in India and their way of living. Chattopadhyay defines tribes as the homogeneous group which lives in a definite geographical area with unifying culture. They are the original inhabitants of the land and have cultural life congenial to the environment and India has second largest population next to Africa. Though the Indian Constitution recognizes them with a special status as scheduled Tribes and provides safeguards to protect their rights, it still remains a question as to whether all their rights are met. Though there are health programs for the rural and the tribal communities, the tribal people have remained marginal. Programs that are meant for the rural community may not be appropriate for the tribal community as the live in a different terrain, with a different lifestyle, culture and practices. According to the 2011 Census, Tribes constitute 104 billion in India, but still remain marginally secluded geographically, economically, socially and politically.

As per census of India, tribes constitutes about 8.6% of total population (Census of India, 2011) and in Nilgiris district of Tamilnadu they are about 4% of the total population. Their health status is less when compared with the general population. There are stark differences in their level of literacy, nutrition, age at marriage, insufficient potable water, lack of personal hygiene, illiteracy, poverty and poor maternal and child health services. Tribes in India have nutritional related disorders where men have under nutritional disorders then women. An alarming prevalence of the Triple Burden of disease(Undernutrition, overweight or obesity, Hypertension) has also been identified among the tribes in West Bengal Odisha and Gujarat and tribal women have low health standards than non-tribal women in areas of antenatal, delivery, Post natal and Post partum

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Nutritional status of the community is influenced by many factors such as belief, customs, and the food materials available in their region. The consumption of nutrients is less in tribal population, especially among pre-school children which is far beyond the recommended Dietary Allowance prescribed for children of that age. This may be because of poverty, less awareness, non-availability of microcredit and social mobilisation.

Poor sanitation is also a reason for disease causation and the consumption of tobacco need to be reduced among the tribal people needs to be reduced. Tribal women and men also face problems due to lack of latrines as they have to travel to faraway places when they are sick or have undergone surgery for birth control. The tribal women though felt the need for construction of toilets are not able to do so as the soil structure was not conducive for construction of pit latrines.

The pattern of diseases among the disadvantaged sections includes both communicable and non-communicable diseases and their health is influenced by multiple factors such as social, environmental, genetic, cultural and behavioural factors. Non-communicable diseases are more prevalent than communicable diseases. Hypertension is very common among men than women though not significant, which can be associated with alcohol intake, central obesity and sedentary lifestyle. They suffer from both communicable and non-communicable diseases in all parts of India. Poverty, poor sanitation, lack of health care facilities, malnutrition, social barriers and taboos, lack of awareness are some of the contributors for increased health risk of tribes in India.

The poor health condition of people affects their livelihood and sets off poverty and affects their education and their social and cultural factors affect the mortality rate. Through awareness health and nutritional status can be improved. Moreover there is a gap to implement interventions which are low cost, affordable and providing immediate results because the majority of the people live in remote areas. Hence it is evident to address the issue on issues related health to understand its causes and pattern. Multi-pronged approaches may be used to increase the effectiveness of the interventions, like improving their nutritional status, integrating the Scheduled Tribes in Public Health Interventions. A study done among the Kora Mudis in West Bengal found that the BMI (Body Mass Index) was significantly low among women than men when compared to other Tribes in India and hence immediate nutritional interventions need to be carried out for tribal community. More research has to be carried out among Tribal population as well as among the rural and urban poor who fall under the below Poverty Line (BPL) as they constitute a vast majority of the population in India.

This study attempts to understand the pattern of diseases existing among tribes in Pandalur taluk, Gudalur taluk and Kotagiri block of Nilgiris District. This district is situated in the north western part of Tamilnadu, Southern India and it is also known as the “Queen of Hills”. There are about 6 different tribes Todas, Kotas, Kurumbas, Irulas, Paniyas and Katunayakas in this district with unique cultural traits. This study attempts to find out the pattern of diseases, their perception towards the disease, food pattern, the accessibility of health care services and the traditional method of treating the diseases among the tribes in Nilgiri district.

Materials and Method

This study emphasizes on Quantitative research and Survey Research Design has been employed to understand health care practices and pattern of disease among Nilgiri tribes. Non-probability sampling is employed in which convenient sampling is used to select the respondents from Pandalur Taluk, Gudalur Taluk and Kotagiri Block of Nilgiris district, Tamilnadu. The data was collected using semi-structured interview schedule and 94 respondents were studied in this research.

Findings

The research aims to understand the pattern of diseases among the Nilgiri tribes and the data was collected from 94 respondents and analysed. The findings of this study show that more than half 55.5% of the respondents are affected by life style diseases and 44.5% are affected by the chronic diseases. The description of the prevalence of the life style and chronic diseases is given in the table number 1.
Table 1: Prevalence of health issues

<table>
<thead>
<tr>
<th>S.No</th>
<th>Health issue</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Chronic diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Tuberculosis</td>
<td>10</td>
<td>10.6</td>
</tr>
<tr>
<td>2</td>
<td>Sickle Cell Anaemia</td>
<td>5</td>
<td>5.3</td>
</tr>
<tr>
<td>3</td>
<td>Anaemia</td>
<td>26</td>
<td>27.5</td>
</tr>
<tr>
<td>4</td>
<td>Myalgia</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td><strong>Life style diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Heart Disease</td>
<td>6</td>
<td>6.4</td>
</tr>
<tr>
<td>6</td>
<td>BP</td>
<td>17</td>
<td>18.1</td>
</tr>
<tr>
<td>7</td>
<td>Diabetic</td>
<td>13</td>
<td>13.9</td>
</tr>
<tr>
<td>8</td>
<td>Respiratory problems</td>
<td>9</td>
<td>9.6</td>
</tr>
<tr>
<td>9</td>
<td>Skin allergy</td>
<td>3</td>
<td>3.2</td>
</tr>
<tr>
<td>10</td>
<td>Cancer</td>
<td>4</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>94</td>
<td>100.0</td>
</tr>
</tbody>
</table>

47.9% of the respondent’s family history has similar health problems, 60.6% of the respondents responded there is no particular communicable diseases affecting their community at large, 90.4% of respondents seek doctors’ advice for treatment and only 7.4% respondents prefer herbal medicines. More than two third 71.3% of the respondents consume forest products as major food intake and majority 82% face economic problems because of which they are not getting nutritious food. More than half 56.4% of the respondents have no toilet facility at home and defecate in open space. The availability of traditional medical practitioners is only 20.2% and 28.7% preferring home deliveries. More than half 55.5% of the respondents have non-communicable diseases such as diabetes, hyper tension, asthma, arthritis and 44.5% of the respondents have chronic diseases such as cancer, sickle cell anaemia, TB and coronary heart diseases. Nearly half of the respondents 47.9% have similar family history of the particular disease. The sanitation facilities is not proper in most of the villages and the incidence of diseases is more during rainy season as nearly 56.4% defecate in open space and use water from river and well. Women are unaware of good menstrual practices and still they use clothes and leaves. Superstitious beliefs and taboos are prevailing in the community and so 28.7% prefer home deliveries and only 58.5% make use of mobile clinics. 40.5% of the respondents are found to be anaemic problems and among them it is mostly common in women which may be due to the insufficient consumption of nutritious food. More than half 58.5% of the respondents have immunity issues which causes further to be anaemic as well.

Discussion

Though tribes live in close harmony with nature, the Nilgiri tribes are found to be vulnerable to different communicable and non-communicable diseases which affect their development. It is found that 55.5% of the respondents have non-communicable diseases such as diabetes, hyper tension, asthma, arthritis and 44.5% of the respondents have chronic diseases such as cancer, sickle cell anaemia, TB and coronary heart diseases. Nearly half of the respondents 47.9% have similar family history of the particular disease. The sanitation facilities is not proper in most of the villages and the incidence of diseases is more during rainy season as nearly 56.4% defecate in open space and use water from river and well. Women are unaware of good menstrual practices and still they use clothes and leaves. Superstitious beliefs and taboos are prevailing in the community and so 28.7% prefer home deliveries and only 58.5% make use of mobile clinics. 40.5% of the respondents are found to be anaemic problems and among them it is mostly common in women which may be due to the insufficient consumption of nutritious food.

The major food items consumed by these people are mostly rice, dhal, spinach and tubers which may not be sufficient as a result of which they have tended to become anaemic. This affects their menstrual cycle, complications during pregnancy and also health complications during childbirth. It was found while interaction that there were child marriage incidents who have immunity issues which causes further to be anaemic as well.
Due to the social taboos and stigma the women are not ready to speak about their health issues. They prefer traditional health care practices but traditional medical practitioners are not always available now a day because of which they go for Allopathic Practitioners. Traditional health care practices are eroding at present as practitioners are not willing to teach the new generation since they do not show interest. 58.5% of the respondents have the accessibility to mobile medical unit once in every month in their village but they are not willing to come for check-up. It was inferred through the study that most of the people falls into the category of below poverty line and high incidence of health issues among them which indicates that they do not have resources to improve their nutrition due to poverty. Also it is observed that the respondents who take forest products such as spinach and honey etc., do not full fill the required nutrition which causes further health issues.

Around 71.3% of women prefer institutional delivery but most of the women hide their pregnancy during the visit of medical mobile unit. This may be due to fact that they have more faith and belief in their own god and are also willing to accept even when unfortunate events happen. 80.9% of the respondents have the support of NGO’s which help them in improving their health standards but the tribes are not make using of it.

**Conclusion**

The primary aim of this research is to understand the pattern of disease among the tribal in Nilgiri district. The dominant disease among the Nilgiri tribes is non-communicable life style diseases and 90% of the respondents seek doctors’ advice for treatment. Menstrual hygiene is not maintained properly and more interventions need to be given on that area. Anaemic problems are prevalent among women and economic status affect their health at large. Sanitation facilities need to be improved to prevent from water born diseases during rainy seasons. On the whole the tribals require additional support to fight against poverty such as organising them into self help groups, social mobilisation and eventually start income generating activity to improve the livelihood which in turn help them to resolve various health issues.

**Conflict of Interest:** The authors declare that they have no conflict of interest to disclose

**Source of Funding:** The authors have no funding for this study.

**Ethical Clearance:** Ethical Clearance obtained from the Human Ethics Committee.

**References**

2. TRIFED. Tribal Cooperative Marketing Development Federation of India (TRIFED) [Internet]. Ministry of Tribal Affairs, Govt. of India. [cited 2019 May 18]. Available from: http://www.trifed.in/trifed/(S(swwgxqamvzxyytvmnvna3mi))/introduction.aspx


Influence of Socio-Demographic and Clinical Variables on the Frequency of Acute Respiratory Infections among Under-five Children

Abhilash Venunathan¹, Bijoy Philip², Kandasamy Muthugounder³, Reetha Ismail⁴, Prathima Prakasam⁴

¹Lecturer, College of Nursing, Gulf Medical University, Ajman, UAE, ²Staff Nurse, Stockport NHS Foundation Trust Hospital, Manchester, UK, ³Assistant Professor, College of Nursing, Gulf Medical University, Ajman, UAE, ⁴Professor, College of Nursing, Gulf Medical University, Ajman, UAE

Abstract

Background: Acute Respiratory Infection (ARI) is a major cause of morbidity and mortality among young children. They account for nearly 3.9 million deaths every year globally. ARI accounts for 30-40% of the hospital outpatient visits by children under five years of age. About 156 million new episodes of childhood clinical pneumonia occurred globally in 2000, more than 95% of them in developing countries. Of all the pneumonia cases occurring in those countries, 8.7% are severe enough to be life-threatening and require hospital admission. Various risk factors have been identified across the globe such as low birth weight, lack of exclusive breastfeeding, crowding – more than seven persons per household, exposure to indoor air pollution, incomplete immunization, under-nutrition, and HIV infection.

Objective:

• To find out the association between socio-demographic variables and frequency of acute respiratory infections among under-five children.

• To find out the association between clinical variables and frequency of acute respiratory infections among under-five children.

Method: A cross sectional study was conducted among 400 under-five children admitted in various hospitals of northern part of Kerala, South India from January 2016- December 2016. Socio-demographic and clinical data was collected by using a Socio-Demographic and Clinical Variable Portfolio. One year follow up was done to identify the frequency of acute respiratory infections among the study participants.

Results: A significant association (p<0.05) was found between frequency of Acute Respiratory Infections (ARI) and age of children, domicile, method of waste disposal, smoking habits of parents, birth weight and nutritional status.

Keywords: Socio-Demographic and Clinical Variables, Acute Respiratory Infections, Under-five children.

Introduction

Acute Respiratory Infections (ARI) among children is one of the major threat to the health care systems of the developing countries¹. Acute Respiratory Infections are considered as a main cause of mortality and morbidity among the children under five years of age especially in Indian subcontinent. As per the recent data from Indian health statistics shows that nearly 19 % of mortality and 8.2 % of morbidity in under five children due to respiratory problems². A huge variety of factors were influencing the occurrence of Acute Respiratory Infections (ARI) among the children. That is why Acute Respiratory Infections (ARI) among children are one
the major public health problem in both developing and developed countries.

Acute Respiratory Infections (ARI) are the infections to any part of the respiratory tract, it may ranges from self-limiting disorders to life threatening ones. In India, about 26.3 million cases of ARI were reported in the year 2011, with an incidence rate of about 2,173 cases per one lakh population. In developing countries 70 % of the under-five mortality is due to respiratory problems. In pediatric patients, respiratory infections can be life threatening if not treated and resolved in time. Acute Respiratory infection (ARI) account for nearly 3.9 million deaths every year globally. ARI accounts for 30-40% of the hospital outpatient visits by children. About 156 million new episodes of childhood clinical pneumonia occurred globally in 2000, more than 95% of them in developing countries. Of all the pneumonia cases occurring in those countries, 8.7% are severe enough to be life-threatening and require hospital admission. About 2 million pneumonia deaths occur each year in children aged less than 5 years, mainly in the African and South-East Asia regions.

Various risk factors have been identified across the globe such as low birth weight, lack of exclusive breastfeeding, crowding – more than 7 persons per household, exposure to indoor air pollution, incomplete immunization, under-nutrition, and HIV infection etc. Emergence of more virulent and novel pathogenic organisms, recurrence of diseases previously controlled, insensible use antibiotics, and suboptimal immunization coverage are major factors that intensifying the incidence of ARI in the under five children apart from the commonly identified causes. Children aged 6-23 months were mostly affected with ARIs.

However most of the studies related to acute respiratory infections in under five children was trying to identify the prevalence and incidence of the problem. None of the studies addressed the actual impact of the contributory facts in the occurrence of acute respiratory infections among under five children. The present study was aimed to identify the impact of socio demographic and clinical variables in the incidence of acute respiratory infections in under five children because they are the most vulnerable group.

Method

A cross-sectional study with a descriptive survey design was used to identify the influence of socio-demographic and clinical variables on the frequency of acute respiratory infections among under five children, who were admitted in pediatric medical ward and pediatric intensive care units of selected hospitals at northern part of Kerala, South India. The target population of the study was assumed 2, 00000 based on the data gathered through the literature search. The sample size was calculated at 95% confidence interval and 5% margin of error. Finally, 400 Children in the age group of 0-5 years who were admitted in the selected pediatric units with Acute Respiratory Infections (ARI) during the time period between January 2016 to December 2016 with the attrition rate of 4% based on the inclusion criteria set by the investigators. Children with the history of chronic respiratory diseases were excluded from the study. A purposive sampling technique was used to recruit the samples for the present study.

A Socio-Demographic and Clinical Variable Portfolio was used to collect the data. The tool used in the present study was developed by the investigators based on the literature review, interactions with clinical experts, parents and professional experiences. The content validity of the tool was established with the help of the experts in the field of pediatrics, pediatric nursing and public health. The reliability of the tool was achieved by inter-rater reliability method and it seems to be reliable (Cohen’s Kappa= 0.88). The Socio-Demographic and Clinical Variable Portfolio having two sections: Section A- demographic profile of the child and Section B – Clinical profile with a respiratory status assessment scale.

After getting the permission from the institutional research and ethical committee, a formal permission from the authorities of the concerned hospitals, the investigators conducted a pilot study in order to find out the practicability of the study. Pilot study was conducted in 30 samples and it found to be feasible and those samples were excluded from the main study. An informed consent was obtained from the parents of all the subjects before data collection and the confidentiality of the data was ensured. After obtaining the written informed consent from the parents of the children was obtained, a semi structured interview was conducted among the parents (either mother or father) to obtain the demographic and clinical profile of the child. The investigators were collected some advanced information related to the child’s clinical profile through
the retrospective analysis of case files and by using biophysical measures. A one year follow up was done to identify the recurrence pattern of respiratory infections among the study participants.

Results

Among the recruited samples 64 % were males and majority of them (57%) belonged to the age group of 2-3 years. More than half (57%) of the samples were residing at corporation area. Majority of the samples (53.25%) belonged to nuclear family. Most of the subjects were residing in terraced houses and nearly half (48%) of the study participants were using gas and firewood as cooking fuel, whereas 13.75 % were using other combustion fuels for cooking. Most (50.75%) of the sample’s house having kitchen without proper chimney. More than (55%) half of the study participants were residing in the houses with less crossventilation.46% of the subjects family were using combustion with other methods as the waste disposal .Among the study participants (30%) of the parents having the habit of smoking.

More than half (52%) of the samples were the second child of their parents. 71.25 % of the participants having birth weight ≥ 3 kg.Majority (77%) of the samples had good nutritional status. Among the study participants 74% of the subjects had the history of inadequate breast feeding. All (100%) the study participants were completed their immunizations up to the age. Majority (84%) of the samples were no significant history of respiratory disorders in their family.

Figure – 1: Frequency of Acute Respiratory Infections (ARI) episodes among study participants

Most of the study participants (45.75%) having a recurrence of the Acute Respiratory Infections (ARI) in 9-11 months after the current infection (Figure-1).

Figure – 2: Monthly incidences of Acute Respiratory Infections (ARI) among study participants (Jan 2016-Dec 2016)

There is a steady increase in the incidence of acute respiratory infections among under five children is observed during the month of April (10.25%) to June (28%)(Figure-2).

Table – 1: Association between socio-demographic variables and frequency of acute respiratory infections

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Variables</th>
<th>$\chi^2$ Value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age</td>
<td>83.77</td>
<td>&lt; 0.00001*</td>
</tr>
<tr>
<td>2.</td>
<td>Domicile</td>
<td>11.21</td>
<td>.02*</td>
</tr>
<tr>
<td>5.</td>
<td>Method of waste disposal</td>
<td>69.04</td>
<td>&lt; 0.00001*</td>
</tr>
<tr>
<td>6.</td>
<td>Smoking habits of parents</td>
<td>20.63</td>
<td>.008*</td>
</tr>
</tbody>
</table>

* Significant at P< 0.05

Table – 2: Association between clinical variables and frequency of respiratory infections

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Variables</th>
<th>$\chi^2$ Value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Birth Weight</td>
<td>10.77</td>
<td>.02*</td>
</tr>
<tr>
<td>2.</td>
<td>Nutritional status</td>
<td>41.44</td>
<td>&lt; 0.00001*</td>
</tr>
</tbody>
</table>

* Significant at P< 0.05

Discussion

The present study revealed that there is an association between the age group of the under five children and the frequency of acute respiratory infections .The similar finding was reported by a study conducted in Haryana in 2012. There is a significant association between Domicile, Method of waste disposal, parent’s
smoking habits and frequency of respiratory infections. The finding is consistent with the study conducted by Sharma D, et al.\textsuperscript{3}\textsuperscript{,} frequency of the acute respiratory infections having a significant association between birth weight and nutritional status of the under-five children. The simile findings were reported by two studies from Tamilnadu, India (2009-2010) and Solapur, India (2000-2001)\textsuperscript{2-3}.

**Conclusion**

This study highlights the influence of the major socio-demographic and clinical variables in the development of acute respiratory infections and its repeated attacks in under-five children. Hospitalization for acute respiratory infections in young children poses a substantial burden on health services, especially in developing countries. However, since the majority of these risk factors are potentially preventable, governments should consider what action can be taken to decrease the prevalence of these risk factors. In addition, it emphasizes the need for further studies investigating other potential risk factors. Since these risk factors are potentially preventable, health policies targeted at reducing their prevalence provide a basis for decreasing the burden of acute respiratory infections (ARI).

**Conflict of Interest:** None declared

**Source of Funding:** Self

**Ethical Clearance:** The study was approved by the institutional ethical committee

**References**


Oral Mucosal Lesions and Conditions in Patients with Dermatologic Diseases: How Common is It?

Arjun Tallada, Junaid Ahmed, Nandita Shenoy, Kashinath Nayak, Nanditha Sujir

1 Post Graduate, 2 Professor and Head, 3 Associate Professor, 4 Reader, Department of Oral Medicine and Radiology, Manipal College of Dental Sciences, Mangalore, Affiliated to Manipal Academy of Higher Education, Manipal

Abstract

Background: Oral lesions are strongly associated with skin lesions and can be easily neglected by dermatologists. This study aimed to estimate the frequency of Oral Mucosal Lesions (OML) in skin disease patients attending the outpatient’s facility of Kasturba Medical College and Hospital (KMCH) in Mangalore city.

Method: Randomly selected 1254 dermatology outpatients were examined for dermatological diseases and Oral Mucosal Lesions (OML) of which 180(15%) are related to oral conditions. Systematic comprehensive extra-oral and intra-oral clinical examinations based on visual inspection and palpation following the World Health Organization (WHO) criteria for field surveys was carried out. All these patients were questioned about their tobacco usage also.

Results: The most frequently observed oral condition was Herpes zoster (10.34%), Lichen planus (9.20%), Pemphigus vulgaris (8.05%), Hand–foot–and mouth disease (8.05%), leukoplakia (6.90%) and Oral submucous fibrosis (6.90%).

Conclusions: Our findings revealed that OML were frequently diagnosed in skin disease patients attending KMCH. This data underlines the importance of the diagnosis of oral conditions in Dermatology because they are frequent and may provide guidelines for an appropriate comprehensive management of patients. Our results project the need for a thorough evaluation of all patients for OML and a multidisciplinary approach in the management of such patients.

Keywords: Oral Mucosa, Applied aspect, dermatology, Oral Lichen Planus, pemphigus

Introduction

The prevalence rates of oral lesions in different populations show a wide variability. Till date, epidemiologic researches have been performed in normal population and the dental outpatient. Global epidemiological studies of Oral mucosal lesions (OML) are rare in comparison with studies on caries and periodontal diseases.

Muco-cutaneous conditions are a group of disorders mainly observed in dermatology practice. Oral mucosal manifestations may be an initial feature, the most florid clinical feature, or the only sign of such diseases. In other cases, lesions occur in both the skin and mucosa, with severe clinical manifestations involving the oral tissues.

Focussing on patients referred to a dermatologic clinic, Ramirez-Amador et al. reported a prevalence...
of 35% OML in subjects affected with muco-cutaneous conditions. Pemphigus vulgaris, Lichen planus, candidiasis and recurrent aphthous ulcers were the most frequently diagnosed conditions.

Oral mucosal involvement of some of the dermatologic disorders such as lichen planus, Behcet’s disease, pemphigus is well known. OML in skin diseases deserve special attention, considering that some are life-threatening, while others have a great impact on individuals and society in terms of pain, discomfort, social and functional limitations.

In this study, we aimed to determine the frequency of OML in skin diseased patients attending the outpatient facilities of Kasturba Medical College and Hospital (KMCH) in Mangalore city.

**Materials and Method**

The study was approved by the Institutional Ethics Committee of Manipal College of Dental Sciences and informed consent was obtained from the patients selected for the study. The study was conducted on 1254 consecutive dermatology outpatients who attended dermatology clinic at Kasturba medical college and hospital (Mangalore).

A detailed history was taken including questions regarding the socio-demographics (gender, age, general health), oral health related characteristics and lifestyle characteristics including smoking and the consumption of smokeless forms of tobacco and alcohol.

**Clinical oral examination:**

Oral examination was carried out with the subject in a supine position. Systematic comprehensive extraoral and intra-oral clinical examinations based on visual inspection and palpatation following the World Health Organization (WHO) criteria for field surveys was carried out. Clinical parameters were recorded using a structured questionnaire modified from the (WHO) assessment form for oral mucosal diseases.

**Skin examination:**

An expert dermatologist evaluated the patient’s dermatological disease through information obtained in a structured interview conducted in the outpatient department of the dermatology clinic.

Elements which were evaluated during skin examination were chief complaint, duration and history of chief complains. Past history and family history was recorded.

**Data management and statistical analysis**

Data were analysed using the statistical packages for social sciences (SPSS, version 15.0). The level of statistical significance was set at 5%. Cross tabulation and Chi-square with Fishers exact test were used to test the statistical significance of the relationships between skin disease groups and types of OML.

**Results**

During the period of 3 months there were 1254 appointments in the dermatology clinic of which 180 (15%) are related to oral conditions. The median age of the patients was 42 years (range, 4-80 years). Twenty eight patients (32 %) were women. Fifty nine patients (68 %) were men.

<table>
<thead>
<tr>
<th>Table 1: Incidence of cases reported in the dermatology clinic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral lesion &amp; conditions</td>
</tr>
<tr>
<td>Lichen planus</td>
</tr>
<tr>
<td>Geographic tongue</td>
</tr>
<tr>
<td>Pyogenic granuloma</td>
</tr>
<tr>
<td>Pemphigus vulgaris</td>
</tr>
<tr>
<td>Pemphigoid</td>
</tr>
<tr>
<td>Erythema multiforme</td>
</tr>
<tr>
<td>Steven Johnson syndrome(SJS)</td>
</tr>
</tbody>
</table>
Table 1: Incidence of cases reported in the dermatology clinic

<table>
<thead>
<tr>
<th>Muco-cutaneous conditions</th>
<th>Papillosquamous disorders</th>
<th>Genodermatoses</th>
<th>Infectious diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lichen planus</td>
<td>Psoriasis</td>
<td>Ectodermal dysplasia</td>
<td>Hand-foot-and-mouth disease</td>
</tr>
<tr>
<td>Pemphigus vulgaris</td>
<td>Tuberous sclerosis</td>
<td>Neurofibromatosis</td>
<td>Varicella</td>
</tr>
<tr>
<td>Pemphigoid</td>
<td></td>
<td></td>
<td>Hansen disease</td>
</tr>
<tr>
<td>Erythema Multiforme</td>
<td></td>
<td></td>
<td>HIV*</td>
</tr>
<tr>
<td>Stevens Johnson syndrome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toxic Epidermal Necrolysis</td>
<td></td>
<td></td>
<td>HIV*</td>
</tr>
<tr>
<td>Lupus</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Include pseudomembranous candidiasis, Kaposi sarcoma, herpetic lesions, linear gingival erythema, and Oral hairy leukoplakia.

Pemphigus vulgaris (PV) was observed in 7 patients (8 %) with the age ranges (24-45 years). In two patients PV was confined to the oral mucosa, and in three patients PV involved oral mucosa and skin, and in two subjects PV involved oral mucosa, skin and conjunctiva.

Lichen planus (LP) was observed in 8 patients (9.2%) with the age ranges (10-67 years). In three patients (37.5%) LP involved the oral mucosa and skin. Oral involvement in LP mainly involved buccal mucosa, dorsum of the tongue, and lips. In the remaining 5 patients only skin involvement was present. In oral mucosal involvement, erosive and reticular forms of LP were most commonly observed. Two of the LP cases showed erosive component only and one case had papular and reticular type of LP.

Table 2: Classification of oral lesions and conditions found in 87 patients in dermatology clinic

<table>
<thead>
<tr>
<th>Muco-cutaneous conditions (n=29)</th>
<th>Papillosquamous disorders (n=19)</th>
<th>Genodermatoses (n=5)</th>
<th>Infectious diseases (30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lichen planus</td>
<td>Psoriasis</td>
<td>Ectodermal dysplasia</td>
<td>Hand-foot-and-mouth disease</td>
</tr>
<tr>
<td>Pemphigus vulgaris</td>
<td>Tuberous sclerosis</td>
<td>Neurofibromatosis</td>
<td>Varicella</td>
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<tr>
<td>Pemphigoid</td>
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<tr>
<td>Erythema Multiforme</td>
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<td>HIV*</td>
</tr>
<tr>
<td>Stevens Johnson syndrome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toxic Epidermal Necrolysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lupus</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Includes drug induced pigmentation, anaemic stomatitis, linear gingival erythema, traumatic fibroma, lichenoid reaction, drug induced gingival enlargement.
The median age of the patients with herpetic lesions was 45 years (ranges 22-58 years). Most common sites of the lesions were tongue, hard palate and soft palate. 9 patients (10.34%) had oral manifestations of herpes zoster, out of which all were males. Most common presentation of these oral lesions was as multiple small oral ulcers.

The lesions of reactive muco-cutaneous disorders like (Erythema Multiforme, Steven Johnson’s Syndrome, and Toxic Epidermolysis Necrosis Syndrome) mainly involved several oral mucosal surfaces which include buccal mucosa, tongue, hard palate and soft palate. Two of the cases were drug related (Sulphonamides) and one case was associated with herpes simplex virus.

Hand-foot-and mouth disease (HFMD) was first described by Robinson and colleagues (1958) from an outbreak in Toronto caused by Coxsackie virus A16. The individuals range in the age group of 4-6 years. In the present study, 7 individuals (8.05%) were diagnosed with hand-foot-mouth disease. 6 individuals (85%) had oral lesions (papules, vesicles, ulcers) and the most common oral sites involved were the lips and the tongue.

Psoriasis was observed in 19 (10.5%) individuals in whom one individual had oral manifestation of geographic tongue.

Other conditions like leukoplakia and oral submucous fibrosis (OSMF) were also found in the study. 12 patients (13%) were found to be diagnosed with potential malignant disorders like leukoplakia and OSMF with a median age group of (range, 22-60 years) and nine individuals had the habit of chewing tobacco and the most common oral mucosal site involvement was buccal mucosa.

In the present study five individuals were diagnosed with Genodermatoses conditions like Hereditary Ectodermal dysplasia, Tuberous sclerosis, Neurofibromatosis.

**Discussion**

Variety of conditions can appear clinically as ulcers in the oral cavity. In our study diseases such as PV, Erythema multiforme, Hand-foot-and mouth disease, herpetic lesions were seen as ulcerations.

Oral mucosal lesions increase with age but in our study as many individuals were diagnosed with Hand-foot-and mouth disease that had oral manifestation of ulcers and papules in the oral cavity ranged in the age group of (4-6 years). In our series the most common infectious diseases were herpetic lesions 9 (10.94%).

Geographic tongue is fairly common in the general population, affecting 1% to 2% of normal persons, but is more frequently encountered in patients with psoriasis, particularly generalized pustular psoriasis. Studies report incidences of geographic tongue in patients with psoriasis to be anywhere from 5% to 10%10-13. Geographic tongue has also been noted in other dermatologic conditions, including atopic dermatitis, but its incidence is higher in pustular psoriasis than in those conditions 13. In our series 19 (10.5%) individuals were diagnosed with psoriasis, however only (5%) individual had oral manifestation of geographic tongue.

Oral lichen planus develops in women twice as often as in men, with a mean age of onset in the sixth decade of life. OLP is uncommon in children but when it develops in this age group, it is frequently erosive and painful. In our series five (18%) females and 3 (5%) males were diagnosed with lichen planus with mean age of onset in fifth decade of life. Children with OLP often have concomitant cutaneous disease14,15 and those of Asian descent may be predisposed to the development of the disease 16.

A remarkable finding in our study was two patients who were diagnosed with tuberous sclerosis; one patient had oral manifestation of fibroma on the buccal mucosa. One patient who was diagnosed with neurofibromatosis had oral manifestation of fibroma on ventral surface of the tongue.

Tuberous sclerosis complex (TSC) has been described and studied for more than 160 years17,18. Abnormalities of the skin, central nervous system, kidney, and heart are prominent features of this disorder. In our study two (1%) individuals were diagnosed with this disorder based on the diagnostic criteria. Oral fibromas in TSC have also been described on the buccal mucosa and dorsum of the tongue19. In our study one individual had shown fibroma on the buccal mucosa. In our study 5 individuals (3%) who were diagnosed with AIDS had oral manifestations like Pseudomembranous candidiasis, Oral hairy leukoplakia, Kaposi sarcoma and linear gingival erythema.
Conclusions

Our findings revealed that OML were frequently diagnosed in skin disease patients attending KMCH and underline the importance of the diagnosis of oral conditions in Dermatology because they are frequent and can provide guidelines for an appropriate management of patients. Our results project the need for a thorough evaluation of all patients and a multidisciplinary approach in the management of affected patients.

Ethical Clearance- Taken from the institutional Ethics Committee of Manipal College of Dental sciences, Mangalore.

Source of Funding- Self

Conflict of Interest -Nil

References

Impact of Vitamin D Supplementation on Anthropometric, Glycemic and Lipemic Profile in Subjects with Type 2 Diabetes: A Randomized Control Trial

Arti Muley¹, Uma Iyer²

¹Assistant Professor, Symbiosis School of Biological Sciences, Symbiosis International (Deemed) University, Symbiosis Knowledge Village, Lavale, Pune, Maharashtra, India, ²Professor, Department of Foods & Nutrition, Faculty of Family & Community Sciences, The Maharaja Sayajirao University of Baroda, Fatehgunj, Vadodara, Gujarat

Abstract

Background: Vitamin-D Deficiency is linked with pathogenesis and progression of diabetes, hypertension, and cardiovascular diseases through various vitamin-D receptors present on tissues and organs in the body. Literature suggests, vitamin-D replenishment improves concentration of lipids and insulin secretion in subjects with type-2 diabetes mellitus (T2DM) and established vitamin-D deficiency. This randomised control trial aimed to study the impact of vitamin-D3 granules on anthropometric measurements, glycemic and lipid parameters in T2DM subjects.

Method: 70 T2DM subjects of age 30-65y, having serum 25(OH)D levels <20ng/ml were randomly divided in two groups; supplementation group (n=40) receiving weekly 60,000 IU vitamin-D3 granules for 8 weeks and the control group (n=30). The anthropometric (waist & hip circumference, BMI) and blood pressure measurements were recorded. Fasting blood samples were taken for estimation of 25(OH)D, lipid profile and HbA1c, before and after supplementation period. Analysis was done using SPSS v20 by independent and paired t-test.

Results: The mean serum vitamin D levels of supplementation and control group were 12.1±3.3 and 10.9±3.3 respectively. After the supplementation significant rise in 25(OH)D levels was seen in supplemented group as compared to controls. A significant decrease in weight, waist-circumference, total cholesterol & LDL-C was observed in supplementation group, post intervention, while HbA1c levels decreased non-significantly.

Conclusion: Vitamin-D supplementation improved the anthropometric and lipid parameters among the subjects, thus suggesting a beneficial role on cardio-metabolic profile of the T2DM subjects.

Key words- 25(OH)D levels, type-2 diabetes mellitus, supplementation, adults, India

Introduction

Vitamin-D inadequacy is a worldwide problem with potential consequences for many chronic diseases, including obesity, cardiovascular disease and type 2 diabetes mellitus (T2DM). Evidence shows that vitamin-D status is important to regulate some pathways related to diabetes development, thus making vitamin-D deficiency (VDD) more evident in diabetic subjects. A
review indicated that VDD may predispose to glucose intolerance, altered insulin secretion and finally to T2DM, either through a direct action via vitamin-D receptor (VDR) activation or indirectly via calcemic hormones or through inflammation. Based on data from epidemiological studies, vitamin-D supplementation is considered to be a potential and inexpensive therapy to increase the serum 25-hydroxyvitamin-D [25(OH)D] levels not only to decrease the risk, but also to improve glycemic parameters in T2DM subjects. In a study among 100, T2DM subjects aged 30-70 years, significant improvements were seen in serum fasting plasma glucose, insulin and in HOMA-IR after treatment with 50,000 IU of vitamin-D3 orally per week for eight weeks. Beneficial effects of vitamin-D supplementation for lipemic parameters have also been reported among diabetics. In India, usually physicians prescribe a vitamin-D3 (cholecalciferol) sachet of 1500 µg (60,000 International Units [IU]) to be taken each week for 6–8 weeks for overt or occult VDD among the general population. However, the exact dose and duration for supplementation needs to be evaluated specifically for diabetic subjects. Also the impact of supplementation on cardio-metabolic profile requires further systematic research. Keeping this need in mind the present randomised control trial (RCT) was framed to study the impact of vitamin-D3 granules supplementation on the serum 25(OH)D levels, anthropometric measurements, glycosylated haemoglobin-A1c (HbA1c) and lipid parameters in adult subjects with T2DM.

### Material and Method

The RCT was conducted in an urban city of western India. A diabetic clinic was selected purposively for the enrolment of the subjects with T2DM (30-65 years). After screening, 94 subjects with serum vitamin-D levels <20ng/ml were randomly divided into two equal groups: supplementation group and control group using computer generated random number tables. 24 subjects (7 and 17 in supplementation and control group respectively) dropped out as were unable to continue or started vitamin-D supplementation in the coarse of time. Thus the intervention study was carried out on 70 subjects (40 in supplementation group and 30 controls). The intervention group received 60,000 IU cholecalciferol (D3) granules in a sachet, procured from USV Limited, Mumbai, once a week for tenure of eight weeks.

Information regarding socio-demographic characteristics and medical history was collected using a pre-tested semi-structured questionnaire. Weight was taken using calibrated Salter electronic bathroom scale. Height, waist and hip circumference were measured using non-stretchable fibre glass tape to the nearest 0.1cm. The waist was defined as the point midway between the iliac crest and coastal margin; while hip circumference as the widest circumference over the buttocks and below the iliac crest. Body mass index (BMI) was calculated by standard formula of weight in kg / height² in meters. Percentage body fat was calculated using the Omron body fat monitor (Model HBF-306). Blood pressure was measured by clinically validated digital BP meter (Omron HEM-7203 model).

For the biochemical profile, after an over-night fast, venous blood samples were collected by a trained technician. 25(OH)D for vitamin-D status was estimated by Chemiluminescence Immunoassay (CLIA) technique using kits by Simens – ADVIA Centaur. VDD was defined as serum 25(OH)D concentration of <20ng/ml and categorized as insufficiency (20-≤30 ng/ml) and sufficiency (>30 ng/ml). Lipid profile was analysed by Photometry using kits by Aggape and Rapid Diagnostics. HbA1c was estimated by HPLC technique. The biochemical analyses were done at an ISO 9001:2008, NABL (India) and College of American Pathologist certified laboratory.

Data was entered in Microsoft Excel 2007. SPSS version 20 was used for statistical analysis of the data. A two-tailed p<0.05 value was used for calculating statistical significance. For quantifiable variables, descriptive statistics were calculated. Comparison of means pre-post supplementation was done using independent t-test.

### Findings

The mean age of the subjects was 54.0±7.7 years. At baseline, all subjects were vitamin D-deficient with serum 25(OH)D levels <20 ng/ml. Change in serum 25(OH)D values performed at baseline and after supplementation at eight weeks are given in Table 1. Serum 25(OH)D significantly increased in supplementation-group (p<0.001). The levels also increased in the control-group significantly; however they still were in deficiency range (10.9±3.3 Vs 15.5±4.3ng/ml). After the supplementation eighty percent (32/40) of the subjects in the supplementation-group
achieved the sufficiency status for serum 25(OH)D, while for the controls nearly eighty percent (23/30) remained in the deficient range (Figure 1). Among the supplementation-group about twenty percent subjects remained in the insufficiency range.

A favourable trend was seen for the anthropometric measurements of the subjects taken at baseline and post supplementation (Table 2). It was observed that within the supplementation-group; weight (p=0.001), waist circumference (p=0.025), waist-stature ratio (p=0.031), systolic blood pressure (p=0.035) and diastolic blood pressure (p=0.010) significantly decreased. A significant decline in systolic blood pressure (p=0.036) was also observed among the controls. After the supplementation, between the groups almost all the anthropometric measurements were lower in the supplementation-group as compared to control-group with weight (p=0.027) and waist circumference (p=0.012) having decreased significantly.

Post supplementation there was a non-significant decline in the HbA1c levels for both the groups. It was positive to see that the supplementation-group had lower values as compared to control-group after eight weeks though the difference was not statistically significant (Table 3). Similarly lipid parameters of the subjects were studied to see the impact of supplementation on their lipemic profile (Table 4). It was observed that LDL-C decreased significantly (p<0.001) for the both the groups after eight weeks of supplementation. The control-group showed a significant decrease in total cholesterol (p=0.03) values as well, while for the supplementation-group lipid ratios TC/HDL-C (p=0.02) and LDL/HDL (p=0.001) decreased significantly. However between the groups post supplementation, the supplementation-group had significantly lower levels for total cholesterol (p=0.037), LDL-C (p=0.035) and the ratios TC/HDL-C (p=0.022) and LDL/HDL (p=0.021). The rest of the parameters also showed a favourable decreasing trend among the supplementation-group at eight weeks, though the difference was non-significant.

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**Table 1: Mean Vitamin-D Levels of the Subjects Pre & Post Supplementation (n=70) [Mean ± SD]**

<table>
<thead>
<tr>
<th></th>
<th>Supplementation group (n=40)</th>
<th>Control group (n=30)</th>
<th>Independent t-test p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>12.1±3.3</td>
<td>10.9±3.3</td>
<td>0.000***</td>
</tr>
<tr>
<td>Post</td>
<td>43.6±16.2</td>
<td>15.5±4.3</td>
<td></td>
</tr>
<tr>
<td>Paired t</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td></td>
<td></td>
<td>0.000***</td>
</tr>
</tbody>
</table>

p< 0.001***

**Figure 1: Vitamin-D Status of the Subjects Post Supplementation (n=70) [n,%]**

---

**Table 2: Anthropometric Measurements of the Subjects Pre & Post Supplementation [Mean ± SD]**

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Supplementation group (n=40)</th>
<th>Control group (n=30)</th>
<th>Independent t-test p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>Post</td>
<td>p-value</td>
<td>Pre</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>70.5±13.3</td>
<td>67.2±13.2</td>
<td>0.001***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>27.9±5.0</td>
<td>27.8±5.1</td>
<td>0.765</td>
</tr>
<tr>
<td>Waist Circumference</td>
<td>95.4±11.2</td>
<td>92.9±10.7</td>
<td>0.025*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hip Circumference</td>
<td>101.6±13.0</td>
<td>100.0±10.4</td>
<td>0.101</td>
</tr>
<tr>
<td>WHR</td>
<td>0.94±0.07</td>
<td>0.93±0.07</td>
<td>0.273</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 2: Anthropometric Measurements of the Subjects Pre & Post Supplementation [Mean ± SD]

<table>
<thead>
<tr>
<th></th>
<th>Supplementation group (n=40)</th>
<th>Control group (n=30)</th>
<th>Independent t-test p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSR</td>
<td>0.6±0.07</td>
<td>0.59±0.07</td>
<td>0.031*</td>
</tr>
<tr>
<td>% Body fat</td>
<td>36.2±6.7</td>
<td>35.2±6.9</td>
<td>0.089</td>
</tr>
<tr>
<td>SBP (mmHg)</td>
<td>141.6±18.6</td>
<td>134.8±18.8</td>
<td>0.035*</td>
</tr>
<tr>
<td>DBP (mmHg)</td>
<td>85.0±9.1</td>
<td>81.5±7.2</td>
<td>0.010**</td>
</tr>
<tr>
<td>% Body fat</td>
<td>36.2±6.7</td>
<td>35.2±6.9</td>
<td>0.089</td>
</tr>
<tr>
<td>SBP (mmHg)</td>
<td>141.6±18.6</td>
<td>134.8±18.8</td>
<td>0.035*</td>
</tr>
<tr>
<td>DBP (mmHg)</td>
<td>85.0±9.1</td>
<td>81.5±7.2</td>
<td>0.010**</td>
</tr>
</tbody>
</table>

p< 0.05*, 0.01**, 0.001***

### Table 3: HbA1c Levels of the Subjects Pre & Post Supplementation [Mean ± SD]

<table>
<thead>
<tr>
<th></th>
<th>Supplementation group (n=40)</th>
<th>Control group (n=30)</th>
<th>Independent t-test p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>8.6±1.5</td>
<td>8.5±1.4</td>
<td></td>
</tr>
<tr>
<td>Post</td>
<td>8.3±1.7</td>
<td>8.4±1.7</td>
<td>0.096</td>
</tr>
<tr>
<td>Paired t p value</td>
<td>0.096</td>
<td>0.607</td>
<td></td>
</tr>
</tbody>
</table>

### Table 4: Lipid Profile of the Subjects Pre & Post Supplementation [Mean ± SD]

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Supplementation group (n=40)</th>
<th>Control group (n=30)</th>
<th>Independent t-test p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC (mg/dl)</td>
<td>174.9±38.6</td>
<td>167.1±41.5</td>
<td>0.098</td>
</tr>
<tr>
<td>TG (mg/dl)</td>
<td>137.9±62.9</td>
<td>128.1±54.9</td>
<td>0.268</td>
</tr>
<tr>
<td>HDL-C (mg/dl)</td>
<td>44.1±10.1</td>
<td>44.8±11.2</td>
<td>0.287</td>
</tr>
<tr>
<td>LDL-C (mg/dl)</td>
<td>106.1±24.8</td>
<td>83.9±29.0</td>
<td>0.000***</td>
</tr>
<tr>
<td>VLDL-C (mg/dl)</td>
<td>27.5±22.6</td>
<td>25.6±10.9</td>
<td>0.27</td>
</tr>
<tr>
<td>TC/HDL</td>
<td>4.1±1.1</td>
<td>3.8±0.9</td>
<td>0.02*</td>
</tr>
<tr>
<td>TG/HDL</td>
<td>3.4±1.9</td>
<td>3.1±1.7</td>
<td>0.25</td>
</tr>
<tr>
<td>LDL/HDL</td>
<td>2.4±0.7</td>
<td>1.9±0.6</td>
<td>0.000***</td>
</tr>
</tbody>
</table>

p< 0.05*, 0.01**, 0.001***

### Conclusion

In view of the Endocrine Society’s Practice Guidelines recommendation for treatment strategies a dose of 60,000 IU oral vitamin-D3 was given weekly for eight weeks. The guidelines are for patients with vitamin D deficiency depending on age and underlying medical conditions. After eight weeks of supplementation, mean serum 25(OH)D levels increased to the range currently considered adequate or sufficient for bone health & extra skeletal functions in about eighty percent of the supplemented subjects thus indicating that supplementation to achieve higher levels of vitamin D remains a promising adjuvant therapy for T2DM patients. Similar significant increase in serum 25(OH)D levels after supplementation have been reported among T2DM subjects by various authors with different baseline serum 25(OH)D levels, cholecalciferol doses used, duration of study, and response to supplementation. There are several reports that have shown an inverse relationship between vitamin D levels and obesity, even in different definition of obesity according to weight, BMI and waist circumference and this correlation...
was not dependent on dose of vitamin D supplements provided to the subjects. Our study also reported a significant decrease in weight and waist circumference post supplementation thus indicating that vitamin-D3 supplementation can alter the risk of abdominal obesity which is determined as one of the proven risk factors for T2DM. However the results differed to other studies which reported no significant changes in BMI & WC after vitamin D supplementation. Ethnicity of the subjects and duration of diabetes may be one of the possible reasons for these differences.

Vitamin D supplementation is considered as one of the novel strategies toward prevention and control of T2DM. However in the present study vitamin-D supplementation did not significantly lower the HbA1c levels among the subjects. This might be due to shorter study period which was unable to trace profound changes in the parameter. Witham also reported that vitamin D intake (at different dosage) had no effects on insulin resistance or on HbA1c values. A systematic review of fifteen trials also reported no significant improvement in fasting glucose, HbA1c or insulin resistance in those treated with vitamin D compared to placebo. Similarly there is enough evidence to support that vitamin D supplementation can independently improve cardiovascular risk. One mechanism may involve direct promotion of large HDL particle formation, via elevations in serum apolipoprotein A1 (ApoA1) concentrations, a process that increases reverse cholesterol transport.

Furthermore, the improved lipid profile of the T2DM subjects can also be attributed to lipid-lowering drugs, which are administered in the population with altered lipid profile. In the present study 32.5% (13/40) of supplementation-group and 14.4% (4/30) in control-group reported consumption of cholesterol lowering drugs. Our study also reported a significant decrease in total cholesterol and LDL-C and lipid ratios, while a non-significant increase in HDL-C in the supplemented group. Alkharfy et al (2013) reported similar results at end of 12 months of vitamin-D supplementation with a significant decrease in endothelial and cardiovascular parameters among Saudi T2DM subjects on different therapeutic regimes. The circulating 25-hydroxyvitamin D levels remained below normal 18 months after the onset of treatment in this group yet it significantly improved lipid profile with a favourable change in HDL/LDL ratio.

Few limitations should be mentioned. Firstly, the duration of eight weeks was very small to observe prominent changes in many of the parameters. Secondly the differences in various parameters were not seen across the duration of disease and based on various medication regimes (though it was not changed during the study period), which may interfere with the vitamin-D metabolism. However the findings have added to the existing knowledge of role of vitamin-D supplementation in improving anthropometric measurements and lipid profile in T2DM.

Thus to conclude, further long term research to see the effect of vitamin-D3 on the control of diabetes and to determine the sustainability of the serum 25(OH)D sufficiency status among diabetics after supplementation is needed. Also despite the close link of vitamin-D with human health, vitamin D inadequacy is not widely recognized as a problem by physicians, academicians and patients, which call for creating awareness among them.

Conflict of Interest: The authors declare no conflict of interest.

Source of Funding: The study was funded by University Grants Commission, New Delhi in the form of research fellowship to corresponding author.

Ethical Clearance: The study is approved by Institutional Ethics Committee for Human Research (No. IECRH/2013/04), the trial has been registered retrospectively in Clinical Trials Registry-India (No. CTRI/2016/08/007130).

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Nutrigenomics: Gene-diet Interactions

Avineet Kaur¹, Malook Vir Singh²

¹Assistant Professor, Maharishi Markandeshwar College of Dental Sciences and Research, Mullana, Dept of Periodontology and Oral Implantology, ²Medical Officer, Govt of Punjab, National Health Mission, Civil Dispensary, Phase II, Mohali

Abstract

Nutrigenomics is a borderline discipline; it’s a branch of ecogenomics which deals with genetic factors that influence the biological response to diet and its influence on the expression on genes. This interaction has lead to a new scientific field leading to the interaction of genetic variation which the role of genetics with nutritional requirements have to lead to reducing susceptibility to chronic diseases.

Key words: Ecogenomics, gene, nutrigenomics.

Introduction

Nutrigenomics, otherwise known as ‘nutritional genomics’, is a branch of science which attends to all the genetic factors that influence the biological response to diet as well as the impact of diet on gene expression. It is a branch of a broader domain, called ecogenomics that addresses the role of genetic polymorphisms which results in the variability of organisms’ that responds to environmental factors.

The term genomics describes the process by which all genes present in the genome of a given species can be mapped, sequenced and characterized.¹

Other Terminologies

Transcriptomics describes the approach in which mRNA, and consequently gene expression, are analyzed in a biological sample under certain conditions at a given point in time.

Proteomics is the term that further aims to characterize all proteins in a biological sample at the functional level.

Metabolomics is used to describe the quantitative analysis of all metabolites in a biological system such as the cell, tissue or biological fluid (blood, plasma, and saliva).²

Ecogenetical diseases are produced after interaction of genetic vulnerability and environment aggression³

Environmental agents involved are as follows

• infectious ecogenomics
• nutritional ecogenomics (nutrigenomics)
• physical ecogenomics
• chemical ecogenomics (including toxicogenomics and the most developed branch of pharmacogenomics).¹

Aim of nutrigenomics

Nutrigenomics aims to reveal the relationship between nutrition and the genome, thus providing the scientific basis to improve public health through dietary means. Interactions between genotype and diet are important in determining the risk for most common complex diseases, including periodontal disease.

Numerous nutritional genetic studies were documented and markers of disease risk were found, most notably cardiovascular disease and cancer⁴-¹¹ thus providing proof of principle. Recently meta-analysis data was collected which compared Western and Asian populations that estimated a reduction in prostate
cancer risk of approximately 30% for men consuming high soy isoflavone diets. It has also been estimated that high intake of food rich in soy can be related to a reduction of approximately 15% in breast cancer risk for premenopausal women.\(^{13,14}\)

**Nutrigenomic segmentation**

Nutrigenomic segmentation means the limits of ‘personal nutrition’ into business models which are being exploited, but it may be needed in the future, consumers should get the value-added proposition for ingredients and products that are delivered by the food industry.\(^{15}\)

Up till now, taste, cultural norms and various stages of life dominate the consumer-centric model of personal nutrition. Prevalence of gingivitis and periodontitis as forms of periodontal disease in humans\(^{16}\) are caused as a result of inflammatory and immune responses to bacterial infections of the gingival tissues. Risk factors that are host-based such as the genetic background of an individual, socio-economic status, smoking and dietary habits lead to alteration of the innate susceptibility of the host to periodontal disease.\(^{17,18}\)

Recently it has been documented that nutrition is important in maintaining the balance between microbial challenges and host response as it has been implicated in a number of inflammatory diseases and conditions, including type 2 diabetes, cardiovascular disease, rheumatoid arthritis and inflammatory bowel disease, which are related to periodontal disease.\(^{19}\) Diet with high saturation of fats and sugar while maintaining low levels of fruit, vegetables, and fibers are common risk factors which leads to chronic diseases.\(^{20}\)

Prospective, observational study carried out over 14 years revealed that men with a high consumption of whole grain were in fact 23% less likely to develop periodontitis than those who had the lowest consumption of wholegrain.\(^{21}\) Furthermore, three separate analyses of the US Third National Health and Nutrition Examination Survey (NHANES III) produced statistically significant associations between periodontitis and markers of increased body mass, thus leading the authors to conclude that obesity has an association with periodontal disease, especially in younger subjects.\(^{22,23,24}\) The evidence for a direct link between periodontal disease and nutrition comes mainly from observational cross-sectional studies, with a large proportion finding that there was no significant association between the nutrient being analyzed and indicators on status of periodontal disease.\(^{25}\)

**Periodontal Disease and Reactive Oxygen Species**

Increase in production of reactive oxygen species in body raises requirements for the antioxidant nutrients involved in defense thus, it modulates periodontal health. Various antioxidant vitamins (vitamins A, C, and E) and trace elements (selenium, copper and zinc), are depleted during periods of inflammation, which counteract reactive oxygen species therefore it will lead to damage of cellular tissues therefore modulating immune-cell function through the regulation of redox-regulated transcription factors which affects the production of cytokines and prostaglandins.\(^{26}\)

Fish oil is the main source of intake of n-3 polyunsaturated fatty acids, that increase the tissue concentrations of eicosapentaenoic acid and docosahexaenoic acid, which in turn down regulate inflammation.\(^{27}\)

Additionally in a longitudinal study for periodontal disease markers in elderly patients revealed that those who consumed the low level of n-3 fatty acids have a high incidence of periodontal disease, thus suggesting an inverse relationship between dietary n-3 fatty acid intake and the progression of periodontal disease in older people.\(^{28}\)

**Gene and Diet Interactions**

Most of the emphasis on gene-environment interactions is on gene-diet interactions. Studies included both observational and intervention studies show major concern about dietary intake from observational studies and it was found that dietary intake assessments don’t accurately reflect true intake of the individual.

It is important to underscore the consolidation of certain genes regarding their role in lipid metabolism and modulation by dietary factors. This is the case of the APOA5 gene, involving the long-known but cryptic APOA2, suggesting potential roles of this apolipoprotein on dietary intake, body mass index, and postprandial lipemia.

Although most of the gene-diet interactions are mainly focusing on dietary fats, other habits like coffee drinking have been studied and observed interactions between the adenosine A2A receptor (ADOR2A), the
CYP1A2 genes and caffeine intake. A modulation was reported of caffeine intake with a genetic variability at the place of ADORA2A gene. Researchers in UK and New Zealand, tested whether children’s intellectual development was influenced either with genetics and early nutrition – i.e. breastfeeding versus formula feeding. It showed that the associates between breast feeding and IQ is moderated by genetic variant in FADS2, a gene involved in the genetic control of fatty acid pathways. T2Rs, receptors as many as 60 are involved in bitter-taste detection, are one of several families of G-protein-coupled receptors, selectively expressed in subsets of taste receptor cells. A wide range of structurally unrelated compounds, such as peptides, amino acids, ureas, thioureas, terpenoids, phenols, and polyphenols, give rise to a uniform bitter taste, these are a large number of distinct bitter taste receptors.

Phenylthiocarbamide (PTC) and 6-n-propylthiouracil (PROP), are two compounds that taste bitter to some individuals but are tasteless to others, used in genetic linkage studies. Women are identified as medium and supertasters they have lower acceptance scores for grapefruit juice, green tea, Brussels sprouts, and soybean curd (tofu) as compared to nontasters of PROP.

Food Allergies

Food allergies are characterized by and dependent on the induction of an immune response of one or more proteins. Although a variety of factors, such as timing, duration, and extent of exposure are key determinants, genetic predisposition also plays a key role.

Celiac Disease

Celiac disease otherwise known as celiac sprue and gluten-sensitive enteropathy, it is a multifactorial disorder of the small intestine. The clinical manifestation results from inflammatory injury to the mucosa of the small intestine after the ingestion of wheat gluten or related rye and barley proteins. The specific protein subunits which cause the damage are gliadins and phylogenetically-related rye secalins and barley hordeins. Celiac disease has a strong genetic association with human leukocyte antigen (HLA) class II antigens among which 95% of celiac disease patients are HLA-DQ2 carriers, the rest of them are HLA-DQ8 carriers.

Celiac disease can be treated with strict adherence to a gluten-free diet, omitting wheat, rye, barley, and possibly oats.

Polymorphism in Lipid Metabolism

Dietary fats absorbed into the intestine are packaged into large triacylglycerol-rich chylomicrons which are delivered to sites of lipid metabolism or storage. Lipoprotein lipase (LPL) thus causes lipolysis that forms chylomicron remnants. The remnants pick up the apolipoprotein E (apoE) and cholesteryl ester from high-density lipoproteins (HDLs) endogenous metabolism is required to handle the lipoproteins. In the liver, hepatocytes synthesize and secrete triacylglycerol-rich, very low-density lipoprotein (VLDL), which can be converted to intermediate-density and low-density lipoprotein (LDL) through lipolysis. Polymorphisms in lipoprotein pathways influence the efficiency of transport and handling of lipids and which alter the risk for cardiovascular disease.

Polymorphism in Biotransformation Enzymes and Its Effects in Cooked Meat

Cooked meat generates many compounds which are mutagenic in bacterial assays, and others are carcinogenic in animal models. The heterocyclic amines (HA) 2-amino-3,8-dimethylimidazo[4,5-f] quinoxaline (MeIQx), 2-amino-3,4,8-trimethylimidazo[4,5-f] quinoxaline (DiMeIQx), and 2-amino-1-methyl-6-phenylimidazo[4,5-b] pyridine (PhIP) are formed when food, particularly is cooked at high temperatures. Exposure to these cooking methods are readily absorbed and bioavailable. Metabolic activation of HA involves primarily CYP1-mediated-hydroxylation, followed by esterification by conjugating enzymes.

Personalized Nutrition and Consumer

The tracking of research on gene-environment interactions has the primary goal of gaining a better interpretation of the impact of nature and care for an individual’s metabolism. Some consumers are interested in the health benefits of personalized nutrition and other interventions, and this has resulted in some genetic testing products being offered to provide ‘personal dietary advice’ for them.

The Future of Nutrigenomics

Nutrigenomics is a profession with significant
challenges and hurdles to overcome, in the academic and the industrial world so the use of genetics is guiding dietary and lifestyle choices.

Pre-market review and post-market controls, genetic testing and laboratory registries, intensify involvement for third parties; and buyer education. Some nutrigenetic tests have been restricted by government bodies, scientists, doctors and purchaser organizations in the UK and the USA.  

The Footprints of Genomics on Creation in Foods and Drugs

Genomics is moving upheaval in food science and as well as pharmaceutical drug research and development. However, before new food products or drugs derived from these scientific advances will be able to enter the arena of commercial dealings. The desire that biotechnology would impact health in new ways has been at the cornerstone of the human Genome Project.

The blooming of New Food Products

A biomedical definition of food consists of essential nutrients in which both foods and drugs are recent innovations in foods. Foods that quell or prevent chronic diseases potentially depict the next trend in ‘added-value foods’. Fortification of foods could be achieved through attaching certain ingredients such as minerals and vitamins, so the emphasis is on alleviating the risk of chronic disease by removing ingredients such as fats, salt, and sugars. These blueprints in addition to advances in nutritional genomics, novel companies should be able to offer foods that enable consumers to live healthier and potentially longer lives simply by changing and surveilling their diets.

Conclusion

Various genetic variations are essential for estimating risk from all kinds of environmental agents thus more of efficient and cost-effective risk reduction approaches need to be designed. These approaches are mainly focusing on gene-diet synergism. So it’s quite difficult to standardize the environment than to as compared to clinical or biochemical traits. Major health problems can be addressed using molecular and more individually targeted approaches through nutrition genetic collaborations.

Ethical Clearance- Taken from. Institutional Ethical committee

Source of Funding- Self

Conflict of Interest - Nil

References


Rh factor and Autonomic Function Test in Normal and Deep Breathing

Chaitra Uppangala¹, Bhagyalakshmi Kodavanji², Vinodini NA³, Rekha D Kini³,
Nayanatara Arunkumar³, Anupama Noojibail³, Sneha Shetty³

¹Assistant Professor, Department of Physiology, Srinivas Institute of Medical Sciences and Research Center, Mukka, Surathkal, ²Professor and Head Department of Physiology, ³Associate Professor Department of Physiology, Kasturba Medical College, Mangalore. Manipal Academy of Higher Education, Manipal, Karnataka, India

Abstract

Background and Aim: Studies have revealed a relationship between erythrocytic antigens of the ABO and Rh blood systems and cardiovascular pathology. Reduced heart rate variability (HRV) indicates an increased risk factor for the development of cardiovascular diseases. The present study was aimed to do correlative analysis of Rh blood groups and HRV in normal individuals.

Materials and Method: This cross sectional study includes 120 healthy medical students (18-22 years) of both sexes, from Kasturba Medical College, Mangalore. The study was approved by institutional ethical committee and study was carried out with written informed consent of students. All the subjects were grouped in to Rh positive blood group and Rh negative blood groups based on the result of standard slide haem agglutination technique. ECG of all the subjects was recorded in lead II for a period of five minutes and HRV was analysed by measuring the R-R intervals using a software “HRV soft 1.1 Version” software package. The HRV was analyzed both by the time domain method and frequency domain analysis during normal breathing. HRV is also analysed by deep breathing test for one minute and analyzed by the time domain method. In the time domain method, RMSSD- the square root of the mean squared differences of successive RR intervals (in milliseconds) SDNN-Standard deviation of RR intervals (in milliseconds), pNN50 - percentage of differences between adjacent normal RR intervals exceeding 50 milliseconds were analyzed. In frequency domain method LF nu - Low frequency in normalized units, HF nu - High frequency in normalized units, LF/HF - Ratio between low frequency and high frequency was measured. Statistical tests included in this study were ANOVA and student’s unpaired t-test. P-value was taken as statistically significant at 5 percent confidence level (P<0.05).

Results: The time domain analysis and the frequency domain analysis of HRV among Rh positive blood group and Rh negative blood group subjects during normal breathing did not show any statistically significant changes. Further, comparison of HRV between Rh positive blood group and Rh negative blood groups during deep breathing using time domain method did not show any statistically significant results.

Conclusions: The present study, concludes that there were no significant change in the heart rate variability of Rh positive blood group and Rh negative blood groups subjects. Further research is needed including in a larger sample size to confirm these findings and to show the correlation of Rh groups and heart rate variability.

Keywords: Heart rate Variability, Time domain method, Frequency domain method, Rh blood group, deep breathing.

Introduction

The extraordinary complexity of the blood groups in association with human disease is a fascinating area in research. Currently there are about 285 blood group antigens according to International Society for Blood Transfusion. The Rh system, stands second most important blood group system in human blood and
it comprises about 50 antigens. Apart from the ABO antigens and Rh antigens, there are many other antigens, expressed on the RBC membrane. Heart rate variability (HRV) is considered a physiological occurrence. It can be measured by variation in heart beat to beat interval. HRV measurement can be used to assess the role of autonomic nervous function. Previous research also focus on the changes in the heart rate variability in healthy and non-healthy individuals. Incidence of various severe cardiac dysfunction has given scope for the emergence of the HRV as an important marker of cardiac abnormality. This current study aims to find out the relation between Rh blood groups and Heart rate variability (HRV) during normal and deep breathing, in normal individuals.

**Material and Method**

[120 volunteered healthy medical students, of age group 18–22 years, of both sexes, from Kasturba Medical College, Mangalore were participated in this study. The study was approved, and the procedures were followed in accordance with the institutional ethical standards. At orientation, each subject was explained the purpose, procedures and confidentiality of this study prior to their written informed consent. A detailed history was taken. They were subjected to preliminary medical check-up. A general physical examination was done for all the subjects and the height (in meters), weight (in kilograms), blood pressure (mmHg) and pulse rate (per minute) were noted. Body Mass Index (BMI) was calculated as the weight in kilograms divided by the square of the height in meters. Pulse rate and blood pressure were measured in sitting position after five minutes of rest. The basal recording of blood pressure was done using sphygmomanometer by standard Riva Rocci method. A systemic examination was also carried out for each subject. The following exclusion criteria were accepted for the investigation: presence of any serious cardiovascular disease, including arterial hypertension, metabolic, neurological, respiratory disorders, and history of smoking and alcohol intake that could influence heart rate variability.

**Rh group determination:** Rh blood group was determined by slide haemagglutination technique. 2.5% suspension of red blood cells was prepared in normal saline (0.85g/dl sodium chloride in distilled water) Rh factor determined using same procedure on a clean glass slide by placing one drop of Anti-D serum is placed by using Pasteur pipette and then one drop of whole blood is added to Anti-D sera and with the help of applicator stick cell serum mixture was finally mixed well. Then the slide was tilted back and forth and observed for agglutination. Then the tests that showed no agglutination within two minutes were considered negative.

**Assessment of HRV:** All the subjects were asked to abstain from consuming caffeinated beverages and undertaking excessive physical activity, including gymnastics, for 12 hrs preceding the data collection. They were also requested not to eat and drink on the morning of the experiment and not to take a shower. The subjects were fully habituated to the equipment, the protocols and the experimenters. Our investigation was performed in a semidarkened, temperature controlled, quiet laboratory which was at room temperature. Before the experiment, the participants rested in a laboratory room in a sitting posture for about 20 min. The records were taken between 09.00AM -10.00AM. The Autonomic activity was assessed by recording the electrocardiogram (ECG) from the limb lead II from all the subjects by using a BPL ECG machine. The analogue output from the machine was digitized by using an A/D converter from National Instruments, Bangalore. The HRV was analyzed by measuring the R-R intervals using a software “HRV soft 1.1 Version” software package (built by using the LabView software from Texas Instruments, USA) which was provided by the All India Institute of Medical Sciences (AIIMS), New Delhi. The ECG was recorded from all the subjects while they were in a supine position, fully relaxed and breathing normally for a period of five minutes, which gave the “Short term HRV”. After this, a he HRV was analyzed by measuring the R-R intervals using a software “HRV soft 1.1 Version” software package (built by using the LabView software from Texas Instruments, USA) which was provided by the All India Institute of Medical Sciences (AIIMS), New Delhi. The ECG was recorded from all the subjects while they were in a supine position, fully relaxed and breathing normally for a period of five minutes, which gave the “Short term HRV”. After this, a break of 2 minutes was given. HRV is also analyzed by deep breathing HR test[10] recorded during deep breathing for one minute. Before beginning the deep breathing test, the subject were taught to breath at a rate of 6 respiratory cycles per min, 5 seconds for each inhalation and 5
seconds for each exhalation. Lead II was then recorded continuously at a speed of 25 mm/seconds for 60 seconds while the subjects were deep breathing as instructed. The HRV was analyzed both by the time domain method and frequency domain analysis both during normal and deep breathing. In the time domain method, root of the mean of the squared successive R-R interval differences (RMSSD) and standard deviation of normal RR intervals in milliseconds (SDNN) were analyzed. The two main frequency components, i.e. the low frequency (LFnu) components (0.04 to 0.15Hz), and the high frequency (HFnu) components (0.15 to 0.4 Hz) in normalized units, was measured.

**Statistical analysis of data:** Statistical analysis of the data was done by SPSS (Statistical Package for Social Sciences) version 11.5. Statistical tests included in this study were ANOVA (analysis of variance), Kluskalwallis test, student’s unpaired t-test and Mann Whitney U test. P-value was taken as statistically significant at 5 percent confidence level (P<0.05).

**Results:** The time domain analysis and the frequency domain analysis of HRV among Rh positive and Rh negative subjects during normal breathing did not show any statistically significant changes. Further, comparison of HRV between Rh positive and Rh negative blood groups during deep breathing using time domain method did not show any statistically significant results.

**Table 1: Comparison of HRV between Rh positive and Rh negative blood groups during normal breathing using time domain method.**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Blood groups</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rh positive</td>
<td>Rh negative</td>
</tr>
<tr>
<td></td>
<td>(n=106)</td>
<td>(n=14)</td>
</tr>
<tr>
<td>RMSSD</td>
<td>51.79 ±18</td>
<td>56.88 ±15</td>
</tr>
<tr>
<td>SDNN</td>
<td>62.45 ± 17</td>
<td>58.20 ± 17</td>
</tr>
<tr>
<td>pNN50</td>
<td>35.50 ± 17</td>
<td>38.13 ± 17</td>
</tr>
</tbody>
</table>

Values are Mean ± Standard deviation, NS =non-significant, n- number of subjects

RMSSD- the square root of the mean squared differences of successive RR intervals (in milliseconds)

SDNN-Standard deviation of RR intervals (in milliseconds)

pNN50 - percentage of differences between adjacent normal RR intervals exceeding 50 milliseconds

**Table 2: Comparison of HRV between Rh positive and Rh negative blood groups during normal breathing using frequency domain method.**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Blood groups</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rh positive</td>
<td>Rh negative</td>
</tr>
<tr>
<td></td>
<td>(n=106)</td>
<td>(n=14)</td>
</tr>
<tr>
<td>LFnu</td>
<td>83.60 ± 14</td>
<td>85.24 ± 7</td>
</tr>
<tr>
<td>HFnu</td>
<td>16.39 ± 13</td>
<td>14.75 ± 7</td>
</tr>
<tr>
<td>LF/ HF ratio</td>
<td>12.36 ± 14</td>
<td>9.35 ± 8</td>
</tr>
</tbody>
</table>

Values are Mean ± Standard deviation, NS =non-significant, n- number of subjects.

LF nu - Low frequency in normalized units

HF nu - High frequency in normalized units

LF/ HF - Ratio between low frequency and high frequency.

**Table 3: Comparison of HRV between Rh positive and Rh negative blood groups during deep breathing using time domain method.**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Blood groups</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rh positive</td>
<td>Rh negative</td>
</tr>
<tr>
<td></td>
<td>(n=106)</td>
<td>(n=14)</td>
</tr>
<tr>
<td>RMSSD</td>
<td>59.47 ± 19</td>
<td>62.94 ± 14</td>
</tr>
<tr>
<td>SDNN</td>
<td>71.11 ± 13</td>
<td>71.48 ± 13</td>
</tr>
<tr>
<td>pNN50</td>
<td>36.94 ± 13</td>
<td>35.70 ± 14</td>
</tr>
</tbody>
</table>

Values are Mean ± Standard deviation, NS =non-significant, n- number of subjects

RMSSD- the square root of the mean squared differences of successive RR intervals (in milliseconds)
differences of successive RR intervals (in milliseconds)

SDNN-Standard deviation of RR intervals (in milliseconds)

pNN50 - percentage of differences between adjacent normal RR intervals exceeding 50 milliseconds

**Discussion**

The ABO and the Rhesus are the most prominent type of blood groups in humans due to their importance and association with blood transfusional reactions and diseases. Currently, increased incidence of cardiovascular disease is observed to be one of the major reasons of sudden death. Various intimidating factors have been associated with CVD. Our previous results showed O blood group individuals had better HRV during deep breathing. HRV has become a method for the studies of physiological mechanisms responsible for the control of heart rate fluctuations.

Rh positive and Rh negative individuals did not show any statistical significance in time domain analysis of HRV during normal breathing and deep breathing. In other words no statistically significant change was seen in RMSSD, SDNN and pNN50 values as well as in frequency domain measures of HRV. To our knowledge this is the first study analyzing the correlation of Rh factor and heart rate variability. This negative correlation may be due to the smaller sample size included in this study. An extensive research is required including follow-up studies with substantial samples to confirm these findings.

**Conflict**; No conflict of interest

It is a self-funded project

**References**

Impact on Mental Health of Women Victims of Cyber Violence: A Case Analysis

Deepanjali Mishra
Associate Professor, School of Humanities, KIIT, Bhubaneswar

Abstract

In one of the shocking and bizarre incident recently a eight year girl, Asifa was gang-raped by a group of men before she was killed in Kathua, located in Jammu and Kashmir. This incidence created huge protest in the social media and many celebrities as well as common people took to social media to display their anger and disgust. Violence against women takes place in various forms which cannot be confined to one state or a nation. It is not bound by any religion, caste or social status. Abusing Woman is a regular phenomenon which occurs in many homes which many choosing to ignore considering it to be a trivial matter. “Without anyone’s knowledge she gets heartbroken and falls mentally sick sometimes leading to suicides or even murder thereby affecting her physical and mental health which ultimately leads to disastrous consequences on children and family. Rights of a woman are restricted and she is confined within the vicious circle of blames, humiliation and segregation. Various studies, research and surveys are being conducted on regular basis on gender violence”1. With the advancement of technology and development of the smart phones, women are falling prey to online violence at an alarming rate. The studies show women are victims of various types of violence and social media contributes to an increasing rate of violence against women falling prey to trolling, body shaming etc. This paper would aim at making a theoretical study from the following angles: An Introduction of the Social Networking sites and Gender Based Violence, An analysis of some shocking incidents of Gender Violence that made it to the headlines, How do women fall prey to social networking sites, remedial actions to be taking for preventing such measures and a conclusion.

Keywords: violence, Women, Social Networking sites, social media, harassment, mental health

Introduction

It is a well known concept that women and girls face violence during every stage of their life cycle. The statistical data shows that there have been maximum cases where women experience violence during the adulthood and lowest when they are children. This data has helped to understand the impact of violence that is inflicted on them in different stages of their life. No doubt it has drastic consequences on their issues related to their physical health as well as mental traumas. Twitter conducted a study on the Gender Based Violence in the year 2014 in order to make an extensive analysis of the use of misogynistic language in developed countries. It was found that the UK and US has maximum number of users who use misogynistic language. Though some conclusion yield same outcome as another survey which focused only on United Kingdom, the specification methods used by them is not satisfactory and are full of shortcomings with regard to location, identification of gender and the language features. In the year 2014, a survey was conducted to analyse the relationship between a misogynistic language and the statistics of rape in the US. This study was carried out through collection of a broader data like the harmful effects of sexual violence etc not just the type of misogynist language used by the users. They established a close connection between the violence and the growth of cell phones. It was found out that the growth in mobile phone use has provided the opportunity for increased access to the internet as a result of which one can easily get access to social media. It is not unknown that social media is a platform of sharing and exchange of useful information on one hand and at the same time it gives rise to drastic situation. As per the study conducted through search in internet through Google Search engine as well as and Google Scholar along with the

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information that is accessible online to the users who are writers, media persons too were involved in the study. Out of which five cases were selected that were reported and was found that in those five cases, the victims had primary contact with their attackers on Facebook which means they knew each other well. In all the cases the attackers were men who were senior to the victims who were in the age group 17 to 20 compared to 24-34 years. The victims witnessed violence of all kinds of physical abuse, mental traumas, isolation, and also economic violence. In one case, the victim gave up and she died, whereas in the other two cases victims were hospitalised because of acute psychological torture. In the first three cases, they were constantly raped where as in the other two cases, they were molested and the attackers tried to rape them. Gender Based Violence have resulted in many cases where the victim as well as the attackers are known to each other and the education of the victim is the only necessity in order to improve their situation.

Objective

The objectives of the paper is to make a study about the impact of mental health of women of all ages due to cyber violence.

Review of Literature

“The usefulness of new media and the transformative potential of social media in the post-Facebook world, the nature of involvement and engagement of people have undergone remarkable changes.” The freedom and independence of social media has provided ample opportunity to stage and bring forth the various contemporary women issues and women movement dealing with gender issues like women atrocities and injustice.

Social Networking Sites have grown and developed rampantly over the years and presently these Social Networking Sites as well as sites have an eye on some countries, people who are members of those groups which are targeted and some professionals belonging to a specific profession. Though there are also instances of some Social Networking Sites which are very successful and mushrooming their business, but they have a very small number of members which may range from some hundreds. The size of members in a Social Networking Sites depend the frequency of group member’s interaction, finance and even the strategies these sites employ to retain their members. “Social Networking Sites as those web sites which permit their users to create a public profile or even a customised profile that professionally coherent the relationship with other members in such a way that the profile can be accessible by any other user who search their file”.

The Indian scenario is no different. A majority of adolescents in the age group 12-19 in India regularly uses digital technologies like smart mobile phones with internet. Various service providers like Jio, Airtel have slashed the data rates which makes the users to have at least one phone with them. By just pressing a fingertip they go to the virtual world. No doubt they use internet to work for their project or search and access study materials, it also facilitates them to create an identity of their own in the virtual media. They open account on these Social Networking sites without being fully aware about its impact. They try to develop friendship and build relationship with whom they know and also sometimes with whom they do not know. It was predicted that internet would internet may be used as an aid to beat the un economic, social equality but now the situation has become such that the adolescents are fast becoming victims due to the internet use. Sometimes the service providers of social networking services lure the users with a promise of lucrative rewards by providing their real identities which includes gender correctly. These users fall prey easily to this trap.

Methodology

The study population is proposed to be girls of various under graduate colleges, post graduate colleges, and those women who are in profession in software companies and in other groups. They were grouped according to their age, types of profession and their education.

The survey that was conducted on Social Media showed that a vast number of respondents have knowledge about the Sexual Violence and also know the association between Social Media and Sexual Violence. It was found that all the respondents were acquainted with Facebook and did not have much idea about the other social networking sites and nearly half of them said it is Facebook is a hub of abuse and harassment. Though some of them said they knew Twitter, Turnbir, Instagram and opined that sexual violence can take place in the form of texting abusive messages or harassing online to the victims.
It depicts the breakdown of awareness of sexual violence related to social media:

75% of respondents knew that social media can be used as a tool which would control, trolling, stalking, with the existing or past boyfriend

74% were of the view that they knew that users share others posts or even personal pictures without their consent

63% had knowledge that users post or share sexually violent texts or pictures

52% had knowledge that social networking sites are used for exploiting and finally it was 10% respondents who claimed that they did not know that harassment, trolling and humiliation take place on Social Networking Sites

A survey was carried out with a group of youngsters in USA consisting of a group of educators, lawyers dealing with cyber violence and workers between June and July 2013. The objectives of the study was

a) collecting data related to gender violence and social networking sites

b) identifying the prevailing strategies of prevention

c) Finding the steps for improvisation for prevention programming.

Findings

Then the online programmes that prevented sexual violence were and integrated and it was put in Appendices A and B.

The survey was conducted online where a link and letter of invitation was sent via email to a group of respondents in USA, comprising of various organisations, various educators, lawyers dealing with cyber crime, internet service providers. Individuals were encouraged to forward the information to community networks with the aim of increasing the survey’s reach and to allow individuals to identify relevant local partners and 25 contacts. 10 questions were given to them. It should be noted that many respondents fit into multiple categories (for example, a community health centre may also provide sexual assault support services) so this represents an approximate breakdown only. In the survey, approximately 25% of respondents directly noted that they work with children, adolescents/teens, and/or youth. Many other respondents did not directly refer to youth, but indicated indirect youth-serving roles (for example, working with parents, university students, and/or noting that they have seen bullying and/or cyber-bullying occurring among those they serve).

How do women fall prey on Social Media:

“Social Media has become more vulnerable and accessible due to smart phones, laptops and low cost service providers of internet, messages could now travel so fast and multidimensional. People have taken it to be one of the most reliable methods of communication. The users know very well that one can maintain anonymity and the message can reach a larger number of audience” 

Therefore users try to post rumours, and criticise someone whom they know or not because they want a very vast audience without just confining to their contacts thereby creating a new level of torture to the victim. Liou (2013) states that “social media campaigns are less effective when conducted as standalone activities, compared to when integrated with face to face and on the ground activities” 

<table>
<thead>
<tr>
<th>Serial No</th>
<th>Type of organization</th>
<th>Portion of total respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Community resource/recreation centre</td>
<td>21%</td>
</tr>
<tr>
<td>02</td>
<td>Shelter/family and child services</td>
<td>19%</td>
</tr>
<tr>
<td>03</td>
<td>Sexual assault support service</td>
<td>14%</td>
</tr>
<tr>
<td>04</td>
<td>Educational institution/school board</td>
<td>12%</td>
</tr>
<tr>
<td>05</td>
<td>Violence prevention coalition/network</td>
<td>11%</td>
</tr>
<tr>
<td>06</td>
<td>Community health centre</td>
<td>7%</td>
</tr>
<tr>
<td>07</td>
<td>Criminal justice program</td>
<td>6%</td>
</tr>
<tr>
<td>08</td>
<td>Aboriginal centre</td>
<td>5%</td>
</tr>
<tr>
<td>09</td>
<td>No affiliation/other</td>
<td>5%</td>
</tr>
</tbody>
</table>

Digital Education: a Remedy to Combat Gender Violence:
“it is important to know that media can never take the place of human interactions” 6. He further emphasises that campaigns carried out on social media have less effect when they are conducted on standalone basis and its impact is huge when campaigns are combined with face-to-face interactions. Education can be imparted to the students regarding social media. In the schools, and colleges, Teachers should involve the students while talking about the social networking sites. Similarly, various NGOs and other non-profit organizations should conduct various training camps, workshops and educate the local people and create awareness about the social networking sites and social media. In order to make comfortable and easy reporting, lots of social platforms are being introduced which ensure prospective evidences and prevent unnecessary and irrelevant communications. For example:

A report link can be initiated where any particular as well as numerous communication can be reported directly without any interface. After that Social Networking sites can take a decision whether to discard the content or disable the account of any offender. Even though the platform cannot guarantee that the offender will not return if his account is suspended or disabled, yet it can provide some consolation to the victims and if such a case is reported in the police station, investigation would be much easier because the data of the offender as well as his offensive content of his message is already present in the report link platform and the police could easily access the data. One can take the screen shots of the abusive content of the texts and can be saved. There should a too that blocks or mute the user who has uploaded the offensive content so that the victim cannot see the post or the attacker will not be able to text her. There are tools that unsubscribe or unfollow users that post offensive content. Privacy settings need to be very strong so that the used could control who should see her posts, personal profile and details like the contact number, mailing id etc. Facebook and Google have developed a new strategy which immediately informs if an account is logged in from another device which makes the user alert and can immediately take action if she has not logged in from there.

Young has emphasised that the human service organization needs to view strategically about the social media for being successful. He goes on to further suggest to set objectives, make plans, implement it and evaluate its outcomes regarding the process of using a social media 10. There are many companies which do not use social media effectively because they are not aware about the process of using it. They need to be more concise and the messages need to have clarity regarding the strategy its using and how it is using the social media. Social media can be extensively used and blogs could be written in order to create awareness among the young people. Adequate reporting mechanisms should also be created which are easy to use and safe for the victims. There should be enhancement of services that are related to preventive measures and counselling to victims should always be available which would use healthcare and legal services and there should be immediate follow up system by the counsellors with their clients. These follow up systems should be done either by the educational institutions or through the professional counselling portals.

**Conclusion**

“No doubt report links are developed and common platforms are formed to combat the violence against women due to social networking sites, yet it would continue posing challenges to the victims and explore new opportunities for the officials of cyber crime as it is conventionally perceived that social media is dangerous for women giving rise to an increased number of crime” 8. “Victims not only face humiliation, torture but also it has drastic effects on mental health. Developed, no doubt common platforms are formed to combat the violence against women due to social networking sites, yet it would continue posing challenges to the victims and explore new opportunities for the officials of cyber crime as it is conventionally perceived that social media is dangerous for women giving rise to an increased number of crime”. 9 Therefore it needs to be seen that the government norms are seriously implemented and the victims needs to be more careful and aware about the latest technologies in order to safeguard themselves from being victimised.

**Ethical Clearance**- Not Required

**Source of Funding**- Self

**Conflict of Interest** - Nil

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Association between Urinary Cotinine Levels and Buccal Mucosal Micronuclei Cells of Smokeless Tobacco Chewers Attending a Tertiary Care District Hospital

Kiran S Nikam¹, Kanchan C Wingkar², Rajesh K Joshi³, Rajashekar K Kallur⁴

¹Ph.D Scholar, ²Professor and Head, Krishna Institute of Medical Sciences Deemed University, Dept of Physiology, Karad, Maharashtra, India, ³Scientist and Head, ICMR-National Institute of Traditional Medicine, Dept of Phytochemistry, Nehru Nagar, Belagavi, Karnataka, India, ⁴Professor and Head, Gujarat Adani Institute of Medical Sciences, Dept of Physiology, Bhuj, Gujarat, India

Abstract

Introduction: Oral squamous cell carcinoma encompasses at least 90% of all oral malignancies. It is sixth most common malignancy and the major cause of cancer morbidity and mortality worldwide. Early detection of a premalignant oral lesion would improve the survival to a greater extent. Tobacco lays an enormous effect of disease for health, economic, social and environment issues. Cross sectional study was done at tertiary care hospital to find association between urinary cotinine levels and buccal mucosal micronuclei cells of smokeless tobacco chewers.

Method: Study comprised of 300 Smokeless Tobacco chewers (STC) and 300 Non tobacco chewers (NTC). Physical examination and Anthropometric parameters were recorded. Fasting urine samples collected for extraction of cotinine. Buccal smears were prepared for exfoliated cells. Slides were stained by Papanicolaou stain and micronuclei (MN) cells was examined by using 100X, 400X magnification as per the Tolbert et al criteria.

Results: Mean Urinary Cotinine in STC was enhanced as compared to NTC. The MN cells were also increased in STC as compared to NTC and statistically highly significant (Mean SD of STC 21.30±10.55, 95% CI ; 20.11 to 22.49 , NTC Mean SD 3.74±3.43, 95 % CI ; 3.35 to 4.12). The MN cells of STC showed strong positive association and statistically highly significant correlation with urinary cotinine levels (r=0.692, p=<0.0001).

Conclusions: The present study establishes link between rise in exfoliated buccal MN and determination of urinary cotinine levels which is a biomarker of genotoxicity and epithelial carcinogenic progression.

Key words: Smokeless tobacco chewers, Non tobacco chewers, Micronuclei, Cotinine

Introduction

Oral cancer is one of the commonest causes of disease and death rate nowadays. In developing countries, both smokeless tobacco chewing and smoking have cancerous causing behavior that contributes to increasing global burden of oral cancer. The World Health Organization figured out that proportion of deaths that result due to tobacco-related diseases would rise in India from 1.4% of all in 1990 to 13.3% of all deaths in 2020².

Tobacco lays an enormous effect of disease for contrary health, economic, social and environment issues. The tobacco epidemic is among the largest public health threat at present situation which almost kills six million peoples per year. Among mortality of ten adults
in every six seconds, one death is reported due to habitual tobacco. Use of tobacco is an indicative public health problem on earth and the only cause for preventable hazard for human health.\(^3\)

As per latest report intimated by Global Adult Tobacco Survey 2, (GATS-2) 2016-17 in India affirm that 28.6% of adults aged >15 (26.7 crore) use tobacco in various forms. Smokeless tobacco usage is marked in every 5\(^{th}\) adult (19.9 crore) and (10.0 crore) in every 10\(^{th}\) adult in smokers.\(^4\) The frequency of tobacco usage is around 37.97% in men 12.5% in female in Belgaum region and the commonest form of tobacco use is smokeless tobacco (ST).\(^5\)

Biological consequences of Nicotine are widespread and lengthened to all systems of the body including cardiovascular, respiratory, renal and reproductive systems.\(^6\) Smokeless tobacco is thought to be highly addictive due to their high nicotine content. The ST also contain carcinogenic substances like tobacco-specific N-nitrosamines (TSNAs) leading to an increased risk of cancers of oral cavity, pharynx and esophagus. Depending on the type of ST products, nicotine content may vary, and therefore, measurement of nicotine and its metabolites among ST users is important to understand the addictive potential of ST products. The half life of nicotine is very less and its metabolites especially cotinine has a long half life, which is good biomarker of nicotine in urine (urinary cotinine level).\(^7,8\)

Estimation of cotinine concentration levels from urine sample of Smokeless tobacco chewers (STC) and Non tobacco chewers (NTC) by High performance liquid chromatography- Diode array (HPLC-DA) and conformation of cotinine metabolite by Gas Chromatography-Mass spectrometry (GC-MS) serves as useful marker to determine the effects of different forms of tobacco consumption. Studies on nicotine and Cotinine levels in smokers and non-smokers in other ethnic groups are well documented but very few studies are found in STC. This may be fact because of the cultivation of the tobacco crops in specific parts of that region only.\(^9\)

Multiple studies have reported that all forms of tobacco use are highly prevalent in both men and women in India. The prevalence of ST use is estimated 33% and 18% for men and women respectively in India.\(^10\) The risk of oral cancer associated with those who use chewing tobacco is approximately 50 times higher than that of non-tobacco users. Nearly 90% of oral neoplasms are caused by smokeless chewing tobacco. Chewing tobacco also results in lesions like leukoplakia caused due to chronic irritation. Many tumors are likely to be known to arise from these lesions.

Globally, about 5,00,000 new oral and pharyngeal cancers are diagnosed annually and three-quarters of these are seen in the developing countries, including about 65,000 cases being reported from India.\(^11\) The micronuclei (MN) assay in exfoliated buccal epithelial cells is potentially an excellent candidate to serve as a biomarker. If not precise, but an arbitrary prediction about the molecular changes that take place in the buccal mucosal cells of tobacco users in individuals without any lesion can hint towards the occurrence of any lesion in those individuals in future.\(^12\) The biomarkers most widely used to quantify exposure to tobacco include nicotine, and their metabolites are cotinine, carbon monoxide, and thiocyanate. Recent investigation has focused on various hemoglobin and DNA (deoxyribonucleic acid) adducts and excretion of nitrosamines in the urine samples.\(^13\)

The literature review revealed that there is a paucity of literature regarding the association among smokeless tobacco chewers in Belagavi region. Therefore, the study aimed to study the cytomorphological changes in the buccal mucosa of smokeless tobacco chewers and normal subjects.

**Material and Method**

This Cross sectional study was conducted in Belagavi region of Karnataka state in India. The study groups were divided as Smokeless tobacco chewers (STC) and Non tobacco chewers (NTC). Ethical clearance was obtained from the Ethical Committee of the Institution and University. A total of 600 participants were studied in this study. The study population comprised from Belagavi Institute of Medical Sciences (BIMS), Belagavi, Karnataka, India. Written informed consent was explained and taken from the participants in English and local languages (Kannada and Marathi). Study was done in the month of April 2013 to December 2016.

Inclusion criteria for age were 300 smokeless tobacco chewers and 300 Non tobacco chewers between 18 to 65 years. Subjects with pre-existing oral cavity lesions, alcoholics and having recent viral infections and who
had received radiotherapy or chemotherapy in last month were excluded from the study. The study included 183 cases based on the prevalence of 13.9 % in Karnataka.

Physical examinations of the subjects were done to record Respiratory rate (cycles/minute) Heart rate (Beats/minute). Anthropometric parameters was recorded for (Height (in cms), Weight (in kgs), Body Surface Area (Square meters), Body Mass Index (Kilogram/meter²),

Collection and chromatographic analysis of the urine samples for cotinine has been already reported by the same group.

Each individual was asked to rinse his mouth neatly by tap water. The exfoliated cells were taken by scrapping the buccal mucosa by using wooden/steel spatula and the scraped cells were taken on lean grease free glass slide and smears were prepared. All smears were stained by Papanicolaou technique using commercially available staining kit Rapid Pap. From each slide, minimum 100 cells were examined in high power magnification (400X) and location of micronuclei (MN) cells was examined by using 100X, 400X magnification. As per the Tolbert et al criteria identifying of micronucleus cells were done.

The completed questionnaires were entered into a database using MS Excel 2000. Frequency distributions and percentages were examined for each answer. Descriptive statistics, comparison among NTC and STC groups using Mann-Whitney U test and Spearman non-parametric correlation analysis was used to indicate a measure of the correlation and the strength of the relationship. The statistical significance level was set at P < 0.05. The statistical analysis was conducted using SPSS version 26.

**Results**

The mean age of participants for NTC was (37.00±16.05) whereas for STC was (37.10±15.99). Distribution of sex for male and female for NTC was 222 (74%) and 78 (26%) respectively, and for STC male and female it was 214 (71.33%) and 86 (28.66%) respectively. The anthropometric data for height (cm) and weight (kg) mean ± SD in case of NTC and STC was 157.85±5.19 and 158.93±6.42 for height (cm) and 59.49±7.24 and 52.00±4.96 for weight (kg). The difference between mean values was statistically highly significant (<0.001). Heart rate in Beats/minute (HR) and Respiratory rate in cycles/minute (RR) on comparison with NTC and STC groups was statistically highly significant. Mean Urinary cotinine value in STC was enhanced as compared to NTC group (NTC, Mean SD, 23.48±11.08 and STC, Mean SD, 1563.68±1198.97) and were statistically highly significant (<0.001) (Figure 1). The comparison of buccal mucosal micronuclei cells by using Mann-Whitney U test was increased in case of STC (Mean SD of STC 21.30±10.55, 95% CI ; 20.11 to 22.49 as compared to NTC Mean SD 3.74±3.43, 95% CI ; 3.35 to 4.12) and was also statistically highly significant (<0.001) (Figure 2). The buccal mucosal micronuclei cells in case of STC showed strong positive association and statistically highly significant correlation with urinary cotinine levels (r= 0.692, p=<0.0001) by using spearman non parametric correlation analysis (Figure 3).

**Table/Fig1**: Mean urinary cotinine level in smokeless tobacco chewers and non tobacco chewers group.

<table>
<thead>
<tr>
<th>Urinary cotinine levels (ng/mL)</th>
<th>Mean SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTC</td>
<td>23.48±11.08</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>STC</td>
<td>1563.68±1198.97</td>
<td>&lt;0.001**</td>
</tr>
</tbody>
</table>

*Significant, ** Highly significant.

**Table/Fig2**: Comparison of mean value for micronuclei cells of buccal mucosa in smokeless tobacco chewers and non tobacco chewers group.

†STC-smokeless tobacco chewers
† NTC-Non tobacco chewers
Discussion

The present study was aimed to assess and compare micronuclei cells of buccal mucosa in STC and NTC and to establish the correlation between urinary cotinine levels of STC with above findings. Previous researchers\(^8,13,15,16\) found a wide range of urinary cotinine levels which is also seen in the present study in STC and NTC 100.84 -5810 and 10.01- 59.02 ng/mL respectively. Several studies showed that urinary cotinine levels in nonsmokers are always less than 100 ng/ml\(^17,18\). The variation in range of cotinine depends on the tobacco chewer’s dietary intake of nicotine, cotinine excretion, metabolic activity, passive smoking and environmental smoke\(^8\).

From the present study highly statistically significant difference was found between STC and NTC group. Similar findings were also found among previous reports\(^19,20,21\). The potential of carcinogenic and genotoxicants effect is very high among tobacco chewers. Habituated chewing tobacco users are the likely odds estimated for oral cancer development\(^19\). Micronuclei in oral exfoliated cells are the biomarkers of chromosomal damage caused by genotoxic agents from the tobacco and tobacco related substances\(^20\). Tobacco-specific nitrosamines present in the smokeless tobacco forms also play a significant role in causing the damage\(^19\).

Urinary cotinine levels of STC statistically correlates with micronuclei of buccal mucosa cells (STC MN cells, \(r = 0.692, p <0.0001\)) in present study. This was similar to the findings of Poppel GV\(^22\) who studied the serum cotinine levels in tobacco users. Oral carcinogenesis is a multistep process of accumulated genetic damage leading to cell dysregulation with disruption in cell-signaling, DNA repair and cell cycle events, which are fundamental to hemostasis. MN in oral exfoliated cells is a biomarker of chromosomal damage caused by genotoxic agents from tobacco related substances\(^20\).

Conclusion

Early detection of a premalignant or cancerous oral lesion would improve the survival to a greater extent and also will reduce the morbidity associated with the treatment to a considerable extent. There is strong correlation between urinary cotinine levels of smokeless tobacco chewers and exfoliated buccal mucosal micronuclei cells. Thus the present study elucidates the link between rise in exfoliated buccal micronuclei...
and determination of urinary cotinine levels, whichisan important biomarker and is valuable measure for diagnosis of health risk.

For definitive and sound results, still larger samples should be studied for longer duration. The buccal exfoliated cells should also be collected after cessation of habit to confirm the prognostic value of MN cells and level of genotoxicity. The cause of micronuclei formation due to tobacco use, different forms tobacco products, difference in the degree and mechanism of action of smokeless variants of tobacco and also the effects of cotinine levels in relation to occurrence of MN should be studied in detailed for strategic tobacco control program.

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Conflict of Interest: No

References


Effects of Steroid Eye Drops on Intraocular Pressure in Post Operative Cataract Patients in a Tertiary Center

Hemalatha Mohan¹, M. Meera Alias Devasena²
¹Consultant in Radhatri Nethralaya, Chennai, ²Assistant Professor, Department of Ophthalmology, Sri Ramachandra Medical College & Research Institute, Porur, Chennai

Abstract

Background: Steroids are known to cause elevation of IOP when used topical, periocular or systemic routes. IOP rise is said to be maximum with periocular use and minimum with systemic use. The degree of IOP elevation depends on the specific drug, the dose, the frequency of administration, and the individual patient. Aim: To study the rise in IOP on using dexamethasone and prednisolone eye drops on postoperative cataract patients in a tertiary center. Settings and Design: It is a prospective hospital based follow up study done in 300 patients, their IOP were evaluated pre operatively and post operatively at 1 and 6 weeks. Material and Method: In this study dexamethasone eye drops and prednisolone eye drops are used along with antibiotic eye drops for a period of 6 weeks in tapering schedule. The patients were examined pre operatively for cataract, IOP measured using Applanation tonometry and fundus examination. Patients were operated by standard SICS or phacoemulsification technique. Patients with uneventful post operative period were examined for IOP using Applanation tonometry at the end of 1st week and 6 weeks. This study was approved by local Institutional Ethics Committee. Statistical Analysis: Data entry and analysis was done using SPSS-16.0 for windows software. Analytical type of analysis were done. Percentages and p values were estimated and paried T test were done to find out significance. Results: Mean value of IOP in patients at the end of 1st week using eye drops dexamethasone was 14.63 and in patients using prednisolone was 14.31 and this found to be statistically insignificant, but at the end of 6th week mean value of IOP in patients using dexamethasone was 14.29 and prednisolone was 13.11 with p value of <0.005. Conclusion: From this study it was found that there was no significant increase in IOP at the end of 1 week and 6 weeks in both groups. however dexamethasone group had significant IOP rise than on prednisolone group at the end of 6 week

Key Words: - Dexamethasone eye drops, Prednisolone eye drops, Cataract, applanation tonometer.

Background

Steroids are known to cause elevation of IOP when used topical, periocular or systemic routes. IOP rise is said to be maximum with periocular use and minimum with systemic use. The degree of IOP elevation depends on the specific drug, the dose, the frequency of administration, and the individual patient. Evidence suppot three independent potential mechanisms of increased resistance to the outflow of aqueous humor that can act synergistically to produce corticosteroid-induced ocular hypertension.

1. Structural changes of the trabecular meshwork
2. A mechanical obstruction of the trabecular meshwork by steroid particles
3. The inhibition of phagocytosis by trabecular meshwork cells
Glucocorticoids exert their effect by increased expression of myociline gene (MYOC) located on locus GLC1A on 1q25.5 chromosome.

Trabecular cells exposed to glucocorticoids increase production of elastin, fibronectin and laminin and decrease production of tissue plasminogen activator, collagenase IV and stromelysin, which causes an accumulation of extracellular matrix (ECM) and increases resistance to aqueous outflow.

Cross-linked actin networks form within the trabecular cells treated with glucocorticoids, which inhibit their proliferation, migration and phagocytic activity and cause accumulation of cellular debris and clogging of the aqueous outflow channels.

Objectives

To study the rise in IOP on using Dexamethasone and Prednisolone eye drops on postoperative cataract patients in a tertiary center.

Material and Method

This study was carried from January 2017 to November 2017. Out of 500 patients operated for cataract surgery during this period 300 patients were followed up to 6 weeks after surgery were selected. Patients selected for this study underwent cataract surgery by routine SICS or Phacoemulsification with uneventful post operative period. Exclusion criteria were history/ family history of glaucoma, high myopia, complicated cataract, intra- op complications, h/o ocular trauma, patients with systemic illness like diabetes, collagen vascular diseases and pediatric patients. Detailed history of all patients was taken including complaints, family history, ocular history and systemic history. Patients were then examined in detail which included Best Corrected Visual Acuity with Snellen’s chart, Slit-lamp examination, Fundus examination and intraocular pressure measurement with Goldmannn Applanation tonometer after anesthetizing the eye with paracaine eyedrops under sterile conditions. Patients underwent either SICS or phacoemulsification surgeries and were followed up. 150 Patients were given 0.1% dexamethasone eye drops and 150 patients were given 1% prednisolone eye drops 6 times a day for 1 week and tapering schedule is followed upto 6 weeks.

Intraocular pressure measurement with Applanation tonometry under sterile conditions were measured at one week after surgery and at the end of six weeks after surgery and were analyzed.

Results

The study results were analysed among 300 patients selected for Cataract surgery in a Tertiary care Hospital. Among them, 165 were Males and the remaining were Females. Intra Ocular Pressure was measured and documented Preoperatively. All patients in the study underwent uncomplicated Cataract extraction by either SICS or Phacoemulsification with posterior chamber IntraOcular Lens implantation. Post operative Intra Ocular Pressure (IOP) was measured at the end of 1 week and 6 weeks. From this study it is found that mean pre op Intra Ocular Pressure between the two groups was 14.87 mm Hg and 13.75 mm Hg respectively. On Statistical Analysis, the postop Intra Ocular Pressure at 1 week between the 2 groups is found to be not statistically significant where as post op Intra Ocular Pressure measured at 6 weeks showed significant statistical difference between the 2 groups with 14.29 mm Hg and 13.11 mm Hg in Dexamethasone and Prednisolone groups respectively with p value <0.005. Detail is given in Table no 1. In Dexamethasone group the standard deviation is 2.178 with standard error of 0.178 and SD of 2.105 with standard error of 0.172 in Prednisolone group was found. Details given in TABLE 2.

| TABLE - 1: Pre and Post operative IOP Estimation |
|-----------------|-----------------|-----------------|
| IOP             | Dexamethasone {mm of Hg} | Prednisolone {mm of Hg} |
| Pre operative   | 14.87            | 13.75            |
| Post operative (1ST week) | 14.63            | 14.31            |
| Post operative (6TH week)  | 14.29            | 13.11            |
TABLE -2: Pre and Post operative IOP with Mean and Standard Deviation

<table>
<thead>
<tr>
<th>Eye drops used</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Standard error</th>
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</thead>
<tbody>
<tr>
<td>Pre operative IOP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>150</td>
<td>14.87</td>
<td>2.521</td>
<td>0.206</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>150</td>
<td>13.75</td>
<td>2.202</td>
<td>0.180</td>
</tr>
<tr>
<td>Post operative IOP - 1st week</td>
<td>150</td>
<td>14.63</td>
<td>2.443</td>
<td>0.199</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>150</td>
<td>14.31</td>
<td>2.567</td>
<td>0.210</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post operative IOP - 6th week</td>
<td>150</td>
<td>14.29</td>
<td>2.178</td>
<td>0.178</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>150</td>
<td>13.11</td>
<td>2.105</td>
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<tr>
<td>Prednisolone</td>
<td>150</td>
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</tbody>
</table>

Discussion

Following cataract surgery raised intraocular pressure is one of the most common problem and most of it is transient rise in intraocular pressure is more marked and is the most frequent postoperative complication requiring specific treatment. From then on numerous studies have evaluated the risks of an increase in IOP following cataract surgery. Individuals with IOP spikes usually have ocular pain, corneal edema and even sight-threatening complications such as retinal vascular occlusion, progressive field loss in advanced glaucoma, and anterior ischemic optic neuropathy (AION) in prone patients. Around to 35 percent of people have rise in intraocular pressure with topical steroid use which was studied by Mansour F. Armaly, MD, in 1960s. In the study steroid drops were given to one eye of normal volunteers thrice a day for one month. He identified that there were 3 levels of responders: in 66 percent IOP went up to less than 5 mmHg, 30 percent of the subjects IOP increased up to 6 - 15 mmHg and in 5 percent it increased more than 15 mmHg. These suggest one out of every three people in the healthy population have a steroid response. Normally patients have transient increase in IOP following postoperative cataract surgery. Aproximately 25% of patients experience an IOP rise of >30 mmHg within 4 to 6 hours following uncomplicated phacoemulsification according to a recent study. But in our study there was no significant increase in postoperative IOP at the end 1st and 6th week. As clinical data suggests that as a general rule, patients with healthy eyes can tolerate a transient postoperative rise in IOP with no detectable effect on visual function. Steroid-induced IOP elevation normally occurs within a few weeks of steroid therapy and the IOP lowers spontaneously to the baseline within a few weeks to months on stopping the drug.

Saari et al. compared the anti-inflammatory effects of 0.7% dexamethasone-cyclodextrin aqueous solution used once daily and 0.1% dexamethasone sodium phosphate used thrice a day in 20 postoperative cataract patients. They were randomized to receive treatment and were assessed on 1, 3, 7, and 21 postoperative days.

They found that there was no significant differences in the mean [standard deviation (SD) IOP between the two treatment groups [14.0 (3.1) vs. 14.3 (2.1) mmHg at final visit]. Lorenz et al. studied the effects of prednisolone acetate 0.5% on intraocular inflammation following phacoemulsification. Prednisolone acetate 0.5% or placebo was instilled in 62 patients QID until day 2 post-operatively. Later patients were then treated with open-label prednisolone acetate 0.5% was given QID until day 14.

Increased IOP observed in 3 patients (4.8%), although mean IOP was normal (<21 mmHg) in both groups at the end of the study period.
Smerdon et al.\textsuperscript{15} compared the efficacy and safety of prednisolone 0.5\% with placebo in the control of inflammation post cataract surgery and found that 7 patients (24\%) had IOP elevated to >22 mmHg during the trial. Akingbehin et al.\textsuperscript{16} compared the IOP effects of fluorometholone 0.1\% and dexamethasone 0.1\% administered QID for 6 weeks in 15 patients with ocular hypertension or glaucoma by using provocative testing. 13 patients (22 eyes) were first provoked with dexamethasone and 6 months after, with fluorometholone. The remaining 2 patients underwent simultaneous testing with dexamethasone (right eye) and fluorometholone (left eye). Drops were discontinued if their was an IOP of >15 mmHg over baseline. The mean increase in IOP was 8.58 mmHg with dexamethasone treatment as compared to 2.96 mmHg with fluorometholone treatment (P < 0.001) was found. Post-treatment IOP elevations of ≥10 mmHg were observed in 45.8\% and 4.2\% of the dexamethasone- and fluorometholone-treated eyes. Stewart et al.\textsuperscript{17} also compared the IOP effects of fluorometholone 0.1\% and dexamethasone 0.1\% in patients who had previously experienced an IOP increase of ≥10 mmHg with dexamethasone. This was a double-masked, crossover study, with 17 patients dosed sequentially with each of the treatments, with a 1-month between-treatment washout period. Dosing consisted of one drop instilled four-times daily for 6 weeks or until there was an IOP elevation of ≥10 mmHg. The mean (SE) duration necessary to effect an elevation of 10 mmHg as compared to baseline was 29.5 (3.9) days in the fluorometholone group when compared with 22.7 (3.5) days in the dexamethasone group (P = 0.015). The authors subsequently proposed that an increase in IOP of ≥10 mmHg over baseline should be considered clinically significant. The same was considered in this study too. Though there was no significant rise in IOP with both types of steroid eye drops, there was a statistically significant difference between mean IOP at the end of 6 weeks in both groups, with dexamethasone group having higher mean value.

**Conclusion**

There was no significant rise in IOP measured at 1\textsuperscript{st} week and 6\textsuperscript{th} week in patients using dexamethasone and prednisolone eye drops along with antibiotic eye drops. Mean value of IOP at the end of 1\textsuperscript{st} week using dexamethasone eye drops was 14.63 and in patients using prednisolone eye drops was 14.31 and this found to statically insignificant. But at the end of 6\textsuperscript{th} week mean value of IOP in patients using dexamethasone eye drops was 14.29 and prednisolone eye drops was 13.11 with p value of <0.005. Thus it is seen that at the end of 6 weeks the IOP in patients using dexamethasone eye drops was higher than in patients using prednisolone eye drops.

**Funding:** Nil

**Conflict of Interest:** Nil

**Ethics Committee Approval :** Yes

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Study of Family History and Environmental Risk Factors Associated with Refractive Errors in Urban School Children Aged Between 10 to 17 Years

K.E. Asvini Sugumaran¹, M.Meera Alias Devasena²
¹Final Year Post Graduate, ²Assistant Professor, Department of Ophthalmology, SriRamachandra Medical College & Research Institute, Porur, Chennai

Abstract

Purpose: The main aim of this study was to collect information regarding the family history and environmental risk factors associated with refractive error and the prevalence of refractive error in urban school children aged between 10 to 17 years.

Study Design: Cross Sectional Study

Method: After getting permission from school Principal and consent from parents, children from class 5 to 12 were included in this study. The unaided visual acuity of each child is assessed with snellen’s number. Visual acuity less than 6/9 in one or both eyes was classified as visually impaired. Cycloplegic refraction and subjective refraction was done to all visually impaired children. Details about environmental factors, time spent to reading, watching television, using electronic gadgets and outdoor sports were collected by questionnaire. Data entry and analysis were done by SPSS-16.0 for windows software.

Results: This cross sectional study was done among 1680 school children aged between 10 to 18 years. Among that 407 children had refractive error. The prevalence of refractive error was 24.2%. The prevalence of refractive error in males was 58.7% and in females was 41.2%. Among the type of refractive error, the commonest was myopia (261) followed by astigmatism (126) and Hypermetropia (20). Among the risk factors studied, reading books, viewing television, electronic gadgets had a statistically significant association to the prevalence of refractive error.

Conclusions: Awareness has to be created among the children, parents and school teachers about the signs and symptoms and the risk factors involved in the development of refractive error. Regular school eye screening programme should be conducted to identify and correct the refractive error and to emphasize the importance of wearing correcting spectacles for refractive error regularly to prevent and avoid childhood blindness

Key-words: Prevalence, Refractive errors, Urban School Children, Myopia, Risk Factors

Introduction

In 2010, 285 million people around the world were disabled visually, 39 million people were blind and 246 million people were with decreased vision. The major cause of blindness was uncorrected refractive error. Visual impairment was 19 million among children, out of these 12 million children were visually impaired
due to uncorrected refractive error which can be easily diagnosed and can be treated. The prevalence of blindness in India was estimated to be 11.2 per 1000 population for the year 2004, out of these 0.1 per 1000 population belong to the age group of 0-14 years. National prevalence of childhood blindness and low vision was estimated to be about 0.8 per 1000. The national survey on blindness conducted in India in 2006-2007 recognized that the second main cause for visual impairment and blindness is uncorrected refractive error (19.7). The blind patients in India was estimated to be 30 % and they lose their vision before 20 years of age and many before 5 years of age. The important cause for blindness among children and in younger age group is uncorrected refractive error. Family history and refractive error play a major role in the development of refractive error in children. Vision is important for children for learning. Defective vision due to uncorrected refractive error in children affects their learning. To eliminate the avoidable blindness, the world health organization launched vision 2020, uncorrected refractive error is one of the important cause of avoidable blindness. School eye screening program is a part of district blindness control society since 1996 which is an important program for blindness control.

**Aim**

The main aim of this study was to collect information regarding the family history and environmental risk factors associated with refractive error and the prevalence of refractive error in urban school children aged between 10 to 17 years.

**Materials and Method**

This cross sectional study was done in urban school children aged between 10 to 17 years in 2016 in Chennai. Permission from school principal and consent from the parents were obtained. All the school children from class 5 to 12 were included in this study. The unaided visual acuity of each child is assessed with snellen’s number and alphabet chart at 6 meters distance by ophthalmic assistants. Visual acuity less than 6/9 in one or both eyes was classified as visually impaired and referred to ophthalmologist in our institution. Cycloplegic refraction and subjective refraction was done to all visually impaired children. Anterior segment examination was done using slit lamp and fundus examination was done with direct ophthalmoscopes. Questionnaires were asked to all the visually impaired children regarding family history and environmental factors, time spent to reading, watching television, using electronic gadgets and outdoor sports.

Data entry and analysis was done using SPSS 16.0 for windows software. Percentages and p values were estimated. Chi-square test was done to find out the association.

**Results**

This cross sectional study was done among 1680 school children aged between 10 to 18 years. Among that 407 children had refractive error. The prevalence of refractive error was 24.2%. The prevalence of refractive error in males was 58.7% and in females was 41.2%. The prevalence of refractive error was higher in males than in females. Among the males, the prevalence of refractive error was highest in the age group of 13 to 15 years which was 23.3% and lowest in the age group of 16 to 18 years which was 15.7%. Among the females, the prevalence of refractive error was highest in the age group of 13 to 15 years which was 15.9% and lowest in the age group of 10 to 12 years which was 9.8%. The prevalence of refractive error was highest in 13 to 15 years of age group in both males and females. Details were given in Table No:1.

Among the type of refractive error, the commonest was myopia (261) followed by astigmatism (126) and Hypermetropia (20). About 145 males and 116 females were myopic. About 80 males and 46 females were astigmatic. 14 males and 6 females were hypermetropic. Myopia was common in 13 to 15 years of age. Hypermetropia was common in 10 to 12 years of age. Astigmatism was common in 16 to 18 years of age. Details were given in Figure No: 1 &Table No:2.

Among the risk factors studied, reading books, viewing television, electronic gadgets had a statistically significant association to the prevalence of refractive error. Children who spent time outdoor playing sport had statistically lower prevalence of refractive error.
Table No: 1. Distribution of study participants by Age & Sex

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALE (n)</th>
<th>MALE %</th>
<th>FEMALE (n)</th>
<th>FEMALE %</th>
<th>TOTAL (n)</th>
<th>TOTAL %</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 TO 12 YEARS</td>
<td>80</td>
<td>19.6</td>
<td>40</td>
<td>9.8</td>
<td>120</td>
<td>29.5</td>
</tr>
<tr>
<td>13 TO 15 YEARS</td>
<td>95</td>
<td>23.3</td>
<td>65</td>
<td>15.9</td>
<td>160</td>
<td>39.3</td>
</tr>
<tr>
<td>16 TO 18 YEARS</td>
<td>64</td>
<td>15.7</td>
<td>63</td>
<td>15.4</td>
<td>127</td>
<td>31.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>239</td>
<td>58.7</td>
<td>168</td>
<td>41.2</td>
<td>407</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure No: 1. Refractive Errors by Sex

Table No: 2. Refractive Errors by Age

<table>
<thead>
<tr>
<th>REFRACTIVE ERROR</th>
<th>10 – 12 YEARS</th>
<th>13 – 15 YEARS</th>
<th>16 – 18 YEARS</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>MYOPIA</td>
<td>67</td>
<td>130</td>
<td>64</td>
<td>261</td>
</tr>
<tr>
<td>HYPERMETROPIA</td>
<td>9</td>
<td>5</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>ASTIGMATISM</td>
<td>44</td>
<td>25</td>
<td>57</td>
<td>126</td>
</tr>
<tr>
<td>TOTAL</td>
<td>120</td>
<td>160</td>
<td>127</td>
<td>407</td>
</tr>
</tbody>
</table>
### Table No: 3. Association between certain risk factors of Refractive Errors & Age in years

<table>
<thead>
<tr>
<th>RISK FACTORS</th>
<th>10 – 12 YEARS</th>
<th>13 – 15 YEARS</th>
<th>16 – 18 YEARS</th>
<th>p VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>READING HABIT &gt;1 HOUR</td>
<td>75</td>
<td>122</td>
<td>90</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>READING HABIT &lt;1 HOUR</td>
<td>45</td>
<td>38</td>
<td>37</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>VIEWING TELEVISION &gt;1 HOUR</td>
<td>29</td>
<td>62</td>
<td>55</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>VIEWING TELEVISION &lt;1 HOUR</td>
<td>91</td>
<td>98</td>
<td>72</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>GADGETS &gt;1 HOUR</td>
<td>9</td>
<td>29</td>
<td>46</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>GADGETS &lt;1 HOUR</td>
<td>111</td>
<td>131</td>
<td>81</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>SPORT &gt;1 HOUR</td>
<td>36</td>
<td>42</td>
<td>23</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>SPORT &lt;1 HOUR</td>
<td>84</td>
<td>118</td>
<td>104</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

**Discussion**

The prevalence of refractive error in our study was 24.2%. In other study where school going children aged between 5 to 15 years of age, screened for refractive error in rural Delhi showed prevalence of 7.4% \(^1\). In a study conducted in Hyderabad to assess the prevalence of refractive error in urban school children showed prevalence of 9.8% \(^2\). The prevalence of refractive error in a study conducted in New Delhi by GVS Murthy et al was 6.4% \(^3\), in Lucknow by Kumar et al was 7.4% \(^4\) and in Haryana by Sharma S et al was 13.65% \(^5\). Studies conducted in different other parts of the world showed the prevalence of refractive error of 8.2% in Baltimore, USA \(^6\), 12.8% in Shunyi district in China \(^7\) and 15.8% in Chile \(^8\). Our study showed a higher prevalence when compared to all the above mentioned similar studies. But a study conducted in a school at Chennai, the prevalence of refractive error was found to be 37.39% \(^9\) which is higher than our study.

In our study, the prevalence of refractive error in males was 58.7% and in females was 41.2%. In a study conducted by Battacharya RN et al \(^10\) found that refractive error was more in males (21.3%) than in females (1.52%). In a study conducted by Niroula DR et al \(^11\) among the school going children in Pokhara City of Nepal on refractive error, found that refractive errors more in boys (7.59%) than in girls (5.31%). The prevalence of refractive error was higher in males when compared to females in our study and in similar other studies.

In our study, the prevalence of refractive error was higher in 13 to 15 years of age group in both male and females. They found that refractive error is increasing with increasing age in the age group of 10 to 14 years among the adolescent age group attending ophthalmology OPD in a study conducted by S.Matta et al \(^12\).

In our study, myopia is the most common refractive error followed by astigmatism and Hypermetropia. Das et al observed that among the school going children aged between 5 to 10 years in Kolkata, 25.11% had refractive error, myopia being the most common 14.02%
followed by astigmatism 3.93% \(^1\). In a study conducted by Rose K et al. they found that the prevalence of myopia, hypermetropia and astigmatism in urban school children was 3.16%, 1.06% and 0.16% \(^1\). In another community based study conducted by Murthy GVS, et al on refractive error in children aged between 5-15 years in the urban population in New Delhi reported the prevalence of myopia as 7.4% and hypermetropia as 7.7% and astigmatism was seen in 5.4% of the cases \(^4\).

In our study, risk factors like reading books, viewing television, electronic gadgets had a significant association to the prevalence of refractive error. In our study, children who spent time outdoor playing sport had lower prevalence of refractive error. Uzma et al. have observed that children with high myopia spent more time studying, reading, and less time playing sports \(^2\) which was similar to our study.

**Conclusion**

The prevalence of refractive error in this study was found to be 24.2%. The prevalence of refractive error was common in males, common in the age group of 13 to 15 years and myopia being the most common refractive error. The risk factors, reading, watching television, using electronic gadgets had a significant association with the development of refractive error. Awareness has to be created among the children, parents and school teachers about the signs and symptoms and the risk factors involved in the development of refractive error. Regular school eye screening programme should be conducted to identify and correct the refractive error and to emphasize the importance of wearing correcting spectacles for refractive error regularly to prevent and avoid childhood blindness.

**References**

Comparative Assessment of and Self-Perceived and Normative Orthodontic Treatment Need and Its Effect on the Self-Esteem of Students of a Prominent Indian Dental School – A Cross Sectional Survey

Madhura Rao¹, Yash Singh¹, Asavari Desai²

¹Undergraduate Student, Manipal College of Dental Sciences, Mangalore, Manipal Academy of Higher Education, India, ²Reader, Dept of Orthodontics, Manipal College of Dental Sciences, Mangalore, Manipal Academy of Higher Education, India

Abstract

Objective - To assess and compare the normative and self-perceived need for orthodontic treatment and its effect on self-esteem in a sample of undergraduate dental students.

Methodology – This cross sectional study was conducted on a pool of 102 dental students after obtaining the required approval from the Institutional Ethics Committee. Students of either gender, between the ages of 18-22 yrs and with a similar socio-economic background were selected for the study. Those who were undergoing or had previously undergone orthodontic treatment were not considered.

Self perceived need of orthodontic treatment was assessed by using the Aesthetic Component (AC) of the Index of Orthodontic Treatment Needs (IOTN). The AC assesses the perception of an individual on the attractiveness of his/her dentition through a 10-point photographical scale showing different levels of dental attractiveness, with photo 1 representing the most attractive and photo 10 the least attractive.

Clinical intraoral examination was done to assess the normative treatment need by using the modified Dental Health Component (m DHC) of the IOTN.

Questionnaires were distributed to the participants to evaluate the psychological impact of the malocclusion. The Global Negative Self Evaluation Scale (GSE), which is an adaptation of the self-esteem scale of Rosenberg (1965), was used.

Results: According to the AC scores only 3% of the study subjects felt a need to seek orthodontic treatment, whereas 58.8% of them fell into the “definite need for treatment” category as evaluated by the orthodontist using the mDHC. There was a negative correlation between perceived treatment need and self-esteem. Female students had a higher self esteem than their male counterparts.

Conclusion: There was a marked difference between the students' and investigator’s opinion in the need for orthodontic treatment. This stresses the importance of taking into account the patient’s need and expectations and avoiding the traditional paternal approach in treatment planning.

Key words: index of orthodontic treatment need, self esteem, perceived malocclusion.

Corresponding Author:
Asavari Desai
Reader, Dept of Orthodontics, Manipal College of Dental Sciences, Mangalore, Manipal Academy of Higher Education, India.
Email id – asavari.laxman@manipal.edu/desaiasavari@gmail.com, Phone no- 9483363045

Introduction

The physical appearance of an individual significantly affects his/her self-esteem and social acceptance as evidenced by several studies in social psychology¹-³, leading to the assumption that improved dental aesthetics would lead to a sense of well being.
However, perception of dental aesthetics is subjective in nature and often idiosyncratic and varies widely, as societal expectations are not equal in all countries and economic subsets.

Orthodontics in the 21st century differs from the past with more emphasis being placed on dental and facial appearance, with patients playing a bigger role in treatment planning than before. Although the demand for treatment may be greatly driven by the desire for improved aesthetics, one should not detract from the prevalence of normative need. A high level of education and exposure to orthodontics has been shown to increase the level of awareness of dentofacial deformities and have a positive impact on attitude towards dental treatment in general.1-5

Dental students in India have training in orthodontics for a total duration of 3 years of which 2 years are in the clinical setting. As future practitioners and clinicians, they should be able to diagnose malocclusion accurately as well as assess its potential detrimental impact on the patient’s oral health and self-esteem. Therefore, it is important to understand how they perceive malocclusion and the need for orthodontic treatment not only as dental professionals but also as consumers of orthodontic care.

Keeping this in mind, this study was designed to assess self-perceived and normative orthodontic treatment needs of Indian dental students and evaluate its effect on their self-esteem.

**Materials and Method**

Approval for this cross-sectional and interview based study was granted by the Institutional Ethics Committee of Manipal College of Dental Sciences, Manipal University, Mangalore.

The study sample consisted of 102 dental students of either gender between 18-22 years of age. Students who were undergoing or have already undergone orthodontic treatment were excluded from the study. Informed consent was obtained from each student prior to study commencement.

Interviews were conducted in a room adjacent to the orthodontic clinic and took approximately 20 minutes to complete. Each student was given a questionnaire to fill out in the presence of the investigator, in case of any clarifications. In addition to demographic data as well as socio-economic status, this questionnaire sought to assess the perceived and normative need for orthodontic treatment; and impact of perceived malocclusion on their self-esteem.

Self perceived aesthetics was assessed using the Aesthetic Component (AC) of the Index of Orthodontic Treatment Needs (IOTN)6. Each student was shown the 10 photographs, which were not in the order that they appear in the original AC scale, and was asked to select the one that he/she felt best represented his/her dental appearance. For the purpose of this research project, it was necessary to distinguish individuals who had a definite normative need for treatment from those who had borderline or no need for treatment. As this was the goal, the use of the modified DHC as described by Burden et al (2001)7 fulfilled the requirements of a normative needs assessment index. Each participant was assessed for the specific conditions mentioned in the index and if any one of these was found, he/she was given a score of “1” and no further conditions were sought. The study population therefore fell into one of the two groups based on this modified DHC, either ‘no definite need for treatment’ or ‘definite need for treatment’.

Twenty participants were randomly selected one month after the initial assessment and the AC and DHC were recorded again, in order to minimize inter-examiner bias.

Questionnaires were distributed to the participants to evaluate the psychological impact of the malocclusion. The Global Negative Self Evaluation Scale (GSE), which is an adaptation of the self-esteem scale of Rosenberg (1965), was used.

It consisted of each question with six response options scored from 1 to 6 and the scores were summed to obtain the average self-esteem of each student.

Subsequently, focus group discussions consisting of 6-8 students were carried out in which participants were asked open ended questions about the impact of malocclusion on their self-esteem.

**Statistical Analysis**

The data obtained was analysed with the help of the Statistical Package for Social Sciences (version 20.0, SPSS Inc., Chicago, Illinois, USA).

Perceived treatment need, normative treatment need and the association between the two was assessed by Chi
square tests. Independent t test was used to check whether there was any correlation between the AC and the gender and year.

**Table 1: Self perceived orthodontic treatment need assessed by the Aesthetic component of the IOTN.**

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
<th>YEAR</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>30</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td>55.6%</td>
<td>58.3%</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.4%</td>
<td>18.8%</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20.4%</td>
<td>18.8%</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.1%</td>
<td>4.2%</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.9%</td>
<td>0.0%</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.9%</td>
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<tr>
<td>8</td>
<td></td>
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<tr>
<td></td>
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<td>1.9%</td>
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</tr>
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<td></td>
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**Table 2: Normative treatment need assessed by the modified Dental Health Component**

<table>
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<th>YEAR</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>32</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>59.3%</td>
<td>58.3%</td>
</tr>
<tr>
<td>Dental Health Component</td>
<td>Definitive need for treatment</td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>40.7%</td>
<td>41.7%</td>
<td>41.2%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>54</td>
<td>102</td>
</tr>
<tr>
<td>% within YEAR</td>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
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</table>
Table 3: Association between the modified DHC and AC of the IOTN

<table>
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<tr>
<th>Definitive need for treatment</th>
<th>Modified Dental Health Component</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>% within Dental Health Component</td>
<td>38.3%</td>
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<tr>
<td>1</td>
<td>Count</td>
<td>11</td>
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<tr>
<td></td>
<td>% within Dental Health Component</td>
<td>18.3%</td>
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<td>2</td>
<td>Count</td>
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<tr>
<td></td>
<td>% within Dental Health Component</td>
<td>28.3%</td>
</tr>
<tr>
<td>3</td>
<td>Count</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>% within Dental Health Component</td>
<td>10.0%</td>
</tr>
<tr>
<td>4</td>
<td>Count</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>% within Dental Health Component</td>
<td>1.7%</td>
</tr>
<tr>
<td>5</td>
<td>Count</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>% within Dental Health Component</td>
<td>1.7%</td>
</tr>
<tr>
<td>6</td>
<td>Count</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>% within Dental Health Component</td>
<td>1.7%</td>
</tr>
<tr>
<td>7</td>
<td>Count</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>% within Dental Health Component</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Chi-Square Tests

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<tr>
<td>Pearson Chi-Square</td>
<td>20.991</td>
<td>6</td>
<td>.002</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>102</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Results

A total of 102 students (50 females, 52 males) participated in the study, out of which 54 were from 2nd and 3rd year and 48 were final year students/interns. The subjects were categorized into 2 groups,

Group A – consisting of 2nd and 3rd year students, with very little/preliminary knowledge of orthodontics, and

Group B – consisting of final year students and interns, with considerably more training and understanding of orthodontics.

This was done with the intention of assessing whether the amount of training received by the students affected their perception of malocclusion and need for treatment.

The students’ perceived need for treatment according to the AC of the IOTN is presented in Table 1. The results showed that only 1% felt they definitely needed treatment (photos 8-10), 2% in the borderline need for treatment (photos 5-7) and 97% felt they do not need treatment (photos 1-4).

However, the normative treatment need as assessed by the investigator according to the modified DHC (Table 2) showed that only 41.2% of the participants fell into the “no need for treatment” category whereas 58.8% had a definite need for treatment. There was a marked difference between the students’ and investigator’s opinion in assessing treatment need (Table 3).

Comparison of the AC scores with self-esteem and gender revealed that female students had higher self-esteem than their male counterparts inspite of having higher AC scores, but the difference was statistically insignificant with a p value of 0.798 (Table 4).

Discussion

In the present study, we attempted to evaluate the correlation between perceived and normative orthodontic treatment needs using the AC and modified DHC of the IOTN, on a patient pool of 102 dental students. These students were selected for their higher capability for expressing opinions on dental appearance compared to younger age groups, as well as for accessibility as they regularly attend university. Most importantly, it was assumed that as upcoming dental graduates these students would be more cognizant of their own malocclusion.

The validity of using the photographs of the AC to represent one’s dental attractiveness has been previously reported. The impact of perceived malocclusion on students’ self-esteem was also assessed using the Global Self-Esteem (GSE) scale.

The results of this study indicate that there was a marked difference between the normative need for treatment and the students’ self-perceived need.

According to the modified DHC assessment done by the investigator, 58.8% of the students had a definite need for treatment. Findings of previous studies on young adults show that normative treatment need ranged from 1.4% to 71.6%, however these studies used different indices to ascertain treatment need. Different ethnicities as well as age of the selected sample size also could have contributed to the varying outcomes.

Self perceived need for orthodontic care was found to be very low in this study with only 1% of the students falling into the “definite need for treatment” category (photos 8-10) and 2% falling in the “borderline need for treatment” category (photos 5-7), as evaluated by...
the AC of the IOTN. Out of the remaining students, 56.9% deemed their dental attractiveness to be similar to photograph 1 of the AC. This contradicts the findings of a study by Ravindranath S et al reported a much higher self perceived need for treatment as compared to the examiner assessed need. This corroborates the findings of several previous studies which shows that there is an uneven distribution towards the attractive end of the scale.

Both the index determined occlusal traits as well as self perceived need for treatment was higher in females and was statistically insignificant. Inspe of this, females recorded higher self-esteem scores than their male counterparts in this study. This can be attributed to the fact that self esteem of a person is affected by several factors like societal and economic background, parental and peer influence, attitude and mental make up of the individual. Physical appearance and malocclusion, though contributing factors, do not solely determine an individual’s self-esteem. This contradicts the findings of studies done by Barani K et al and Birkeland et al.

**Conclusion**

There was a very significant difference between the orthodontic treatment need evaluated by an orthodontist and dental students. The presence of malocclusion appeared to have no impact on the self-esteem. This study reinforces the fact that perception of treatment need and treatment uptake does not solely depend on the knowledge thereof and may be influenced by other psychological, economic or social factors.

**Ethical Clearance:** It was obtained from the Institutional Ethics Committee before commencing the study.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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Non-Invasive Diabetes Diagnosis with Pancreas Bio-Magnetism

P.Sankari¹, N.Prabhavathi²

¹Assistant Professor; ²Head and Associate Professor, Government Arts College for Women, Sri Sarada College for Women, Salem-8, Salem

Abstract

Obese patients are at a higher risk of being affected by diabetes. Diabetic patients often use invasive blood sample collecting devices to measure glycemic level. The method discourages patients to use these invasive devices. The glycemic level measure after each meal to keep track of blood glucose level. This analysis helps diabetic patients to maintain glycemic level at normal levels. In this paper, we propose a novel non-invasive method to measure pancreas insulin secretion activity. This helps to analyze glycemic level in body.

Keywords: Pancreas, Bio magnetism, insulin, Diabetes

Introduction

The autoimmune disease is caused due to the effect of self-immune system detects its own proteins as antigens and performs an attack over its own tissues. These are caused due to the genetic proneness over the stimulus of prior environmental disease commencement. Diabetes is a chronic disease caused due to the swelling of T-cells, which causes autoimmune disorder that destroys the β-cells in the pancreas. These are the base cells for producing insulin for regulating the blood glucose level.

This develops the impairment in maintaining glucose level in the blood. The insulin helps the cells to consume glucose from the blood stream. Nearly 70 to 80% of β-cells are present in the islet of pancreas and it covers 1 to 2% of pancreas total size. The islet is covered by glucagon, somatostatin and pancreatic polypeptide. These are responsible for generation of α-cells, δ-cells and ε-cells. The pancreas acts as a digestive organ that generates lytic enzymes for the catabolism of nutrients. Type 1 diabetes was detectable only after the loss of 80 to 90% of β-cell.

The several researches and development in the knowledge about the pancreatic impairments leads to the study of different types in the diabetic syndrome. Three type are categorized they are Type 1, Type 2 and Type 3 diabetes syndrome. Along with this category, gestational diabetes is also classified as individual type.

The classification was generated clinically and analysis performed based on etiologies over the molecular level generates individual classifications of diabetes mellitus.

The patients with Type 1 diabetes depend on external insulin source. This is the only way to treat the Type 1 diabetes since the insulin was invented by Banting, Macleod and Collip (1920). Normal pancreas maintains the blood glucose level around 5.5mmol/L but the patients with Type 1 diabetes have fluctuated concentration of blood glucose at before and after fasting. Frequent increase in concentration of blood glucose in Type 1 diabetes patients will lead to diseases like neuropathy, retinopathy, nephropathy and cardiovascular problems.

Patients with Type 2 diabetes are not dependent on external insulin injection. This is caused due to the insulin resistance or failure of β-cells to overcome the resistance. To improve the glucose homeostasis few patients are allowed to intake insulin. The development of Type 2 diabetes may or may not lead to Type 1 diabetes condition. The patients with Type 1 diabetes can posses’ symptoms of Type 2 diabetes. This leads to the difficulty in categorizing the patients. The patients not responding to oral therapy of Type 2 diabetes treatment may lead to Type 1 diabetes.

The third type of diabetes is also referred as secondary diabetes, which may be caused due to the malnutrition. This type of diabetes can be seen in infants due to the delay in development of β-cells in the pancreas. Due to
the lack of alternative way to generate insulin and the severity of type 1 diabetes, there is a need to develop the options for diagnosis and treatment. Several methods are introduced to monitor the functions of pancreatic cells and many new technologies are introduced to classify the type of diabetes present in the patients. The methods and technologies to identify and diagnose diabetes mellitus was presented as literature review.

**Literature Survey:**

Diabetes, for the early diagnosis and daily monitoring, acetone existing in human breath is an effective biomarker of diabetes. Breathe analysis of acetone such as non-invasive, accurate, and its merits, comparing to the other methods diabetes diagnosis and monitoring based on analyzing blood glucose level. For acetone detection, a novel nanostructured $K_2W_7O_{22}$ was tested and recently developed. The trace amount of acetone at room temperature shows that $K_2W_7O_{22}$. The fast response time of 12s is achieved with the lowest detection limit of 2.0 ppm (parts per million). $K_2W_7O_{22}$ and modifying the design of device circuit to realize weak signal detection, further improvement of sensing performance with the detection limit down to 25ppb. Strong charge transfer between acetone and $K_2W_7O_{22}$ and the result is the effective interaction of unique properties of $K_2W_7O_{22}$ and ferroelectric and semiconducting.

Acetone gas in breath has a good correlation to blood glucose levels its suggested by the researches, its reliable non-invasive diabetes prediction system. Acetone levels are measured using quartz crystal microbalance sensor that application has biosensor; acetone is promising biomarker in diabetes prediction system. To detect the quantity mass variations piezoelectric sensor, we can use. When there is a deposition of mass on the surface of the crystal, the resonant frequency of the sensor changed. Need to understand the sensors electrical characteristics such as its conductance gain and admittance, to evaluate the performance of this sensor, the shift in resonant frequency is directly proportional to the change in the mass concentration. Characteristics and calculate the Presence of different acetone absorption in for normal type 1 and type 2 diabetic topics.

Diabetes mellitus (DM) is gradually becoming an epidemic. Sparse representation classifier (SRC) its features to detect DM based on facial block color using the non-invasive method. It’s used to capture a facial image of four facial blocks strategically placed around the block, of non-invasive capture device with image correction. To calculate the facial color features of each block six centroids from a facial color gamut are applied. Facial color features represented the facial block. For SRC, Healthy facial color features sub dictionary and DM facial color features sub dictionary, two sub-dictionaries, are employed in the SRC operation. The SRC can difference Healthy and DM classes an average accuracy of 97.54% by using the combination of facial blocks.

Diabetic Retinopathy (DR) becomes one of the 21st century’s major health problems; the non-invasive method to detect Non-proliferative Diabetic Retinopathy (NPDR) and DM, three groups of features extracted from tongue images of the initial stage. Twelve colors representing the tongue color features, a color tongue gamut is established. The texture values nine-tongue texture features, eight blocks strategically located on the tongue surface, with additional of all eight blocks is used to characterize. From tongue images, 13 features extracted based on measurements, areas distances, and ratios, geometry features. Tongues using from each of the three groups with average accuracies of 80.52% and 80.33% applied 34 combinations of features, Healthy/DM tongues same as NPDR/DM sand NPDR (DM samples without NPDR).

Screening system has two parts, the first analyses the signal obtained from the pulse oximeter, and the second consists of a machine-learning module. Pulse oximeter signal consists of a front end that extracts a set of features. This features the input of the machine-learning algorithm determined the class of the input sample, whether the subject had diabetes or not, based on the physiological considerations. Machine-learning algorithm was gradient boosting, random forests, and linear discriminate analysis as the benchmark. Collected from five community health centers the system was tested on a database 1,157 subjects (two samples per subject). Receiver operating characteristic area found 69.4% and range [75.4% - 61.1%], specificity=64%, threshold gave a sensitivity=5%. Screening method for detecting diabetes comparable to the glycated hemoglobin test results in less than five minutes does not require blood extraction.

Diabetes is a disease affects many people. Here by the analysis of Heart Rate Variability (HRV) signals...
acquired from the ECG signals, diabetes is diagnosed. The deep learning networks of Convolutional Neural Network (CNN) and Convolutional Neural Network Long Short-Term Memory (CNN-LSTM) combination to detect the abnormality automatically. Feature extraction is not needed for these deep learning techniques. The maximum accuracy sing CNN-LSTM for test data is 90.9%. With 5-fold cross-validation, the accuracy by CNN is 93.6% and the accuracy by CNN-LSTM is 95.1%.

Here to carry out an early detection of Diabetes Mellitus, an application of computational intelligence with the help of fuzzy hierarchical model. The concept of the proposed method is designed based on how a doctor finalized in relation to the indication that someone has the power against Diabetes Mellitus, which is the model that has been coincided with the data that have been obtained in a medical laboratory. A comparison of the data has obtained from the laboratory with the decision of the doctor and the result is 87.46% of the 311 relevant data is same with the doctor’s statement.

Persons with the elevated risk of diabetes mellitus developing with the early detection are not possible to prevent the disease. Here the objective is that in electronic medical records, to apply association rule to discover sets of risk factors and their subsequent subpopulations that show patients especially at high risk of developing diabetes.

**Methodology**

Here the early detection of diabetes is by analyzing the function of pancreas. If the pancreas of a patient is functioning normally then the patient has no symptoms of diabetes. To detect the diabetes in a patient, the primary step is to analyze the functioning of pancreas. The pancreas is a glandular organ located in the digestive system and endocrine system in vertebrates. In humans it is in the abdominal cavity behind the stomach. It produces several important hormones such as insulin, glucagon and pancreatic polypeptide. The proposed method of detecting diabetes by the pancreas by capturing the magnetic emissions from pancreas is shown in the figure 1.

**Figure 1: Detection of Diabetes using Pancreas**

**Data Acquisition:**

The figure 2 shows the pancreas bio-magnetic signal emission. A spintronic sensor captures these magnetic emissions. Spintronic sensor working principle is based on the magneto resistive effect. It converts the magnetic field directly into voltage or resistance with a DC bias current supply. Spintronic sensor is based on the concept of spintronics that describes the intrinsic spin of electron and its associated magnetic moment. The principle of spintronic is based on the fundamental physical principles such as anisotropic magneto resistance, giant magneto resistance and tunneling magneto resistance. The output from the spintronic sensor is a voltage signal. Figure 2 shows the signal acquired from pancreas using spintronic sensor.

**Figure 2: Spintronic sensor placement above pancreas.**

The obtained signal from the spintronic sensor is denoised by applying the stationary wavelet transform. In discrete wavelet transform there is a lack of translation invariance. To overcome this stationary wavelet transform is used. The Stationary Wavelet Transform
has many applications such as signal de-noising, pattern recognition, brain image classification and pathological brain detection. After the signal is de-noised using the stationary wavelet transform, the signal is processed with the HAAR wavelet analysis. HAAR wavelet is nothing but a continuous sequence of rescaled square mapped functions. The HAAR wavelet’s mother wavelet function can be described as

$$\psi(t) = \begin{cases} 
1 & 0 \leq t < \frac{1}{2}, \\
-1 & \frac{1}{2} \leq t < 1, \\
0 & \text{otherwise}.
\end{cases}$$

Its scaling function can be expressed as

$$\varphi(t) = \begin{cases} 
1 & 0 \leq t < 1, \\
0 & \text{otherwise}.
\end{cases}$$

Finally, the processed signal from the HAAR wavelet analysis and the glucometer correlation processed for validation.

Results & Discussion

The blood sample acquire from two people with non-diabetic and other with diabetic condition to check glycemic level. For both people the magnetic signal from pancreas acquires and process with stationary wavelet transform and Haar wavelet analysis to detect pancreas magnetic activity. The sprintronic sensor placed above pancreas region of non-diabetic person. The pancreas magnetic signal acquires from person before meal and signal processed with stationary and Haar wavelet analysis. The processed signal shows pancreas insulin secretion inactivity. The pancreas does not secrete insulin due to no food ingestion.

For study, the blood sample acquires from a diabetic person before meal and check for glycemic level. The glycemic level was abnormal. The magnetic signal from pancreas acquired before food intake and processed with wavelet analysis. The wavelet features show lower pancreas activity than normal person due to lower beta cell content in pancreas. The lower beta cell produces less insulin, resulting in minimal pancreas activity as shown in figure 3 and 4.
The diabetic person feed with meal and the glycemic level check with glucometer. The glucometer shows increased glycemic level. The bio-magnetic signal analyses with wavelet transform. The wavelet analysis shows slender pancreas activity compared to before meal consumption. However, the pancreas magnetic activity for diabetic person is low as in figure 5 compared to pancreas magnetic activity for non-diabetic person after meal scenario. Table 1 gives the signal parameter comparison for diabetic and non-diabetic person bio-magnetic signal.
Table 1: Signal parameter comparison for diabetic & Non-diabetic patients.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Mean</th>
<th>SD</th>
<th>Median absolute deviation</th>
<th>Mean absolute deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Diabetic person (before meal)</td>
<td>0.001269</td>
<td>0.001782</td>
<td>0.0005733</td>
<td>0.0008187</td>
</tr>
<tr>
<td>Non-Diabetic person (after meal)</td>
<td>3.413</td>
<td>0.0007897</td>
<td>0.0005033</td>
<td>0.0006205</td>
</tr>
<tr>
<td>Diabetic person (before meal)</td>
<td>5.066</td>
<td>0.0002127</td>
<td>0.000122</td>
<td>0.000159</td>
</tr>
<tr>
<td>Diabetic person (after meal)</td>
<td>6.37</td>
<td>0.0007371</td>
<td>0.0004289</td>
<td>0.0005558</td>
</tr>
</tbody>
</table>

Conclusion

The performance of spintronic sensor to detect bio magnetic signal from pancreas before and after meal is presented. The spintronic sensor absorbs magnetic signal emitted by pancreas. The magnetic signal process with stationary and Haar wavelet to extract magnetic features in pancreas. The magnetic features provide a non-invasive way to detect pancreas insulin secretion activity to determine glycemic level in body. Experimental results show the proposed method analyses magnetic property of pancreas effectively before and after meal.

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Conflict of Interest: The authors declare no conflict of interest.

Source of Funding: None.

Ethical Clearance: All procedures were in accordance with the 1964 Helsinki Declaration (and its amendments). No approval by ethical committee or institutional review board was required. Informed.

References

A Study to Assess the Effectiveness of Educational Package Regarding Life Style and Behavior Modification Practices on Body Mass Index (BMI) of Adolescents from Selected Colleges of Greater Noida

Pauline Sharmila¹, Revathi²
¹Dean Cum Principal, School of Nursing Science and Research, Sharda University, Greater Noida, U.P; ²Research Director, Maher, Chennai, Tamilnadu

Abstract

It is essential to maintain an adequate nutrition, physical activity and sound body weight for overall wellbeing of an individual. These measures could reduce the risk of the development of serious health effects such as hypertension, diabetes mellitus, high blood cholesterol, stroke, cancer and cardiac disorders. According to Office of disease prevention and health promotion (2015); to achieve and maintain a healthy weight; balanced diet, regular exercises and activities and keeping up a healthy weight are essential to manage these health conditions, so that they will not worsen the eventually.

On the background of prevalence pattern of overweight and obesity in late adolescents, there is a need for educating and counselling, for at least 30 to 45 minutes of cumulative moderate physical activity at least 5 days in a week. Multi-sectoral approach of different sectors like education department, food industry, media and people will contribute in halting this problem of childhood obesity.

Objectives:

1. To assess the level of knowledge regarding the efficacy of dietary practices, physical activities and behavioural modification practices on effective management of body mass index among adolescents.
2. To find out the effectiveness of educational package regarding life style and behavior modification practices on body mass index (BMI) of adolescents.
3. To assess the life style and behavior modification practices by the adolescents for maintaining adequate body mass index (BMI).
4. To correlate the knowledge and practice regarding life style and behavior modification interventions by the adolescents.
5. To describe the frequency of dietary consumption among the adolescents with a view to identify possible dietary factors regulating the BMI.
6. To develop and distribute an educational booklet regarding life style and behavior modification practices on body mass index among the adolescents.

Key words: Effectiveness, Educational package, Lifestyle practices, Behavioral modification practices, Body Mass Index, Adolescents

Background of the Study

If someone wishes for a good health, one must first ask oneself if he is ready to do away with the reasons for his illness; only then it is possible to help him.
Once it was thought that the high prevalence of overweight and obesity is an issue only faced by the developed countries. But the obesity is found to be increasing even in developing and underdeveloped nations, especially urban areas. According to various studies the prevalence of obesity has doubled since 1980. According to WHO, more than 340 million children and adolescents up to the age 19 years were in the category of overweight or obesity in 2016. As per a recent study published in The New England Journal of Medicine, in the world, after China, India has got highest number of the adolescents (14.4 million cases) who are reported to be obese.

A significant change responsible for obesity is the lack of exercise that the older adolescents nowadays get. Earlier, they had more time to play, run about or work out, compared to the adolescents of this generation. Long school hours, the ordeal of getting ready for college and tuitions increases inactivity. Most of the adolescents are physically inactive as they have limited play areas and open spaces around their schools and homes. Another reason for lack of exercise, sports and physical activities are high level of academic competitiveness, homework and parent’s academic expectation about their children.

Even, recommended daily calorie requirement would lead to excessive energy balance due to lack of activity. This makes the fat accumulated in the body and leads to overweight and obesity. Especially, this pattern is frequent when the older adolescents spend excessive time on watching TV, play video games and work on computers. The problems of late adolescent obesity and sedentary lifestyle are interrelated leading to a vicious cycle. Many studies have shown a significant association between physical activity and obesity.

Goyal et al. (2010) suggested that prevention of obesity in adulthood requires the prevention and management of childhood overweight and obesity. In late adolescents, it leads to the health issues during adulthood by means of development of chronic diseases such as adult-onset diabetes mellitus, coronary heart disease, orthopedic and respiratory diseases.

Childhood and adolescence obesity is today a global health problem. Concerted efforts by health care providers, parents and the children themselves are needed to control and prevent the problem from escalating. So, the researcher felt the need to conduct this study to understand their level of knowledge and practice and increase the awareness about BMI, overweight and obesity management among the late adolescents with the help of an educational package.

Methodology

Research Approach

In this study Quantitative research approach is used.

Research Design

True Experimental Pretest posttest design (Randomised pre-test post-test control group design) was adopted for this study.

Table No:-1 showing the Research design of the study.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-test</th>
<th>Intervention</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp (20)</td>
<td>O1</td>
<td>(X) Educational package and its reinforcement</td>
<td>O2</td>
</tr>
<tr>
<td>Control (20)</td>
<td>O3</td>
<td>Routine information</td>
<td>O4</td>
</tr>
</tbody>
</table>

Variables Under The Study:

Independent variables: In this study, independent variable refers to the intervention, which is Educational Package.

Dependent variables: Dependent variables are Level of knowledge and practice regarding diet, physical activities and behavioral modification, which helps in weight management strategies of obesity.
Demographic variables: It includes the variables including age, gender, grade/class, height, weight, BMI, parent’s education, parent’s occupation, parent’s income, religion, type of family, area of residence, obesity level of parents and type of diet.

Setting:

Pilot study was conducted in Noida International University, Greater Noida.

Population

Target population: All the overweight or obese bachelor degree students of age 18-19 years, from Greater Noida, Uttar Pradesh

Accessible population: All the overweight or obese bachelor degree students of age 18-19 years, who meets the inclusion criteria.

Sample

The sample comprises of 40 bachelor degree students who were overweight or obese, of age 18-19 years from selected colleges, Greater Noida; who fulfilled the inclusion criteria were selected for pilot study and the samples were excluded from original sample that is samples for pilot study were selected from Noida International University, Greater Noida.

Sampling Technique

Simple random technique (Lottery method) was used to allocate the participants into experimental and control group.

Criteria for sample selection

Inclusion Criteria: - The study participants include

- those who are bachelor degree students, aged 18-19 years
- who are overweight or obese
- those who knows to read, write and interact in English
- who are available and willing to participate in the study.

Exclusion Criteria: - The study will exclude the participants, who had endocrine/medical problems which led to obesity.

DESCRIPTION OF THE TOOL: The instrument consists of following parts.

Part I – Demographic Data: It includes the variables including age, gender, grade/class, height, weight, BMI, parent’s education, parent’s occupation, parent’s income, religion, type of family, area of residence, obesity level of parents and type of diet.

Part II – Knowledge questionnaire regarding the lifestyle and behavioral modification: This part consists of 40 items to assess the level of knowledge regarding the lifestyle and behavioral modification in the management of overweight and obesity.

Part III- Practice questionnaire regarding the lifestyle and behavioral modification: This part consists of 32 items to assess the lifestyle and behavioral modification practices in the management of overweight and obesity. It also contained a FFQ.

Part IV: Educational package: Educational package regarding the diet, activity and behavioral modification which helped the adolescents to enhance their knowledge and manage their weight.

Scoring and interpretation:

Questionnaire for Assessing Knowledge

The questionnaire consists of 40 questions. Score of 1 was given for each single correct answer, and 0 score for wrong answer. Hence, the maximum score calculated for each adolescent was 40 and a minimum of 0.

Table No:- 2 showing the interpretation of the knowledge score

<table>
<thead>
<tr>
<th>Score</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-100%</td>
<td>Adequate Knowledge</td>
</tr>
<tr>
<td>51-75%</td>
<td>Moderately Adequate Knowledge</td>
</tr>
<tr>
<td>0 - 50 %</td>
<td>Inadequate Knowledge</td>
</tr>
</tbody>
</table>

Questionnaire for Assessing Practice

This consists of 32 items to assess the practice of the adolescents in the management of overweight and obesity. Each correct answer carried 1-5 marks based on the level of practice in the scale. Hence, the maximum
score calculated for each adolescent was 160.

Table No :-3 Table showing the interpretation of the practice score

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-100%</td>
<td>Most favorable practice</td>
</tr>
<tr>
<td>51-75%</td>
<td>Favorable practice</td>
</tr>
<tr>
<td>0 - 50 %</td>
<td>Unfavorable practice</td>
</tr>
</tbody>
</table>

Results of the pilot study:-

The pilot study was conducted with 40 (10% sample size of the main study) samples, allotted using randomization with 20 to study group and 20 to control group. These participants were excluded from the main study. Reliability of the tool was assessed by using Cronbach Alpha and was found to be $r' = 0.92$ ($p<0.001$) for knowledge questionnaire and $r' = 0.95$ ($p<0.001$) for practice questionnaire. The reliability was found to be highly significant. Pilot study was conducted after obtaining permission, from 01.06.2017 to 30.06.2017 with a total of 40 samples, 20 in each group. A miniature study of pre-test post-test knowledge and practice assessment was performed to find out the effectiveness of the tool, and obtained t-value was extremely statistically significant, which shown that, the study is feasible and tool is effective for administration.

Summary and Implications

Overweight and obesity are the significant long-term health problems that are common among the late adolescents in India. Being overweight or obese can contribute to type 2 diabetes in childhood and increase the risk of secondary effects in adulthood. Primary prevention of obesity prevents the development of serious secondary complications in adulthood too. Nurses can help adolescents by providing nutritional advice and, through weight management programs, offer strategies for decreasing caloric intake and increasing physical activity. Nurses’ actions should always take a family and community level approach including schools because it is challenging for obese adolescents to alter their dietary or physical habits if not supported by their families, friends and the teachers, who helps in their behavioral modification. Nurses should work with all members of the multidisciplinary team in addressing adolescent obesity as it is a major health issue with long-term complications.

Conflict of Interest : There is no conflict.

Source of Funding : Self

Ethical Clearance:- Institutional Ethical Committee, Adesh University, Bathinda, Punjab

References


Impact of Market Economic Principles on Workplace Anxiety and Stress

Pradeep Menon P, Priya V
1Research Scholar, Department of Social Work, Amrita School of Engineering, Coimbatore, Amrita Vishwa Vidyapeetham, India, 2Assistant Professor, Department of Social Work, Amrita School of Engineering, Coimbatore, Amrita Vishwa Vidyapeetham, India

Synopsis

The mainstream economic policies that have almost become a global narrative post the World War II have been that of the Free Market Economy. The key principles of this narrative include free labour market, free trade and the self-regulating market mechanisms. These principles essentially stem from the formalist economic principles that found its manifestation as classical and neo classical economic theories.

While “Maximization of Social Welfare” has been professed as the ultimate goal of this principle, there are incriminating instances and evidences where adoption of these principles has led to conflicts at micro (individual) and macro (societal) levels in society through increase in workplace anxiety consumerism, inequalities, poverty, identity conflicts, reduction in social capital, social cohesion etc.

This paper attempts to establish the how the outcome of market economic principle led policies such as inequality, individualism, social capital and globalized workplace contributes to workplace anxiety and stress.

Keywords: Market Economy, Formalist Economy, Globalisation, Inequalities, Social Capital, Identity Conflict, Decision Latitude, Social Welfare

Introduction

The Market Economic policies pushed to the centre stage by the International Monetary Fund, World Bank and the US Department of treasury which is otherwise known as Washington consensus has come to dominate the current economic world view. The market economic world view professes greatest good for the greatest number. However, increasing number of studies have pointed to incriminating evidences that the application of Market Economic principles have actually led to increase in conflicts in societies affecting the mental and social welfare of human beings.

Market economic policies put “Market” which was hitherto functioning on the periphery of society as the only institution of economic activity. In order for effective functioning of the market as the central place in society, it was necessary to commoditize factors of production, strip away the non-mechanistic characteristics of the labour and shape a new human and social reality where production and acquisition of wealth was the main purpose of life. The market economic characterization of human being (homo economicus) thus became the de facto expectation of the individual in the society.

The adoption of market economic principles paved the way for introduction of multitude of policy changes in adopting countries including Globalization, Liberalization and Privatisation. While the impact on GDP has been encouraging for many of the countries which adopted these changes, it was not without significant social ramifications including widening of income inequality, lack of social capital and cohesion, individuality, job instability, pollution, job insecurity among others.

Research studies on workplace stress indicates that the above listed factors which are outcome of market economic policies are primarily reasons for workplace stress and anxiety. Termed as the twenty first century
health epidemic, workplace anxiety and stress is said to cause significant global economic losses up to the tune of US Dollars one trillion per year in lost productivity (5).

Materials and Method

There is very little direct research on the effects of market economic principles on workplace anxiety and stress. The focus of this paper will be on potent risks of anxiety and stress in workplace that are central outcomes of market economic principles. This paper tends to review the research articles and chapters from books focusing causative factors for workplace anxiety and stress. More than 40 research articles and chapters from books published by Scopus, Pub Med and Sage were reviewed and the following factors concomitant to economic principles were recognized as leading to workplace anxiety and stress.

Findings

The findings from the reviews are categorised into four major factors and the evidences pertaining to these causes are discussed below.

- Wealth and Income Inequality
- Social Capital
- Individualism
- Globalized Workplace

Wealth and Income Inequality

Since the adoption of Washington consensus driven deregulation policies, the gap between the world’s rich and poor has only widened. In varying data levels across the years, Naomi Klein in her book Capitalism vs Climate Change claims that the top three percent of the wealthy, held fifty five percent of all wealth while the bottom ninety nine percent controlled only around twenty five percent of wealth (6). The data on wealth inequality in recent years in 2018 shows that the world’s richest which constitute nearly one percent of the population owns a staggering forty five percent of global wealth (7).

Inequality in societies leads to trust erosion, increased anxiety levels and excessive consumption. When economic inequality is more pronounced it has been found to have adverse impact such as physical health and mental health degradation, drug abuse, increase in imprisonment, decreased social mobility, trust and community life, increase in violence and child well-being (8). Inequality in economic status creates adverse view of one’s self worth and loss of control over work and life leading to deterioration in mental health.

The homo economicus characterization has set the default expectation of an individual in modern society as the one who not only constantly strives to create wealth but also has made it the main purpose in life. A dominant global narrative such as this in societies lead to Status Anxiety, a constant fear among individuals of not being perceived as successful if they don’t end up in the top of the economic income or wealth ladder (9). In workplace this translates to increase in competition, trying to outsmart his/her colleagues at whatever cost leading to constant state of anxiety and fear at the workplace. A vast disparity in wealth and income in societies thus leads to a constant stress and anxiety in the workplace.

Social Capital

Workplace is a social setting where individuals develop important friendships among co-workers. Elements of trust in workplace enables individuals to discuss individual problems which can have a positive effect on well-being of workers (10). Social capital is defined as features of social structure (such as trust, norms, sanctions, informal social control), appropriable social institutions, and channels that benefit groups or societies, which fosters mutual trust and reciprocity (11) (12) (13).

Market economic principles made Markets as the sole institution handling economic activity and subjugated other social institutions such as kinship, religious and political institutions which were also involved in production and distribution of goods (14). The hegemony of market as the sole institution handling economic activity in societies have thus paved the way for weakening of other traditional social institutions, traditions and norms. By appropriating and subjugating the functions of these social institutions market economic principles eroded the central social mechanisms governing human relations and thereby reducing the social cohesion in society (15) (16).

Wide range of studies conducted in United States, Finland and Iran have indicated that decrease in social cohesiveness and social capital results in weakened social support and increased psychosocial morbidity (17) (18). World Health Organization studies on Social
Determinants of Health further establishes that Social Capital and Social Cohesion is one of the key factors affecting individual health (20). Social capital in workplace has been identified to reduce stress and anxiety through various means including stress-buffering, availability of social support and exerting individuals to act in accordance with the established norms within the workplace (19)(21).

**Individualism**

Individualism is a set of principles that advocates that the interests of the individual should achieve precedence over the state or a social group. The political and economic system based on the principles of individualism value independence and self-reliance and limit the control of the government (22). Under individualism, individuals are considered as the basic building block of society and emphasises more on personal achievement with the person being the focus of attention (23). Relations with others are shallow and of limited emotive intensity (24).

The market economic principles for optimal functioning of the market are firmly anchored on economic individualism which considers individuals consistently make rational decisions and are narrowly self-interested and pursue their individual goals. Driven by American and European nations with its political and economic strength, globalization has not just exported products, technologies and economic systems but also the western culture, values, ideas and beliefs anchored on individualism (25).

Thus, individualism has become an essential characteristic of the developed market economy countries. Market economy through its emphasis and focus on individual achievement and competition have made individualistic values more desirable than collectivistic ones in these societies (26). Various studies indicate that job dissatisfaction, turnover intentions, common mental disorders, crime and divorce increases when societies become more individualistic (27)(28).

In today’s social setting workplace makes up significant time of an individual’s life catering to the need of the social self. Driven by the individualistic requirement of the market economic society, workplace of today is thus characterized by individuals who focuses only on personal gains. Continuous competition to succeed, one up-manship, winning at other’s cost and thereby creating a climate of distrust, continuous stress and anxiety at workplace.

**Globalized Workplace**

The market economy adoption have significantly changed the work environment, which is now characterised by boundary less outsourcing of business, increase in identity conflicts and reduction in decision latitude at work (29).

Globalization provides an avenue for organization to increase profits through outsourcing it to geographies, where the cost of production is less (30). However, the strategy has created a core set of fulltime workforce which focuses on the organization’s critical work and another set of nonstandard workers in periphery which is outsourced for cost advantages.

There are compelling evidences from studies that majority of the new jobs created post 1990s are informal and temporary in nature (31) and the erstwhile jobs characterized by reliable and stable employment has given way to new changing workplace experience characterised by informal and temporary arrangements (8) Studies conducted by (Kivimäki et al., 2001) (32) and (Virtanen et al., 2005) (33) have found that informal temporary employment is associated with higher psychological morbidity.

The globalized work environment has also contributed to the change in decision latitude which is defined as the extent to which one can make decisions and exercise control over his/her work. The globalized work environment is characterised by business and operational decisions being made at a global scale without leaving enough room for individual decision making in workplace (34). The new form of globalized workplace has also increased the level of job demands from the workers. Many a times workers have realized that the autonomy of work in globalized setting is only illusory (35). Numerous studies conducted over the years provide consistent findings that that low decision latitude combined with heavy job demands is associated with mental strain in workplace (36)(37)(38).
Market economic principles led globalization are characterized by rapid expansion of multinational corporations, dominance of global brands and pervasiveness of global media, which penetrate the local experience and provide a gateway to information and people in other geographies. Exposed to the global media, young people from non-market economic societies end up forging identities with the westernized global views and culture. This has led to an identity confusion among individuals outside the west, with a sense of delocalization resulting in significant sense of alienation, temporariness and lack of cultural identity. Lack of cultural identity leaves the population in these countries without clear guidelines on how life is to be interpreted and how lives have to be lived (39).

Influenced by globalized work environment, individuals in these newly adopted societies thus ends up possessing simultaneous identities, a globalized one at the workplace and a localized one outside the workplace. Multiple possession of identities leads to confusion and distress as individuals struggle to make priority of one over another while encountering conflicting situations. There have been growing evidence that multinational organization setting has actually led to increase in domestic problems, substance abuse, depression and anxiety (40) (41).

Conclusion

Market economic principles were the outcome of situations prevailing in sections of Europe post Second World War. The resurgence of these principles as Neo classical economics and Washington consensus has been applied worldwide in form of globalization, deregulation and privatization. These form of uniform policy application without due consideration of traditional culture, societal and religious norms prevalent in countries have developed conflicts in both at the level of the individual and the society. We have seen that the market economic principle implications include wealth and income inequality, reduction in social capital, rise in individualism and changing workplace among others. These factors are seen to increase mental stress and depression at the workplace.

A multipronged intervention is urgently required in order to mitigate this growing epidemic. The approach should include positive intervention from government, employers and NGOs. All interventions should take a comprehensive view of the social, cultural and economic context. Holistic interventions at workplace such as Yoga, Tai-Chi may also be explored.

Further ongoing research is needed to fully understand the fault lines created by blind application of market economic policies without due consideration to the social and anthropological factors, so that the community and society is saved from the rising requirements for operating at the margins of Supply Demand Curves.

Ethical Clearance: Considered not required as this is a review and concept paper

Source of Funding: Self

Conflict of Interest: Nil

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Physiologic and Psychologic Understanding and Consideration in the Treatment of Geriatric Edentolous Patients – A Review

Pradeep. S

1Additional Professor, Dept. of Prosthodontics, Manipal College of Dental Sciences, Manipal

Abstract

Perfect health has been the goal of mankind throughout all ages. It must be understood that there can be no separation between good bodily health and good dental health. A diseased body often produces a diseased mouth intum, a diseased mouth may often lead to a diseased body. Great majority of people have a heritage of good health, many destroy this priceless possession by failure to properly care for their bodies. Much of this neglect is due to a lack of knowledge of the best way to care for this complicated and wonderful machine. This is more so amongst the older age group of individuals. The care of dental problems of the senior citizens assumes an increasing proportion of the time of health care-takers. Dentistry for elderly must be practiced with increased awareness of the biologic factors, since the adaptive mechanism and tissue regenerative potentials of the elderly patients are usually significantly lowered

Keywords – Geriatrics, old age, senile

Introduction

Perfect health is a prize that has been the goal of mankind throughout all ages. It must be understood that there can be no separation between good bodily health and good dental health. A diseased body often produces a diseased mouth intum, a diseased mouth may often lead to a diseased body.

The care of dental problems of the senior citizens assumes an increasing proportion of the time of health care-takers. Dentistry for elderly must be practiced with increased awareness of the biologic factors, since the adaptive mechanism and tissue regenerative potentials of the elderly patients are usually significantly lowered. The elderly are not merely older ordinary patients because they require a different approach, modified treatment planning and a knowledge of how the tissue changes associated with senescence affect oral health services.

The subject of geriatrics is increasing in its importance because of great age shift in the living population of the world. Statistical data from United States, published in 1964, indicated that approximately 50% of the American population over 45 years of age was edentulous. This percentage was estimated to be 75% for those over 70 years of age. In spite of the profound changes, which can be anticipated in these statistics in future, owing to the remarkable advancements in the scientific disciplines of pedodontia, periodontia and restorative dental procedure, the potential number of geriatric patients seeking prosthodontic services in the immediate and predictable future stagger the imagination.

Geriatrics refers to the study of aged. Dr. S. Silverman views age as a three dimensional phenomenon; wherein, there is a constant interaction between chronologic age, physiologic age and psychologic age. The average life expectancy in 1789 was 35 ½ years. Today, it is one hundred years. The man has altered his average life span, but not his maximum potential. It seems obvious that whatever the troubles man’s mass longevity may cause, they make him no less eager to survive as an individual. His dream of continuing life and vigor and his corresponding terror of impotent old age are obsessive themes in his literature and now-a-days in his psychiatry.

The process of aging begins at birth. Thereafter, two phases of aging must be considered. The chronologic age and the physiologic age. The former denotes the time of existence of the individual and the later, the resultant effect of the passage of time on the functional elements of the body. Much of the life span is controlled...
by heredity, but a degree of modification may be made by environment, diet, emotional status and medical care. A person at the age of 60 years may have a gastrointestinal tract comparable to that of a 40-year-old, a nervous system of a 30 year old, a cardiovascular system comparable to that of a 50 year old person and the dental apparatus of an 80 years old, biologically.

From this we come to understand that the degree of a person i.e. chronologic, physiologic and psychologic, if plotted on a graph, may invariably stand at different levels in terms of years. This is a matter of increasing concern in the practice of dentistry, because of the number of elderly people who require denture service. The validity of this statement can be understood. If one maintains the records of problems posed by aged denture patients as against the young. The dental practitioner, who follows a stereo-typed treatment plan, without giving any consideration to the age and the problem, which are specific of each individual, certainly faces more number of failures in case of elderly patients. This can be attributed to different oral and general disorders of the aging persons, which, most of the practitioners fail to realize. These patients need to be treated by nutrotherapy as well as psychotherapy. Also the treatment procedures need to be altered according to the requirements of individual patient.

The effectiveness of execution and application of nutrotherapy, psychotherapy and modified clinical procedures in the success of the treatment, greatly depends upon the thorough understanding of changes that may take place in different systems of the body as well as in different organs, tissues and cells.

The prosthodontist can play a key role in reducing the number of prosthetic failures by a careful understanding of the physical, mental and metabolic changes that occur during senescence. The oral changes that occur during aging should be recognized, understood and treated before prosthetic restorations are prescribed for these individuals.

This article has been aimed at reviewing the available literature pertaining to “The problems and management of geriatric patients” and suggest methodology which will help the prosthodontists as well as general practitioners of dentistry, to considerably reduce the number of prosthetic failures through a proper understanding of the pitfalls and suggest ways and means to overcome these difficulties.

**Effect of aging on organ systems**

No organ and tissue of the body is spared from physio-anatomic changes, which can be called, senescent degenerations. These changes occur to a variable extent in different organs. To make a generalized statement, the essential changes is dehydration and waste of tissue. This wasted tissue is either not replaced at all or is replaced by a tissue of a different variety. Those changes in cellular function and growth are manifested by different organs, in different ways.

**Gastrointestinal system**

There are dilatations of the intestine and stomach accompanied by progressive atrophy of the glands. This probably causes irregularities of absorption and bowel. There is a diminished secretion of hydrochloric acid resulting in impaired absorption of dietary elements such as calcium, iron and vitamin C. Secretion of proteolytic enzymes, pepsin, trypsin chymotrypsin, is markedly reduced, consequently causing incomplete protein digestion.

**Glandular system**

There may be progressive atrophy, fibrosis, sclerosis and fatty degeneration in different glands of the body. As a result, there is marked degree of reduction in function which adversely affects metabolism, nutrition, enzymatic and hormonal relationships. This will be evident from the fact that the patient may suffer from moderate to severe deficiency diseases, inspite of consuming a balanced diet. Diminution of sexual power, diabetes, kidney dysfunction due to altered acid-base balance, are some of the manifestations of diminished glandular activity.

**Cardiovascular system**

Blood volume and haemoglobin content of blood, are reduced, cardiac insufficiency along with vascular changes – which reduce the optimal blood supply to tissues are common findings. The result is less oxygen supply to the tissues. According to many Geriatricians, this fact is the basis of senescence. Hypochromic anaemia is commonly seen in aged patients, which can probably be attributed to achlorhydria and deficiency of ascorbic acid, which affects absorption of iron. Sastry et al are of the opinion that 60% of the patients seeking
complete denture treatment are anaemic.

**Respiratory system**

Lungs show gradual fibrosis, which decreases respiratory efficiency leading to problem of oxygen exchange. This may be manifested as breathlessness after a little physical strain.

**Musculo-skeletal systems**

Generalized dehydration results in loss of elasticity and resiliency of the muscles. Notable skeletal changes also take place. Organic matrix of the bone is reduced which makes the bones brittle and prone to easy fractures, which heal with difficulty. This impaired healing tendency can probably be attributed to the deficiency states of vitamin C, calcium, which are important in healing of wounds. Bone marrow becomes gelations and contains relatively more fat that younger bones. There is also reduced osteoclastic activity. As a result, osteoclastic activity is apparently increased. This causes continuous resorption of the bones. This fact also, can probably be attributed to impaired healing of the fractures bones.

**Skin**

Thin, dry, and inelastic skin is characteristic of an aged. There may be atrophy of sebaceous and sweat glands. This makes the skin prone to injuries. The subcutaneous fat disappears and hyperkeratotic areas become apparent. There may be sparse and discoloured hair.

**Nervous system**

These cells reach the highest degree of specialization, undergo senescence and die without being able to divide and produce new cells. They lose the capacity to reproduce about the end of first year of life. Aging changes are most evident in such tissues and cells.

**Psychologic aspects of aging**

In addition to the physiologic evaluation of the geriatric patient who is to undergo prosthodontic treatment, a psychologic preparation is most important, which plays an important role in the success of the treatment. It is important to have some understanding of the psychology of human aging, to be able to appreciate the difference between behavioral disorders associated with organic brain disease and those which are not. According to Dr. Donald B. Giddon, this differentiation is necessary, as it would decide the need of measures to be followed in psychological conditioning of the patients.

Among the psychologic disorders which are associated with any organic brain damage, hypochondriasis (morbid anxiety about one’s own health, with complaint of imaginary disorders) is the common behavioral disturbance. In the older people this is basically withdrawal phenomenon where the individual substitutes his body for his previous concern for the world about him.

Organic brain damage presents difficult problems in the dental treatment. For example, in senile dementia, an irreversible deterioration of intellectual faculties develops and the patient is frequently withdrawn and incapable of adjusting to any prosthesis. Such patients are probably best treated by the eradication of oral disease and dietary changes to accommodate to their modified dentition or their non-existent prosthesis.

Geriatric patients show high incidence of depression and feelings of insecurity and experience vague pains and fears. Nervous habits like tooth clenching may develop and this places extra stress on tissues that already have lowered load bearing capacity.

Older patients are also likely to be using drugs and care must be taken to understand the clinical dental implications of such drug use. Tissue distortion can result from medication taken for oedema caused by kidney or cardiac dysfunction, from fatigue or changes in fluid intake. Tissue distortion can seriously affect impression making and it is recommended that morning appointments be organized to ensure minimum tissue distortion from oedema.

Reassurance, tolerance and a patient clinical approach can usually help the elderly obtain satisfactory prosthodontic results.

**Discussion**

General health and oro-dental health, are interdependent. In other words, one must have good bodily health, if he is to have a healthy oral cavity. Similarly, an unhealthy oral cavity and stomatognathic system adversely affect the general health of the individual. Again, the general as well as oral health depend upon the age of the person and his dietary habits.
As for any construction to be successful, a strong and stable foundation is the basic requirement, similarly for the artificial dentures to function successfully, healthy foundation tissues are necessary. No prosthesis, even if it is fabricated by a highly skilled and well experienced clinician using latest materials and techniques, can be and should not be expected to function satisfactorily, if it is to rest on poor and weak foundation. Moreover, psychological constitution of the patient also plays an important role in the success of treatment procedures and hence this aspect of patient evaluation cannot be overlooked.

Human body as a whole undergoes degenerative changes during the declining years of life. Stomatognathic system manifests these senile changes in different ways depending upon nutritional status of the patient. The alterations seen in the oral cavity during the old age should be considered to be physiologic. We, as dental professionals, should be able to appreciate these physiologic aging manifestations and should also be in a position to treat these conditions, so as to improve the individual’s oral health, thereby uplifting the stress bearing capacity of the denture supporting and denture bearing elements of the orofacial complex. The treatment procedures aimed at betterment of the oral and dental health status, should include the recognition of the dietary inadequacies and psychological setbacks and their treatment by proper dietary and psychologic counseling. This make evident the necessity of the knowledge of aging changes in different tissue of the body, particularly, those in the province of the prosthodontist

Summary

Knowledge of the senile changes that take place in different tissues, is important for the prosthodontists, to be able to appreciate and treat these conditions. Psychologic evaluation and counseling plays and important role in the treatment success

Conflict of Interest – None

Source of Funding – Self Funding

Ethical Clearance – As it is a review article ethical clearance was not required so was not obtained

References

Original Article

Post Stroke Pain in Patients from Eastern Uttar Pradesh: A Prospective Study from a Tertiary Care Centre

Rameshwar Nath Chaurasia¹, Jitendra Sharma², Abhishek Pathak³, Deepika Joshi¹, Vijay Nath Mishra¹

¹Professor, Department of Neurology, Institute of Medical Sciences, Banaras Hindu University, India,
²Senior Resident, Department of Neurology, Banaras Hindu University, India, ³Assistant Professor, Department of Neurology, Institute of Medical Sciences, Banaras Hindu University, India

Abstract

Background: Post stroke pain (PSP) is one of the most common but understudied consequence of stroke along with depression, cognitive impairment and poor quality of life. The aim of current study is to see the prevalence and intensity of post stroke pain after 03 months.

Method: The present study was a hospital based prospective study. For this study data was collected from stroke patients admitted in Neurology ward during Oct, 2015 to April, 2017. Total 200 patients were included in this study. VAS scale was used for measurement of intensity of post stroke pain after 03 months. Chi-square test was used to see independence between two variables.

Results: The prevalence of pain among stroke survivors is 25% at 03 months after onset of stroke. Average VAS score was 6.12 and standard deviation 1.76. Majority of the patients reported moderate to severe pain. Association between age, gender, type of stroke, territory of lesion are not significant predictors of pain intensity.

Conclusion: Post stroke pain is still an underestimated consequence of stroke which results in impairment of daily activities of life and further deteriorates quality of life, which affects restoration process negatively. Stroke patients having lesion in the thalamic region are more prone to develop post stroke pain. Therefore, pain management should be integrated with stroke treatment of patients.

Keywords: VAS Score, Central Post Stroke Pain, Thalamus.

Introduction

Stroke is a global health problem and is a leading cause of adult disability.¹ Of 35 million deaths attributable to Chronic Non-communicable diseases that occurred worldwide in 2005, stroke was responsible for 5.7 million (16.6%) deaths, and 87% of these deaths occurred in low-income and middle-income countries.² The earliest studies conducted in late sixties and early seventies in the Vellore in South India³ and Rohtak in the North India⁴, demonstrated prevalence rates of 57 and 44 per 100,000 persons, respectively.

Post stroke pain is characterized by constant or intermittent pain and is associated with sensory abnormalities, particularly of thermal sensation.⁵ Central Post Stroke Pain (CPSP) which was formerly known as thalamic pain syndrome, is a central neuropathic pain occurring in patients affected by stroke.⁶

CPSP has been a neglected consequence of cerebral stroke which has a negative impact on the quality of life. Since it has negative impact on quality of life and

Corresponding author:
Dr Rameshwar Nath Chaurasia (DM),
Professor, Department of Neurology, Institute of Medical Science, Banaras Hindu University, Varanasi-221005, U.P. (INDIA).
E_mail: goforrameshwar@gmail.com
rehabilitation therefore, pain is an important topic to be studied among stroke survivors.

**Material and Method**

The present study is a hospital based prospective study. Patients were enrolled in this study from Oct, 2015 to April, 2017. Total 200 patients were included in this study from stroke registry. A valid informed consent was taken from all of them. All the patients were subjected to a detailed clinical history, physical, neurological and radiological examination as per the standard protocol prepared by us. The past history of any illness, history of chronic illness, personal history of addiction, occupational, dietary habits and family history were taken in detail.

**Stroke Registration**

Stroke is defined as rapidly developing clinical signs of local or global loss of cerebral function that lasted for more than 24 hours or led to death within 24 hours. Subtypes of stroke were coded according to the *International Classification of Diseases (ICD), 10th Revision*. Events were classified as cerebral infarction (ischemic; ICD 434), Intracerebral hemorrhage (ICD 431), and subarachnoid hemorrhage (ICD 430). Patients with transient ischemic attacks were excluded. The subtype of stroke was verified by computed tomography (BRAIN), MRI (BRAIN). Stroke was further sub classified as unspecified stroke (ICD 436) if CT or MRI does not reveal any abnormality. VAS score was used to measure pain intensity and it defines pain intensity as mild (1–3), moderate (4–6), or severe (>6). We used SPSS 16.0 for analysis purpose. Chi-square Test was used to see relationship between two variables. Probability (p) values less than 0.05 were considered significant.

**Inclusion Criteria**

All Stroke patients admitted in neurology ward of Sir Sundar Lal Hospital from Oct 2015 to April 2017 were included.

Visual analog scale (VAS) was used for pain intensity measurement defining pain intensity as mild (1–3), moderate (4–6), or severe (>7).

WHO guidelines were used for all blood parameters.

Hypertension was classified as per Joint National Committee (JNC) 8.

**Exclusion Criteria**

Patients of Transient Ischemic Attacks (TIA) and Cerebral Venous Thrombosis (CVT).

Pediatric Age Groups were excluded (upto 14 yrs).

**Results**

Majority (33.0%) of the patients belong to age group 61-70 years, followed by 26.5% between 71-80 years and 23.0% between 51-60 years. In this study we see that more than 80.0% of patients are in the age range 51-80 years. Mean age of patients is 64 years with a standard deviation of 12 years. Further, sex- wise distribution of stroke patients shows three fourth of the patients were male (73.5%) and 26.5% patients were female. Majority (70.5%) of the patients were educated upto primary level, 13.5% upto high school and only 7.0% upto graduation level or above while 9.0% patients were illiterate. In our data economic status of the patients was measured by Kuppuswamy’s socio-economic scale. According to this 24.0% patients belonged to lower class followed by 29.0% from lower middle class, 34.5% belonged to upper middle class and 11.0 % belonged to upper class.

In our data 140 (70%) had left infarction/ bleed and 60 (30%) had right side injury in brain. Out of these 39 had lesion in thalamic region and 25 patients had bleed while only 4 patients had infarction. Further it is evident that majority of the strokes are Ischemic 113 (56.5%) as compared to Haemorrhagic 79 (39.5%). Subarachnoid haemorrhage constituted only 4% of total stroke. According to the TOAST classification of ischemic stroke majority of the patients had SVD (65) followed by LVD (28) and cardio embolic (20). In our study group around one third (31.5%) patients had hypertension. Also 97.0% of the patients had first ever stroke and only 3% patients had experienced stroke prior in the past. Pain intensity was measured by VAS score. The mean VAS score was 6.12 and the standard deviation was 1.76. In the present study Post stroke pain was found in 50 (25.0%) cases out of 200 stroke patients. Among all stroke patients, 12.0% patients reported moderate pain followed by 10.5% with severe pain and only 2.5% had mild pain.(Table 1)

Table 1 presents the association between different background characteristics and pain intensity. We used chi square test to check the significance of association between two characteristics. From table 2 it is clear that
age, sex, education, economic status and hypertension has insignificant association with pain intensity. Further we see that association between pain intensity and type of stroke was also not significant at 03 months. In our data out of 39 patients whose territory of lesion was thalamic region, left sided lesions (25) predominated. Among these 39 patients, 32(82%) patients developed post stroke pain within 03 months after onset of stroke. Out of these 32 patients, 15 (46%) patients had moderate pain and 16(50%) had severe pain intensity. The rest of the 18 patients with PSP had extra thalamic lesions. Among these 9(50%) patients had moderate and 5(27%) had severe intensity pain at 03 months after onset of stroke. Thus, we can say that stroke patients having thalamic lesion are more prone to develop PSP but this result was not statistically significant.

Table 1: Clinical profile of stroke patients.

<table>
<thead>
<tr>
<th>Clinical Profile</th>
<th>Stroke Patients (N=200)</th>
<th>Percent (%)</th>
<th>CPS Patients (N=50)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TYPE OF STROKE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemorrhagic</td>
<td>79</td>
<td>39.5</td>
<td>38</td>
<td>76.0</td>
</tr>
<tr>
<td>Ischemic</td>
<td>113</td>
<td>56.5</td>
<td>11</td>
<td>22.0</td>
</tr>
<tr>
<td>Subarachnoid Haemorrhage</td>
<td>08</td>
<td>4.0</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>TOAST CLASSIFICATION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVD</td>
<td>28</td>
<td>24.77</td>
<td>01</td>
<td>8.33</td>
</tr>
<tr>
<td>SVD</td>
<td>65</td>
<td>57.52</td>
<td>10</td>
<td>83.33</td>
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<td>Cardio embolic</td>
<td>20</td>
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<td>01</td>
<td>8.33</td>
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<td>Cryptogenic</td>
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<td><strong>HYPERTENSION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Yes</td>
<td>63</td>
<td>31.5</td>
<td>20</td>
<td>40.0</td>
</tr>
<tr>
<td>No</td>
<td>137</td>
<td>68.5</td>
<td>30</td>
<td>60.0</td>
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<tr>
<td><strong>PAIN INTENSITY (VAS SCORE)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild (1-3)</td>
<td>5</td>
<td>2.5</td>
<td>5</td>
<td>10.0</td>
</tr>
<tr>
<td>Moderate (4-6)</td>
<td>24</td>
<td>12.0</td>
<td>24</td>
<td>48.0</td>
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<tr>
<td>Severe (7-10)</td>
<td>21</td>
<td>10.5</td>
<td>21</td>
<td>42.0</td>
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<tr>
<td>No pain (0)</td>
<td>150</td>
<td>75.0</td>
<td>6.12 ± 1.76</td>
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<td><strong>TERRITORY OF LESION</strong></td>
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<tr>
<td>Thalamic</td>
<td>39</td>
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<td>32</td>
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<td>Extra-Thalamic</td>
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<td>36.0</td>
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<td><strong>TYPE OF PHYSICAL WORK</strong></td>
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<td>Moderate Physical</td>
<td>64</td>
<td>32.0</td>
<td>20</td>
<td>40.0</td>
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<td>Sedentary</td>
<td>136</td>
<td>68.0</td>
<td>30</td>
<td>60.0</td>
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</table>
Table 2: Association between CPSP and different background characteristics.

<table>
<thead>
<tr>
<th>Background characteristics</th>
<th>Pain intensity (VAS Score)</th>
<th>χ²(df)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>AGE (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 40</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>41-50</td>
<td>0</td>
<td>2</td>
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<tr>
<td>Upper</td>
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<td>3</td>
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</tr>
<tr>
<td>Yes</td>
<td>2</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>10</td>
<td>7</td>
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<tr>
<td>TYPE OF STROKE</td>
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<td></td>
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</tr>
<tr>
<td>Extra-Thalamic</td>
<td>4</td>
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<td>5</td>
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</table>

* insignificant at 95%
Discussion

The results of our study showed that the prevalence of PSP is 25%, which is in the range cited in previous studies. In many previous studies prevalence of PSP is reported in the range of 1%-12%. However, in a study 21% had pain related to stroke at 03 months. In Hansen et al. (2012) study 55.3% had post stroke pain at 03 months. In Kong et al. (2004) study 42% of the patients had post stroke pain. The time for onset of PSP has not yet been established. It may start immediately after onset of stroke up to 10 years but usually PSP starts between 03 to 06 months after onset of stroke. Therefore, the timing of clinical investigations must be considered carefully. In a study by Bashir et al. half of the patients reported onset of pain within first three months after stroke. While in present study one fourth of the patients had pain after three months of onset of stroke.

In our study average VAS score were 6.12 which shows higher proportion of patients belonged to moderate to severe pain category. In our study one fourth patients reported moderate to severe pain intensity. While in a study by Jonson found that one third of patients had moderate to severe pain at 04 months after stroke onset, and at one year follow up 20% were still experiencing moderate to severe pain with increased intensity. Also, they found that women had significantly lower Barthel Index than men. In a study by Klint and colleagues patients with CPSP often reported moderate pain intensities and CPSP generally only interfered little with daily activities, mood, sleep, and enjoyment of life. In present study we found CPSP was more prevalent in men than women. Similar results were obtained in study by Bashir also but they did not test the significance of results. However in our study we used chi square test to check the association between two and found insignificant association. Previous studies have shown that age, gender and location of lesion in the CNS could not be considered as predictors of CPSP. In present study also we have seen age, sex, education and economic status have shown insignificant association with the type of stroke.

Further in subgroup analysis between type of stroke and pain intensity at 03 months we found in ischemic stroke subgroup, three fourth of the patients had moderate pain and around one fifth had severe pain. Here again we see that majority of the patients had moderate to severe pain. In hemorrhagic stroke subgroup we found equal ratio between moderate and severe pain intensity and there was no patient with mild pain. While in subarachnoid haemorrhage subgroup 100% patients had moderate pain. The distribution of pain can range from a small area (e.g., the hand) to large areas (e.g., to one side of the body). Place of the pain varies, but hemi syndrome or lower limb involvement was frequent, which results in motor impairment and disability. In present study the cerebrovascular lesions were located in the lower brain-stem in 10 patients, involved the thalamus in 30 and in 6 were supra-thalamic. In 4 patients the location of the cerebrovascular lesion (CVL) could not be determined.

Here we seen that prevalence of CPSP vary widely from study to study and the possible reasons are non-uniformity in the selection criteria and the different ethnic populations being studied. Some studies are population based whereas some studies are hospital based and the duration of study also varies from one study to the other.

As per pain intensity is considered we can say that majority of the patients had moderate to severe pain at first follow up or baseline and over the time of second follow up at 06 months or one year or after that we found decreased percentage of patients reporting moderate to severe pain. Here again we see that there is discrepancy between timing of second follow up. Thus, different methods of study adopted and time points at which pain is measured makes comparison between two studies difficult. Therefore, some standard guidelines must be prepared by higher authorities and should be strictly followed by researchers. Then only we would be able to compare two studies scientifically and can come up with some crucial and relevant investigations which will ultimately help in further policy making.

In our study we found that age, sex, education and economic status are not significant predictors of CPSP. Though we have seen majority (96%) of patients having lesion in thalamic region had experienced pain intensity as moderate to severe while only 77% patients experienced moderate to severe pain intensity whose lesion site was extra-thalamic. Type of stroke, territory of lesion and physical activity are also not significant predictors for CPSP and this result is in accordance by the previous studies. But we recommend that pain therapies should be integrated with treatment of stroke.
patients having lesion in thalamic region because if affects motor activities of patients.

**Ethical Issues**: Nil,

**Funding**: None

**Conflict of Interest**: The authors declare that they have no conflict of interest.

**Ethical Clearance**: Taken from Institute committee

**Informed consent**: Informed consent was obtained from all individual participants included in the study.

**References**

Surgical Management of Radicular Cyst of Deciduous Tooth – A Case Report

Rathanakumar Vigil Dev Asir¹, Banu Sargunar², Rakesh Mohan¹, Wasim Ahamed¹, Shanmugapriyan², Swarna Priya²
¹Senior Lecturer, ²Reader, Department of Oral and Maxillofacial Surgery, Sree Balaji Dental College and Hospitals, Chennai

Abstract

Radicular cyst is the most common inflammatory odontogenic cystic lesion of the jaws. They arise from the epithelial remnants of the periodontal ligament as a sequel to the periapical inflammatory process, following chemical, physical or bacterial injury. The radicular cysts most commonly involves the maxillary anterior region and are managed by surgical enucleation and marsupialization. This article deals with the pathogenesis, clinical features, and treatment options present thereby discussing the successful management of the radicular cyst by surgical method.

Keywords: radicular cyst, odontogenic cyst, enucleation, deciduous tooth

Introduction

The term, ‘cyst’ is derived from a Greek word, meaning, ‘sac or bladder’ (1). Cyst is defined as a pathological cavity that is usually lined by epithelium and which has a centrifugal, expansive mode of growth (2). Of all the cysts that occur in the jaw, radicular cysts occurs the most and comprise about 52% to 68% of all the cysts(3–5)oral medicine, oral & maxillofacial surgery and radiology. This fourth edition reflects advances in immunohistochemistry, molecular biology and human genetics, which have contributed to the understanding of the etiology, pathogenesis, pathology and treatment of these lesions. This book is a comprehensive treatise on cysts occurring in the oral and maxillofacial regions, covering clinical features, epidemiology, radiology, pathogenesis and pathology. Classification and frequency of cysts of the oral and maxillofacial tissues -- Gingival cyst and midpalatal raphé cyst of infants -- Odontogenic keratocyst -- Dentigerous cyst -- Eruption cyst -- Gingival cyst of adults, lateral periodontal cyst, botryoid odontogenic cyst -- Glandular odontogenic cyst (sialo-odontogenic cyst, mucoepidermoid odontogenic cyst. Radicular cysts are rare in the primary dentition, representing only 0.5–3.3% of the total number in both primary and permanent dentitions (6). The male preponderance occurs essentially in the fourth and fifth decades(1). They originate from epithelial remnants of the periodontal ligament as a result of inflammation that is generally a consequence of pulp necrosis (7). Commonly found at the apices of the involved teeth(8) but may also occur in the lateral aspects of the roots in relation to lateral accessory canals(9). These cysts are slow growing and asymptomatic unless secondarily infected and usually an accidental finding

Trauma or dental caries are the common etiological factors. Dental caries cause inflammation of the pulp cavity, leading to pulp necrosis (10). The infection then spreads to the tooth apex of the root, causing periapical periodontitis, which leads to either an acute abscess or a chronic granuloma. Persistent chronic infection can lead to formation of a periapical cyst(11). Cortical expansion and root resorption of the affected tooth and displacement of the adjacent teeth are common features of radicular cysts(11). The treatment for radicular cysts includes conventional nonsurgical root canal therapy when lesion is localized or surgical treatment like enucleation, marsupialization or decompression when...
the lesion is large \(^{12}\)

**Case Report:**

An eight year old female patient reported to the Department of Oral and Maxillofacial surgery, with a chief complaint of swelling and pain in the left lower back tooth region for the past 15 days.

History revealed pulpectomy procedure followed by stainless steel crowns placement in 74,75,64,65 a year ago. On Extraoral examination a swelling measuring 2 x 1.5cm, was present in the left body of the mandible. On palpation, it was tender and hard in consistency. Intraoral examination revealed a swelling extending from 73 to the mesial aspect of 36. Radiographic examination revealed periapical radiolucency involving 73,74,75 and the tooth buds of 33(Nolla’s stage VI)\(^{13}\), 34(Nolla’s stage V)\(^{13}\) and 35(Nolla’s stage IV)\(^{13}\) and mesial root of 36. (FIGURE 1)

Based on history and clinical findings a provisional diagnosis of Radicular cyst involving the primary molars was made.

FNAC was performed with an 18 gauge sterile needle. 1cc of dirty white turbid fluid which was aspirated was sent for histopathological examination. Incisional biopsy was done under LA and a specimen of 0.5cm soft tissue with extracted 74 was sent for histopathologic examination. It confirmed the provisional diagnosis of Radicular cyst.

The patient was planned for surgery under general anesthesia. Routine blood investigations and chest X-Ray was taken. Pre-anesthetic consent was obtained. Medical history and investigation did not reveal anything that could oppose or influence the proposed treatment plan.

The patient was posted for surgery. Under general anesthesia nasotracheal intubation was done. Local anaesthesia administered in surgical site. Crevicular incision extending from 72 to 36 was made with relieving incision anteriorly. Mucoperiosteal flap was elevated. For entry into the cystic cavity, cortical bone window was created until the underlying pathology was adequately exposed and sufficient space was available for thorough enucleation and bone curettage and surgical removal of tooth buds of 33, 34 and 35. A careful enucleation was carried out along with the careful removal of the tooth buds which were embedded and loosely hanging inside the sac. Extreme care was taken not to injure the inferior alveolar nerve. After thorough enucleation, sharp bony margins were trimmed. Metronidazole and betadine wash was given. Careful examination of the area ensured that no residual infected tissues were left behind. The flap was repositioned and the flap margin was ensured to rest on the sound bone. Wound closure done with 3.0 vicryl. Post-operative oral antibiotics and analgesics were advised for 10 days and the patient was advised to be on soft diet for 1 week. (FIGURE 2,3)

**Followup:**

The patient was periodically followed on the third day, one week, three weeks, two months, three months and six months post operatively. (Figure 4,4)

**FIGURE 1** pre operative Orthopantomogram

**FIGURE 2** Intra operative – cystic cavity after thorough enucleation

**FIGURE 3** cystic content with removed tooth buds
Discussion

Radicular cysts originating from the deciduous teeth are quite rare. The low frequency maybe because the pulpal and periapical infections in deciduous teeth tend to drain more readily than those of permanent teeth and different antigenic stimuli may evoke the changes responsible for the formation of radicular cyst\(^6\). However, Mass et al\(^1\) reported that the prevalence rate of radicular cysts associated with primary molars is probably higher compared with that in the reported literature. It may be attributed to the fact that, unlike cysts of permanent dentition, primary teeth are extracted but not submitted for pathological examination, which may account for the low estimation of the real frequency of cysts associated with primary teeth\(^6\). Owing to the fact that these cysts are asymptomatic until they are secondarily infected, they are usually diagnosed during routine radiographs. The sequelae of an untreated or undiagnosed radicular cyst are swelling, tenderness, tooth mobility, and a bluish tinge caused by buccal expansion of the cortical plate. Furthermore, displacement of the successor tooth or, even more unforgiving, the loss of its vitality may result\(^9\).

The radicular cyst of the primary dentition most commonly occur in the mandibular molars\(^1\). In the present case pulpectomy procedure was undertaken for treatment of apical periodontitis in the primary mandibular molars, a year before. However, the side effects of the pulp therapy procedures may include cyst formation, delayed eruption or enamel defects in successor teeth\(^1\). The growth rate of radicular cyst in primary dentition was estimated to be 4-5 mm annually\(^2\). Rare cases of rapidly growing cyst similar to the present case has been reported\(^1\).

Owing to the large size of the lesion, conservative surgical approach was planned which involved the removal of the infected tissues. Marsupialization or enucleation are the common surgical approach to treating cysts of the jaws. The treatment of choice is dependent on the size and localization of the lesion, the bone integrity of the cystic wall and its proximity to vital structures\(^1\). Thorough examination after enucleation was done to prevent any possible recurrence. Post-surgical period was uneventful. The histopathological features of the submitted lesion were consistent with the clinical diagnosis of infected radicular cyst.

Conclusion

The present case is one of the rare occurrences of radicular cyst occurring in the primary dentition. Early diagnosis proves very important, and regular clinical and radiographic follow up for pulp treated primary teeth is strongly recommended.

Conflict of Interest – Nil

Source of Funding– Self

Ethical Clearance – Nil

References


Comparison of Perceptions Towards Modified PBL and Didactic Lecture among First Year Medical Students in India

Ravindra Maradi¹, Chandana Bhargavi², Kishan K³, Krishnananda Prabhuvi¹, Vaideki Bvi⁵, Prashanth N Dixitvi⁶

¹Associate Professor, Department of Biochemistry, ²Assistant Professor, Department of Anatomy, ³Assistant Professor, Department of Physiology, ⁴Professor, Department of Biochemistry, ⁵Post graduate, Department of Biochemistry, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India, ⁶Associate Professor, Department of Physiology, KIMS, Koppal, Karnataka, India

Abstract

Background: Most of the Western Medical schools have implemented Problem Based Learning (PBL) for many years and found that it facilitates deeper learning and longer retention of knowledge required for the patient care. But in India, because of the high ratio of students to faculty and lack of resources, it is very difficult to implement proper PBL. The present study is done to know the perceptions of medical students towards MPBL (Modified problem based learning) and didactic lecture.

Materials and Method: 165 students who have completed I MBBS and undergone MPBL and didactic lecture at Kasturba Medical College, Manipal were involved in the study. Informed consent and feedback was taken through a validated questionnaire. A descriptive analysis was done.

Results: Our study showed didactic lecture is better suited for understanding of medical concepts (58%), examination performance (77%), focus on important issues (59%), understanding and longer retention (57%), coverage of syllabus (82%), learning of new information and clarification of existing information (47%). For motivation, self-directed learning and use of additional learning resources (55%), active involvement (48%), fun and enjoyable (52%), improvement in confidence, communication and presentation skills (75%), critical thinking (51%), leadership qualities and team work (76%), application of basic science knowledge to diagnose the diseases (51%) and integration of preclinical subjects (61%) modified PBL is the preferred method.

Conclusions: The present study shows that a hybrid model of teaching and learning method (MPBL + Didactic Lectures) is more suitable for Indian Medical Schools than MPBL alone as our students have not been exposed to such Teaching and Learning methods in their pre-professional years. Also our assessment methods are not suitable for evaluation of MPBL.

Keywords: Modified Problem Based Learning, didactic lecture, PBL, Active learning

Introduction

Most of the Western Medical schools have implemented Problem Based Learning (PBL) for many years and found that it facilitates deeper learning and longer retention of knowledge required for the patient care. It should motivate students toward active, self-directed learning, rather than just being passive recipients of information in the classrooms. In 1997
recommendation of Medical Council of India has suggested the introduction of problem-based learning (PBL) in teaching. In PBL, a clinical problem is given to students without prior reading or lecture. The student analyses the problem through self-directed efforts, solves the given problem by applying his knowledge and skills followed later by group discussions. The student not only acquires knowledge but also develops skills. An adequate infrastructure, trained faculty, well-equipped library and internet facility is required for PBL. A tutor is present throughout the session to facilitate the learning process. Work by Papinczak T et al concludes that PBL will be beneficial to both teachers and students in terms of early availability of notes and easy, quicker assessment process. They also concluded it improves interaction among students and also with teacher. It also improved student’s perception to problem solving and their motivation to perform better. But in India, because of the high ratio of students to faculty and lack of resources, it is very difficult to implement proper PBL. A mixture of modified PBL (MPBL) and didactic lecture will be better suited for enhanced student learning in medical schools of India. Objective of our study is to compare the perception of first year medical students towards modified PBL and didactic lectures.

Material and Method

Institutional Ethical Committee clearance was taken Institutional Ethics Committee of Kasturba Medical College, Manipal. Informed consent was taken from 165 students who have completed I MBBS and undergone MPBL and didactic lecture at Kasturba Medical College, Manipal.

Unlike classical PBL which requires at least one facilitator for each small group, in modified PBL all 250 students were divided into 4 groups of 62-63 students each. Four different halls were allotted for each group of students and one facilitator from each preclinical subjects namely anatomy/physiology/biochemistry were facilitating the sessions. Each hall students were sub grouped into 6 small groups with 10-11 students. Each sub group was asked to write one objective on the board after discussing the key words of the case, which was debated by all other groups with active interaction. Likewise, all groups were asked to write one or two objectives each. Subject experts from each department finalized and shortlisted the objectives. All group members were asked to discuss all the objectives. Then one-week time was given for the students to prepare for their presentation. The presenter from each group was decided by lots. This activity was simultaneously happening in all the 4 halls in the presence of facilitators. This approach enforced all students to prepare for all the objectives and was conducted efficiently with minimum number of facilitators. Data were collected using an author designed questionnaire which was pilot tested on few students and was further modified based on their inputs. A descriptive analysis was done.

Table 1: Perception towards Modified PBL & Didactic Lecture in 1st year students

<table>
<thead>
<tr>
<th>Sl. No.</th>
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<th>Better in Modified PBL</th>
<th>Better in Lecture</th>
<th>Both equally effective</th>
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<td></td>
<td>Understanding of the medical concepts is</td>
<td>32</td>
<td>95</td>
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<td>Motivation for self-directed learning and use of</td>
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<td>additional learning resources</td>
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<td>Active involvement in the learning process is</td>
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<td>Facilitation of examination performance is</td>
<td>24</td>
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<tr>
<td></td>
<td>Fun and enjoyable learning experience</td>
<td>85</td>
<td>56</td>
<td>24</td>
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<tr>
<td></td>
<td>Improvement in confidence, communication &amp; presentation skills is</td>
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<tr>
<td></td>
<td>Provides focus and emphasis on important issues</td>
<td>44</td>
<td>97</td>
<td>24</td>
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<tr>
<td></td>
<td>Understanding &amp; longer retention of knowledge is</td>
<td>45</td>
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<td>Coverage of syllabus is</td>
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<td></td>
<td>Critical thinking is</td>
<td>83</td>
<td>55</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Development of leadership qualities and team work</td>
<td>125</td>
<td>30</td>
<td>10</td>
</tr>
</tbody>
</table>
Our study showed didactic lecture is better suited for understanding of medical concepts (58%), examination performance (77%), focus on important issues (59%), understanding and longer retention (57%), coverage of syllabus (82%), learning of new information and clarification of existing information (47%). For motivation, self-directed learning and use of additional learning resources (55%), active involvement (48%), fun and enjoyable (52%), improvement in confidence, communication and presentation skills (75%), critical thinking (51%), leadership qualities and team work (76%), application of basic science knowledge to diagnose the diseases (51%) and integration of preclinical subjects (61%) modified PBL is the preferred method.

**Discussion**

In this questionnaire based study, students had more inclination towards MPBL than didactic lectures in many questions which were answered. In this study group students felt PBL is a better method of teaching learning method when compared to didactic lectures in terms of motivation for self-directed learning using different resources. PBL is more enjoyable, helps in critical thinking, integration of topics between different subjects and helps in application of basic science knowledge to understanding diseases and its process.

Students agreed to the point that PBL help to improve immensely the confidence, leadership qualities and presentation skills. PBL helped them to improves the inter personal relationship and improves the team work capacity. Many papers have showed similar results in their study.

In Sanson-Fisher RW at al study almost same type of results in their study where PBL was rated higher by the students when compared to lecture based learning (LBL). They agreed that PBL stimulated their interest, improved retention of knowledge, stimulates interest, helps students to apply their knowledge thus integrating basic with clinical science4. In study by Ibrahim NK et al PBL was preferred over didactic lectures by their study group. This was mainly seen in learning skills and attitudes4. In Indian Scenario, effective implementation of PBL is difficult as student faculty ratio is more and lack of resources. Work by Ibrahim ME et al suggested that for Effectiveness of PBL will be high after taking a series of PBLs and intended program outcome should be determined to assess the effects of PBL6.

In many studies faculty prefer PBL over didactic lectures, studies done in Bangladesh7, Hong Kong,8 and in Canada9 faculty rated PBL high over traditional methods and supported inclusion of PBL in their teaching. In a study done in Pakistan10, 46.22% of the faculties were in favor of the implementation of PBL. Study done in Chennai half of the study group agreed that the PBL will help them to understand concepts and improves their communication skills11. Similar observations were made in studies from Iran12, Malaysia13, and Pakistan14.

In our study students were of the opinion that didactic lectures are better in understanding medical concepts, focuses on the important concepts and helps in long retention of concepts learned. Students felt that didactic lecture role is maximum in completing the syllabus and facilitates exam performance. Tisonova J et al. study concludes that students felt that lectures were more useful than PBL in solving multiple choice questions (MCQs) and essays questions. This is possible as most of the MCQs in examinations is not based on clinical case, but related to knowledge acquired following LBL15.

Further improvements are needed to provide students with an effective favorable learning environment and to take the students recommendations into consideration16. Even though lectures are being considered passive type of learning, for many complicated topics in medical education, well organized lectures will be a good teaching and learning tool17.
Intense efforts are being made to implement PBL extensively in the medical curricula. It is seen as a method to acquire knowledge, skills, and attitude. To implement PBL, sufficient number of trained staff and adequate time is required. In some medical schools, education is implemented entirely through PBL, whereas in others it is combined with lectures and other methods of teaching-learning depending on the structure of the curriculum. Finally, whichever method is selected for teaching pharmacology, it should be student centered and integrate theoretical knowledge with practical skills\(^1\).

These results suggest that PBL is a useful strategy in the teaching and learning process and it is clear that the pedagogical process and other variables can potentially influence the results obtained\(^18\). Many of the previous studies have shown PBL is better suited for student learning. But from our study it’s found that both MPBL & didactic lectures have their own advantages and disadvantages.

**Conclusions**

The present study shows that a hybrid model of Teaching and Learning method (MPBL + Didactic Lectures) is more suitable for Indian Medical Schools than MPBL alone as our students have not been exposed to such Teaching and Learning methods in their pre-professional years. Also our assessment methods are not suitable for evaluation of MPBL.

**Conflict of Interest** – NIL

**Source of Funding**- Self

**Acknowledgement**: - None

**References**


Teenager Response to the Conditions of Basic Level Emergency: A Phenomenology Study

Ronal Surya Aditya¹, Fitriana Kurniasari Solikhah², Setyo Budi Kurniawan³
¹Kepanjen College of Health Sciences, ²Polytechnic of Health, Ministry of Health, Malang, ³Shipbuilding Institute of Polytechnic Surabaya

Abstract

Emergency events are occurred quickly, suddenly, impacting anyone and difficult to be predicted. The ability of basic emergency services is an obligation that must be skilled by everyone, not only health workers. Teenagers are the frontline in handling emergencies among society. This research was conducted to qualitatively analyze the understanding of basic level emergency action among teenagers. The descriptive phenomenology design was used in this study to obtain data via in-depth interviews conducted to 15 participants that have experiences in handling emergency events in their past. The Interpretative Phenomenological Analysis (IPA) was chosen to analyze the result of obtained data. Result showed that there were four identified thematic areas in the understanding basic emergency action namely the knowledge of emergency handling, the experience in handling emergency situations, the feelings when handling emergency situations and the meaning of handling emergency situations. Specific themes indicating that teenagers obtain their knowledge in handling emergency situation from various methods. The thematic area of teenagers feeling suggested that they are feeling happy while helping others.

Keywords: Action, Adolescence, Emergency situation, Experience, Interpretative Phenomenological Analysis.

Introduction

Emergency events are serious condition that occurred rapidly, suddenly and unpredictable. Emergency can occur at any time and generally involves serious condition that threatens the life and the standard actions are needed for immediate action to handle the victim. Emergency conditions like cardiac arrest and loss of breath are life-threatening problems and can result in death. The most effective way to handle emergency condition is by knowing the response to anticipate a worse situation. Basic Life Support (BLS) is important because it is showing basic techniques about how to save victims from various accidents or everyday calamities that are commonly encountered.

An assistance for the victims from the beginning of the events until the trip to the health facility must be considered and prioritized. Achieving the quality of victim’s life must be the goal of the accompaniment. In order to achieve to carry a proper response to the emergency situations, a basic level understanding of emergency conditions become the basis of first aid procedure. This ability is usually skilled by only health workers while actually, this ability is also expected to be skilled by general public.

Teenagers are currently becoming the largest population (23%) among Indonesian society. Since the number of teenagers is very high, it should be the focus of attention and strategic intervention points for the development of human resources. Study related to the depth of understanding of teenagers to the basic level emergency situation is very interesting to be conducted, but still have not been widely studied. This can be the basis for determining future strategies in educating the younger generation to be more responsive to emergency conditions. Related to this condition, the experience of teenagers in facing the emergency conditions become a very important information for understanding their knowledge about proper responses (Califf et al, 2016). This research was aimed to deeply analyze the understanding of teenagers to the response of basic level emergency conditions by determining thematic area and specific themes to describe the phenomena of the response of basic level emergency by teenagers.
presented result may highlight the depth of teenagers understanding in terms of basic level emergency condition, especially in Indonesian society.

**Materials and Method**

This research was carried out in a descriptive qualitative study using phenomenological approach. By using this method, researchers want to explore or reveal the meaning of a concept or phenomenon of experience based on the awareness that occurs in some individuals. This research was conducted on November 19 to November 26, 2018. The method of selecting participants was carried out using a non-probability sampling basis with a purposive sampling technique, which was considered to be suitable for our certain criteria.

A total of fifteen participants who interviewed in this study were teenagers aged 18-20 years old (coded as P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15). All participants reside in Kebon Agung Sub-district, Malang District, Indonesia and had experienced a basic emergency toward their friends of the same age. All participants were declaring their willingness to provide information needed by researchers to achieve the goal of this study. Data collection in this study was carried out by in-depth interviews using voice recorder and direct observation techniques. Interviews were conducted structurally using interview guidelines prepared by researchers based on response theory and phycology theory. All obtained data from in-depth interviews were then analyzed using Interpretative Phenomenological Analysis (IPA).

**Findings**

**Table 1 Demographic Information of Research Participants**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Education</th>
<th>Description</th>
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<td>1</td>
<td>18</td>
<td>Health Vocational High School</td>
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<tr>
<td>2</td>
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<td>15</td>
<td>19</td>
<td>Health Vocational High School</td>
<td>Join In Junior Of The Red Cross</td>
</tr>
</tbody>
</table>
The sample studied for this investigation consisted of fifteen Indonesian women and men aged 18-20 years. This range and demographic is a representation of community members interested in emergency response in Malang (total population of 861,414 at the 2017 census) where the developer first introduced the practice at the community level. Table 1 provides a brief description of the sample, including the number given to each participant (in lieu of the name) to protect their identity. Various activities are represented in the core sample of this participant (college, personal work, home, and others). The youngest participant identified as a student.

**Results**

The educational background of all participants were homogenous since most they are all senior high school graduates with 20% of them were Health Vocational School graduates. The level of education is highly related to the knowledge they have. The higher the education, the better knowledge in terms of health education they have such as the provision and delivery of Methadone (as legal drugs. The result of in-depth interview analysis was presented in 4 themes as described below.

**Theme 1: Knowledge of emergency handling**

Teenager achieved their knowledge about basic emergency actions derived from their subject matter at school, school health unit, online information and sharing with health worker. Based on the opinions expressed by participants, 4 groups of sub-themes for the source of the knowledge, namely subject matter at school, school health unit, online information and sharing with health worker can be created. The expressed statements by participants were listed below:

“From biology subject matter at school”, stated by P1, P2, P3, P7 and P9;

“There are first aid lessons at school”, stated by P4, P5, P6, P8, P11 and P15;

“I have had school health unit training”, stated by P1, P2, P3, P10, P12 and P14;

“I asked the health center employee, but I was confused about the treatment”, stated by P4, P10 and P13;

“I search and browse on the internet”, stated by all participants.

**Theme 2: Experience on handling emergency conditions**

Teenagers have many experiences on basic emergency handling during their daily activities. Five sub-theme groups of experience on emergency conditions namely taking care of dysmenorrhea, treating wounds, caring for nosebleeds, handling fainting during ceremonies and helping road accidents were divided based on the expressed opinions. The expressed opinions were mentioned below:

“Take care of my friend who was having dysmenorrhea”, stated by P1, P2, P3, P4, P6, P11;

“I have treated wounds during exercise”, stated by P4, P5, P10, P13;

“When my friend got a nosebleed I immediately looked for cotton to stop the blood”, stated by P1, P7, P15;

“I often help friends that are faint during school ceremony”, stated by P5, P8, and P14;

“People fall, then I help and accompany them to the hospital”, stated by P2 P9 and P12;

**Theme 3: Feelings while handling emergency conditions**

There are so many feelings when handling basic emergency situations during daily activities. The opinions expressed by participants about feelings while handling emergency situations can be grouped into 5 sub-themes i.e., fear, anxiety, confusion, calm, shock. The feeling expressions while handling basic emergency conditions were mentioned below:

“First time doing it, I’m afraid”, stated by all participants;

“My friend fell from bicycle, I was confused about what to do first”, stated by P5 and P14;

“After routine Red Cross Youth Volunteer exercises and facing the case more often, I started to calm down a bit”, stated by P1, P2, P11;

“I often see my friends fainted during nose bleeding, so I’m shocked”, stated by P3, P13.
Theme 4: Personal view on the meaning of handling emergency situations

Teenagers have a various personal sight on the meaning of handling emergency situations. The opinions expressed by participants about their personal view on the meaning of handling emergency conditions can be grouped into 3 sub-themes i.e., happy, proud, and curious about advance emergency situations handling. The stated opinions indicating the sub-themes were listed below:

“I am happy to be able to help others”, stated by all participants;

“With me being able to treat it like this, I am proud and I can also make my parents proud”, stated by P3, P4, P5, P13 and P14;

“I am happy when I see someone whom I care for is getting normal again”, stated by P1, P2 and P3;

“If there is an opportunity, I want to increase knowledge about advance handling methods on emergency situations”, stated by all participants.

Discussion

The results of research on knowledge about emergency action indicating sources of Red Cross Youth Volunteer training, school subject lessons, online information and sharing with health workers. This was in line with. Support from their close friends can help someone to better adapt and accept their success in life, which stated that one factors that influence knowledge was the level of education. Person who is highly educated will find it easier to receive information. The participants experience in daily emergency situations are quite varied. They have experience in caring for dysmenorrhea, treating wounds, taking care of nosebleeds, handling fainting during ceremonies and helping on road accidents. This result was in accordance with research conducted by, which stated that personal experience was gained from practicing the obtained knowledge so that it can provide benefits to others. the opportunity for someone to live independently, work for themselves and others can be given a strong community.

Participants were expressing the feeling of scared, nervous, confused, calm, and shocked. The obtained expressions were in match with such as the provision and delivery of Methadone (as legal drugs which reported that attitudes have three elements, namely cognitive (knowledge), affective (emotions, feelings) and active (actions). Confusion about handling victims, affects emotionally and develops emotionally. From these elements of emotion or feeling, teenagers can be triggered to have negative or positive expression based on personal role model on their daily live. Participants have various personal meaning of handling emergency situations. They interpreted it happily, proudly, and curious in learning advance response to the emergency conditions. The importance of moral values easily understood by children when they can discuss their understanding with their peers rather than just being heard lectures from teachers or parents. regulating the behavior of individuals in their immediate community environment has a slim relevance to cultural values. Previous research shows the need for a public education strategy to improve community preparedness in emergency conditions.

This research is very important because it is the basis of further research on the provision of basic life aid materials. the success of Basic life support training needs to be explored by the experience of handling daily emergencies and the response experience of someone handling the emergency so that the important results of this study are to become a reference material. so that the training does not increase knowledge but is able to practice it in daily life. BLS done to patients is of course an important step before definitive care is planned. Government policies support related to the distribution of expert health workers who are fair so that the community is able to maximize prevent emergency conditions.

Conclusion

Teenagers gain knowledge related to the response to emergency condition from various method and medium, especially from additional health-related activity during their formal education period, the online information, and a lot of information from the media will enrich life support knowledge. Teenagers were also concluded to be proud and happy by doing social activity in helping others during the emergency situation. So they will look for life support and be a motivation for themselves.

Conflict of Interest Statement : None

Source of Funding: This research was fully funded
by STIKes Kepanjen Malang.

**Ethical Clearance:** Not required

**References**


Development and Validation of the Pre-Operative Counselling Module for Total Laryngectomy - An Interprofessional Approach

Sheela S\(^1\), Kiran S\(^2\), Anupama P B\(^1\), Balakrishnan R\(^3\), Venkataraja U Aithal\(^3\), Rajashekar B\(^2\), Gagan Bajaj\(^4\)

\(^1\)Assistant Professor-Senior Scale, Department of Speech and Hearing, Manipal College of Health Professions (MCHP), \(^2\)Senior Research Associate, Department of Speech and Hearing, Manipal College of Health Professions (MCHP), Manipal Academy of Higher Education (MAHE), Manipal, Karnataka, India, \(^3\)Professor, Department of Speech and Hearing, Manipal College of Health Professions (MCHP), Manipal Academy of Higher Education (MAHE), Manipal, Karnataka, India, \(^4\)Associate Professor, Department of Audiology and Speech Language Pathology, Kasturba Medical College, Mangalore, Karnataka, India

Abstract

**Background:** Total laryngectomy (TL) is necessary for patients with malignant tumor on the larynx. This could however cause a devastating situation affecting patients’ quality of life. A comprehensive pre-operative counselling could reduce their anxiety and prepare them for TL. Laryngectomy rehabilitation requires a team approach and we aimed at developing (Phase 1) and validating (Phase 2) the pre-operative counselling module for TL, using an interprofessional (IP) approach.

**Material and Method:** Phase 1: Development of the pre-operative counselling module through the literature review and discussions among the IP team consisting of a speech-language pathologist, head neck surgeon, psychologist and physiotherapist.

**Phase 2:** Validation of the module by another IP team having a minimum of five years clinical experience in alaryngeal rehabilitation. The changes done to an item following specific “ratings” by at least two experts were as follows: “highly appropriate”- item exactly retained; “just appropriate” - minor modification; “inappropriate”- major modification, and “highly inappropriate” - excluded.

**Findings:** Phase 1 resulted in the module having six domains (D) focusing on speech subsystems, oncological aspects, physical limitations, respiratory, phonatory, swallowing changes and their management. Following phase 2, the items under all domains were retained as they were, except for D3.7 which was rated as “inappropriate”.

**Discussion and Conclusion:** The item D3.7 i.e., ‘progressive resistance strengthening with thera-bands’ was rated as ‘highly inappropriate’ by two experts, and ‘inappropriate’ by another two. Therefore, the item was excluded. However, as per the suggestion of two experts ‘post-isometric relaxation techniques’ and ‘myofascial release of cervical region’ were included as D3.7. The finalized module has four items each under D1, D2, D4, D5, and eight items under D3 beneficial in providing comprehensive information for patients undergoing TL. Future studies can focus on comparing anxiety levels of patients undergoing TL, before and after counselling using the module presented.

**Keywords:** Laryngeal Cancer, Total laryngectomy, Pre-op counselling, Anxiety, Interprofessional approach

**Background**

Laryngeal cancer is a type of head and neck cancer (HNC) characterized by malignant tumor on the vocal cords.
folds and/or other parts of the larynx. The patient who has been diagnosed with advanced laryngeal cancer -stage 3 or 4 will be undergoing devastating situation as there will be a need to undergo major surgery. Total laryngectomy (TL) is a surgical procedure which involves the surgical removal of larynx.

Increased anxiety prior to surgery is reported in patients recommended for TL\(^1\) and this also affects their quality of life (QOL). Therefore, comprehensive counselling of such patients who are candidates for TL should be considered\(^2\). There are studies in which laryngectomees have post-operatively reported that they wished for a more detailed pre-operative counselling\(^3\,-\,6\). Providing good pre-operative counselling to patients posted for surgery will provide an opportunity to discuss their concerns, reduce their anxiety and help them recover better\(^7\,-\,9\). A systematic review of the need for appropriate information with particular reference to patients with head and neck cancer suggested that, providing detailed information increases patient’s knowledge, overall satisfaction, and decreases emotional distress\(^10\). Another systematic review on pre-operative counselling, suggested that the studies done on pre-operative counselling for laryngectomees are flawed in design and represent weak levels of evidence\(^11\). Therefore, a well designed pre-operative counselling module is the need of the hour.

Laryngectomees undergo a lot of biological, psychological, and social changes post. Lack of proper prior information on such aspects naturally increases anxiety levels in patients. Inadequate counselling might make them refuse surgery, increase the risk associated with surgery or make them anxious about life after surgery. So, providing them comprehensive information through pre-operative counselling could help in reducing their anxiety. However, no pre-operative counselling can fully prepare a patient for the consequences of such a major surgery. Yet, the role of a comprehensive counselling to assist the patient to accept the condition and be prepared for the surgery with as lesser anxiety as possible cannot be refuted. Such counselling, will also provide opportunities to the patient to clarify their expectations and accept the ‘ground reality’ and facilitates an improved long-term quality of life following surgery. Total laryngectomy rehabilitation requires a team approach. Therefore, a comprehensive pre-operative counselling protocol for individuals with advanced laryngeal cancer developed with Interprofessional (IP) team approach is warranted. IP team approach refers to the cooperation, coordination, and collaboration among members of different professions in delivering patient-centered care collectively. The study was aimed to develop and validate the pre-operative counselling module using an IP approach for individuals undergoing total laryngectomy.

### Material and Method

The study was conducted in two phases. Phase 1 involved the development of pre-operative counselling module through the review of literature (ROL) and discussions among the IP team that consisted of a speech-language pathologist (SLP), head neck surgeon (HNS), psychologist (PL) and physiotherapist (PT). All had a minimum of five years experience in the rehabilitation of alaryngeal patients. In phase 2, validation of the module by another IP team of four subject experts (SLP, HNS, PL, & PT) again with a minimum of five years clinical experience in alaryngeal rehabilitation, was carried out. If ≥ 2 experts rated an item as ‘highly appropriate’, that item was exactly retained. If ≥ 2 experts rated an item as ‘just appropriate’, that item was retained after suitable minor modifications. Similarly, if ≥ 2 experts rated an item as ‘inappropriate’, such an item was subjected to major modification, and if ≥ 2 experts rated an item as ‘highly inappropriate’ then, such an item was excluded. Content validation ensured that the tool does not miss out any potentially relevant items.

### Findings

Phase 1 resulted in the development of a module consisting six domains namely: ‘awareness of speech subsystems and their function’, ‘oncological aspects’, ‘respiratory changes and treatment’, ‘phonatory changes and treatment’, ‘swallowing changes and diet recommendations’ and ‘physical limitations’. During Phase 2, for the validation of the module, ≥ 2 IP team experts rated as ‘highly appropriate’ for all the items under domains ‘awareness of speech subsystems and their function’, ‘oncological aspects’, ‘phonatory changes and treatment’, ‘swallowing changes and diet recommendations’ and ‘physical limitations’. During Phase 2, for the validation of the module, ≥ 2 IP team experts rated as ‘highly appropriate’ for all the items under domains ‘awareness of speech subsystems and their function’, ‘oncological aspects’, ‘phonatory changes and treatment’, ‘swallowing changes and diet recommendations’ and ‘physical limitations’. During Phase 2, for the validation of the module, ≥ 2 IP team experts rated as ‘highly appropriate’ for all the items under domains ‘awareness of speech subsystems and their function’, ‘oncological aspects’, ‘phonatory changes and treatment’, ‘swallowing changes and diet recommendations’ and ‘physical limitations’. But only one item (no. D3.7) under ‘respiratory changes and treatment’ domain, was rated as ‘highly inappropriate’ by two, and as ‘inappropriate’ by other two IP team experts.
Discussion and Conclusion

The current study aimed to develop and validate the pre-operative counselling module using an IP approach for individuals undergoing total laryngectomy. Phase 1 resulted in the development of a module with 6 domains (D) namely: D1-‘ awareness of speech subsystems and their function’, D2-‘oncological aspects’, D3-‘respiratory changes and treatment’, D4-‘phonatory changes and treatment’, D5-‘swallowing changes and diet recommendations’ and D6-‘physical limitations’.

Phase 2 involved four more IP team experts, rating the items for their appropriateness so as to be included/modified/excluded in the pre-operative counselling module. Items rated as ‘highly appropriate’ by at least two experts were retained without any changes. It was noted that a majority of the items across all the domains were rated as ‘highly appropriate’ by ≥ 2 experts. But, the item D3.7 i.e., ‘Progressive resistance strengthening with therabands’ was rated as ‘highly inappropriate’ by two experts, and as ‘inappropriate’ by other two experts. Therefore, the theraband exercise was excluded. However, as per the suggestion of two experts ‘relaxation exercises’ such as ‘post-isometric relaxation techniques’ and ‘myofascial release of cervical region’ were included as D3.7. This is relevant because patients after TL, with or without radiation therapy could experience restriction in the range of motion of the neck and shoulders. This decrease in flexibility could be treated using stretching techniques like post-isometric relaxation. On the other hand, the typical continuity of the fascial tissue could impact superior esophageal constrictor that forms the ‘mouth of esophagus’ and could thereby hinder the mastery of esophageal speech. Literature has report of average decrease in pressure from 37.9 to 26.6 mmHg in the cervical region using myofascial release therapy. This could help patient obtain faster esophageal speech.

Using an IP approach, the current study offers a validated pre-operative counselling module The finalized module has six domains out of which four domains (D1, D2, D4, and D5) has 4 each items and one domain (D3) has 8 items (See Appendix). As the module is developed and validated with IP approach and hence is comprehensive, each item is believed to have positive influence on the outcome of laryngectomy rehabilitation. Potential patients undergoing TL could benefit by the use of this pre-operative counselling module by SLPs. Future studies can focus on comparing the anxiety levels of patients undergoing TL, before and after counselling using the comprehensive module presented in this study.

Appendix

D1. Awareness of speech subsystems and their function

D1.1. Respiratory system

D1.2. Phonatory system

D1.3. Resonatory system

D1.4. Articulatory system

D2. Oncological aspects

D2.1. Diagnostic findings based on Biopsy/ CT/ PET/ TNM staging

D2.2. Need for the surgery

D2.3. Need for Radiation therapy (RT) / Chemotherapy (CT) and side effects

D2.4. Prognosis, local recurrence and metastasis

D3. Respiratory changes and treatment

D3.1. Transformation from nose to neck breathing

D3.2. Permanent tracheostoma care and maintenance

D3.3. When the patient coughs, the sputum will be expelled through the stoma

D3.4. Diaphragmatic breathing exercise - Take slow, big breath through the stoma; Try to hold the breath for 1 to 2 seconds by placing the finger over the end of the stoma; Relax and breath out

D3.5. Active cycle of breathing technique (ACBT) - It is a combination of deep breathing, relaxed breathing and huffing; It can be performed in high sitting or side lying

D3.6. Flexibility exercises - Neck and shoulder range of motion (One set of 5 repetitions per session)

D3.7. Relaxation exercises (Post-isometric relaxation technique-one set of 5 repetitions per session; Myofascial release for the cervical region for 10 -15
D3.8. Physical fitness exercise - Warm-up exercise (10-15 min); Aerobic exercise such as walking, jogging, cycling etc. (30-45 min); Cool down exercise (10-15 min)

D4. Phonatory changes and treatment

D4.1. Loss of voice

D4.2. Communication immediately after TL either through writing or gestures only until voice restoration is done

D4.3. Most commonly used voice restoration modes – EL speech, esophageal speech and TE speech

D4.4. Pros and cons of each mode in terms of time needed to learn, overall voice quality, cost, care and maintenance of the device

D5. Swallowing changes and diet recommendations

D5.1. Reduced sense of taste

D5.2. Reduced sense of smell

D5.3. Swallowing feels different and relatively more effort is required to clear food through the throat

D5.4. Post-surgery, need to begin with liquid and/or pureed and gradually shift to solid food intake

D6. Physical limitations

D6.1. Lifting heavy objects/weights in the early post-operative periods (lifting domestic LPG cylinders, putting two-wheeler on centre stand etc.)

D6.2. Bathing, swimming and aquatic exercises

D6.3. Walking in the rain

D6.4. Smoking is not possible through mouth. However, smoking through the stoma is not recommended

Conflicts of Interest: Nil

Source of Funding: Self

Ethical Clearance: Not applicable

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Comparative Evaluation of Gallium Aluminium Arsenide Laser in Disinfection of Root Canal System

Shruthi H Attavar¹, Mithra N Hegde², Veena Shetty³

¹Lecturer, ²Vice Principal /And Head of The Department, Department of Conservative Dentistry and Endodontics, A B Shetty Memorial, Institute of Dental Science, NIITE (deemed to be University) Mangalore, ³Additional Professor, Department of Microbiology, K S Hegde Medical College, NIITE (Deemed to be University) Mangalore

Abstract

Aim: To evaluate the bactericidal effect of 980 nm gallium aluminium arsenide laser and irrigating solutions such as 3% sodium hypochlorite and 2% chlorhexidine in E. faecalis infected root canals

Material Method: Thirtynoncarious mandibular premolar teeth were selected for the study. crowns of all the teeth were decoronated working length was determined followed by cleaning and shaping of the root canal was done using protaper size F 2. Pure bacterial culture of E faecalis (ATTC 29219) in BHI broth was obtained and inoculated into the root canal using insulin syringe and incubated for 48hrs. After 48 hrs root canal were disinfected using following irrigation protocol: Positive control group (n=5) – Tooth inoculated with E faecalis with no irrigation, negative control no bacterial inoculation. Experimental group (n=10) – group I -5% sodium hypochlorite as irrigant followed by laser irradiation .group II (n=10) -2% Chlorhexidine along with laser disinfection .After disinfection, the root samples were collected using the paper point and was placed in BHI broth incubated for 24hrs. The samples were then collected from the tube and streaked into brain heart infusion agar plates using a nichrome wire loop and incubated for 24 hrs. Bacterial colony counting and scanning electron microscopic analysis was done to evaluate the efficacy of irrigation protocol on disinfection of the root canal system.

Results: student t-test was done to assess the level of significance between the groups. The results showed no statistically significant results between the two groups. However, chlorhexidine with laser showed less no of bacterial colonies compared to sodium hypochlorite with the laser.

Conclusion: within the limitation of this study both chlorhexidine with laser and sodium hypochlorite with laser can be a promising treatment option for disinfection of the root canal system.

Key words: laser, E faecalis, brain heart infusion broth

Introduction

The success of root canal treatment depends on complete removal of microorganism from the root canal system. The removal of biofilm, necrotic tissue debris from the root canal space can be done using hand or rotary instruments under copious irrigation. Enterococcus faecalis is a gram-positive facultative anaerobic cocci which resist chemo mechanical instrumentation endures chemomechanical instrumentation as well asintracanalmedicaments. They release lytic enzymes, pheromones to proceed to remain viable within the dentinal tubules.

Sodium hypochlorite is the most commonly used straw colored nonspecific proteolytic root canal irrigant
with concentration ranging from 0.5-5.25%. The important property of sodium hypochlorite is that it has excellent antimicrobial property and tissue dissolving capacity.

Chlorhexidine gluconate solutions in varying concentrations of (0.2-2%) have been recommended as an endodontic irrigant. Its broad-spectrum activity against Gram-positive and Gram-negative bacteria, its ability to absorb to dental tissues and mucous membrane with prolonged gradual release at therapeutic levels, as well as its biocompatibility are some of the properties that justify its clinical use.

Lasers have become the latest choice to eradicate microorganisms in the root channel, especially in the lateral dentinal tubules. This has been achieved by the development of a fiber delivery system. It has been proved in numerous studies that an emission of laser light directly in the root canal does have a bactericidal effect. The antibacterial effect of a laser beam is based on thermal properties of laser-tissue interaction. The high-power diode laser has been used in several areas of dentistry, with promising results in relation to dentinal disinfection. Hence the aim of this study, is to evaluate the bactericidal effect of 980 nm diode laser and irrigating solutions such as 3% sodium hypochlorite and 2% chlorhexidine in *E. faecalis* infected root canals.

### Material and Method

Thirty noncarious mandibular premolar teeth extracted for orthodontic purpose, were collected from the department of oral and maxillofacial surgery ABSMIDS. The presence of a single canal was determined radiographically with digital radiographs taken at different angulations. The teeth with open and resorbed apices, grossly carious teeth, and teeth with fractured roots were excluded from the study. All the teeth were disinfected according to the Occupational Safety & Health Administration (OSHA) regulations, 2004. Crowns of all the teeth were transversally removed with a high-speed diamond disc. The working length was determined with the help of digital radiograph and chemomechanical preparation of the root canal sample was done using protaper file up to ISO 25 (DentsplySirona). Two coats of nail varnish were applied to seal the apex. Tooth was subjected to ethylene oxide sterilization at the center for sterilization services KSHEMA.

A pure bacterial culture of the Gram-positive cocci *Enterococcus faecalis* (ATCC 29212) [Hi Media Laboratories, Mumbai, India] were obtained. The grown bacterial colonies were then harvested and placed in BRAIN HEART INFUSION broth (Hi-Media Laboratories, Mumbai, India) and incubated for 24 hr at 37°C under aerobic conditions. The turbidity of BHI broth containing *E. faecalis* was adjusted to MacFarland and 0.5 standard which corresponds to $1.5 \times 10^8$ colonies. Then the 20 μL of the bacterial culture was transferred into the canal lumen of the mechanically enlarged root canals using a sterile insulin syringe and stored at 48 hrs at 37°C. After incubation, samples were retrieved from the incubator.

### Irrigation Protocol

#### Control Groups

- **Positive control group (N=5)** – Tooth inoculated with *E. faecalis*
- **Negative control group (N=5)** – Tooth containing only BHI Broth without organism

GROUP I (n=15) - 5 ml of 3% sodium hypochlorite (Vansons India) were irrigated for 2 mins followed by 2 ml of saline to remove any residual irrigant. The canals were dried using sterile paper points and followed by laser disinfection.

GROUP II (n=15) - 5 ml of 2% Chlorhexidine (DC CHLOR) will be irrigated for 2 mins followed by 2 ml of saline to remove any residual irrigant. The canals will be dried using sterile paper point followed by laser disinfection.

Irradiation of the root canal system was done using 980 nm diode laser and power of 2 w. A 200 μm fiber tip was placed 1 mm short of the working length and laser light was delivered 5 times for 5 sec, with a 15-s interval between irradiations at repeated pulse mode, using a pulse duration of 20 ms and a pulse interval of 40 ms.

### Bacterial Culture Method

After disinfection, the samples from the root canal were collected using paper point and placed in an Eppendorf tube containing 1 ml of brain heart infusion broth and incubated for 24 hr.

The samples were then collected from the tube and streaked into brain heart infusion agar plates using a
nichrome wire loop and incubated for 24 hrs.

Mean colony forming unit was calculated using the formula

\[ \text{Bacteria per ml} = \frac{\text{Number Of Colonies Present On The Plate}}{\text{Dilution Factor}} \]

The volume of culture plate

**Scanning electron microscopic analysis of samples**

The SEM was performed to visualize the remaining biofilm after disinfection procedure. Two grooves were placed on the tooth surface and with the help of a hammer and a sharp chisel, teeth were split into two halves along the longitudinal grooves cut previously. SEM images were taken at 1000 x magnification.

The total area of the image and the area occupied by the biofilm were scored.

Score 0 – No *E. faecalis* biofilm seen

Scores: 1. Few areas covered by *E. faecalis* biofilm colonizing root dentin surface without invasion of dentinal tubules

2. Few areas covered by *E. faecalis* biofilm colonizing root dentin surface with invasion on dentinal tubules

3. Most areas covered by *E. faecalis* biofilm colonizing root dentin surface and invading dentinal tubules

4. All areas covered by *E. faecalis* biofilm, no dentinal tubule openings

**Results**

**BACTERIAL COLONY COUNT** (figure 1a & b, 2, 3)

![Fig 1](image1)

Fig 1 : A) positive control group showing the growth of microorganism

B) Negative control group showing no growth of microorganism

![Fig 2](image2)

Fig 2: Sodium hypochlorite group along with laser disinfection

![Fig 3](image3)

Fig 3 : Chlorhexidine group along with laser disinfection

The mean standard deviation and standard error of all groups are shown in table 1. The mean colony counting of sodium hypochlorite in the combination of laser group (group I) was slightly more compared to chlorhexidine and laser group (group II). Further Independent sample t-test was done to check the level of significance between the groups. The results show no statistically significant difference between group I and II with the P-Value of 0.4050 which is >0.05, However when compared to the positive control group there was a significant difference (table 2).

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial count</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium hypochlorite+ Laser</td>
<td>10</td>
<td>1.1700</td>
<td>.89697</td>
<td>.28365</td>
</tr>
<tr>
<td>Chlorhexidine+ Laser</td>
<td>10</td>
<td>.8400</td>
<td>.91433</td>
<td>.28914</td>
</tr>
</tbody>
</table>

Table 1 - Group Statistics showing the mean, standard deviation and standard error of the two test groups. The mean colony counting for sodium hypochlorite along with laser disinfection was more compared to that of chlorhexidine and laser group.
Table 2 - Independent Samples Test

<table>
<thead>
<tr>
<th>Bacterial count</th>
<th>Levene’s Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>.005</td>
<td>.943</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>.815</td>
<td>17.99</td>
</tr>
</tbody>
</table>

Scanning Electron Microscopic Imaging (figure 4,5,6,7)

SEM analysis revealed the differences between the surface of root dentin and morphology of the microbial cells after treatments. Examination of the root canals after incubation with E. faecalis (control group) showed the formation of a thick biofilm on the surface of root dentin with bacteria penetrating the dentin tubules. In group I and II there was no biofilm formation seen. Table 3 shows the percentile difference between the two experimental groups however the p-value was P=0.3415,P=0.64,P=0.6147,P=0.16 which was > 0.05.

Table 3 denotes the independent sample t-test for two samples since the P-Value 0.4050 which is > 0.05 hence there was no statistically significant difference between the two experimental groups.

Discussion

Endodontic microorganism forms a complex biofilm or can penetrate into the dentinal tubules which resist removal by the chemomechanical technique of cleaning the infected root canals. The present treatment protocol includes mechanical treatment by instrumentation using the rotary file system followed by chemical cleaning by the irrigants\textsuperscript{11}.

Several studies have been documented to determine the role of E faecalis as a biological indicator. Adhesion of E faecalis into the root canal wall is the essential step which determines the pathogenicity of the microorganism. E faecalis has the capacity to adhere to the dentin because they contain collagen binding proteins, ace and gelatinase which are the virulence factors.

Sodium hypochlorite has the ability to remove most of the infected microorganism from root canal infection but due to the presence of smear layer that prevents the penetration of irrigants, there can be the possibility of reinfection\textsuperscript{12}.

Table 3 denotes the percentage difference between the two experimental groups

<table>
<thead>
<tr>
<th>Levels</th>
<th>Sodium hypochlorite +laser</th>
<th>Chlorhexidine +laser</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2 (20%)</td>
<td>4(40%)</td>
<td>P=0.3415</td>
</tr>
<tr>
<td>1</td>
<td>4 (40%)</td>
<td>3 (30%)</td>
<td>P=0.64</td>
</tr>
<tr>
<td>2</td>
<td>2 (20%)</td>
<td>3 (30%)</td>
<td>P=0.6147</td>
</tr>
<tr>
<td>3</td>
<td>2 (20%)</td>
<td>0 (0.5%)</td>
<td>P=0.16</td>
</tr>
</tbody>
</table>
Chlorhexidine has the ability to bind to hydroxyapatite crystals on the tooth surface hence there is a sustained release of irrigants and prevent bacterial colonization on the root canal for a prolonged period of time.

Diode laser with the fiber optic tip can penetrate into unaccessible areas of the tubular walls resulting in greater bactericidal effects. This can be attributed to the fact that the laser can penetrate up to depth of 1000 micrometer into the dentinal tubules when compared to the conventional irrigation method which has been limited to a depth of 100 micro mt. Laser light has the property of light scattering, local intensity enhancement and attenuation which allows the greater depth of penetration contributing to superior antimicrobial efficacy.

In the present study, both sodium hypochlorite and chlorhexidine in combination with laser disinfection showed a better eradication of *E. faecalis* from the root canal wall with no statistical difference between the two groups (table 2 and 3). This may be due to the fact chlorhexidine has a unique property of antimicrobial substantivity. The positively charged molecules of chlorhexidine get absorbed on the dentin and prevent the microbial colonization on the dentinal wall. Similar studies were done by White et al to evaluate the antimicrobial property of 2% chlorhexidine as an endodontic irrigant and they found that the substantivity property lasted for up to 72 hrs. Leonardo et al conducted an in vivo study to evaluate the efficacy of 2% chlorhexidine when used as an irrigating solution in teeth with pulp necrosis and visible chronic periapical lesion and they found that chlorhexidine prevents microbial activity with residual effects in the root canal up to 48 hrs.

Hence within the limitation of this study combination of the laser along with chlorhexidine and sodium hypochlorite can be an irrigation regime to eradicate *E. faecalis* from the root canal system.

**Conclusion**

Combination therapy consisting of irrigation using chlorhexidine along with LASER irradiation, and sodium hypochlorite with laser especially at high output power was an effective treatment option for a reduction in *E. faecalis* as well as other bacterial flora from the root canal system.

**References**


Assessing the Awareness of Type 2 Diabetes Mellitus from KAP (Knowledge, Attitude, Practice) Studies in West Bengal, India

Sourav Gangopadhyay¹, Jayeeta Majumder², Arunangshu Giri³

¹Assistant Professor, Management Department, Haldia Institute of Management, Haldia, West Bengal, India,
²Associate Professor, School of Management & Social Science, Haldia Institute of Technology, Haldia, West Bengal, India,
³Assessing the Awareness of Type 2 Diabetes Mellitus from KAP (Knowledge, Attitude, Practice) Studies in West Bengal, India

Abstract

Type 2 Diabetes Mellitus (T2DM) is regarded as one of the major threat for mankind. A large number of people died or getting impaired due to it. Many life threatening complications are arising due to T2DM. The awareness level of T2DM is poor among general people of different countries. In India the public awareness regarding T2DM is also poor according to many researchers. In this research paper we were trying to find out the Knowledge level, attitude level and practice level (KAP) regarding T2DM in people of West Bengal, India. A cross sectional survey has been executed in selected Municipal and Gram-Panchayat areas in West Bengal through purposive sampling method. A structure questionnaire was prepared in three languages which covers knowledge, practice and attitude portion to access the awareness level among people. Independent t-test and ANOVA were executed with the help of Statistical Package for Social Science (SPSS) version 21.0. The study shows that the KAP level is poor among the people of West Bengal. There are verity levels of knowledge, practice and attitude score in different people from different demographic background. The paper suggests that extensive level of awareness program on diabetes is required which can minimize the effects of this dangerous issue.

Key Words: Type 2 Diabetes Mellitus (T2DM); Knowledge; Attitude; Practice; West Bengal.

Introduction

Diabetes is known as one of the most ghastly threat for mankind as 4.6 million people from all over the world, are dying due to diabetes in every year. Nearly about 8.5% of the total world populations are diabetic. Researchers have made estimation and it is saying that by the year 2030, diabetes will be the seventh major cause of death (Mathers, et al., 2006). Diabetes is preventable and controllable disease but still people are devastated by it, one of the major causes of failure is lack of participation in the treatment process by the patient (Jin, et al., 2008). Diabetes causes occurrence of many life threatening complications, like kidney failure, stroke, blindness, heart attacks, lower limb amputation, coronary heart disease, diabetic retinopathy and diabetic neuropathy and many more. In many developing countries, the diabetes is prevalent as there is existence of unhealthy lifestyle, rapid westernization, poor knowledge, negative attitude and poor practices (Lemes, et al., 2014). Major things associated with the management of the diabetes are the ability of following self care, development of awareness. Generally three ways are to be looked at to reduce the diabetes – growing knowledge, attitude and self management. Type 2 diabetes is preventable but still now, 90% of the diabetic patients are having type 2 diabetes. Most of the T2DM cases are remained undiagnosed. Health Education and awareness on diabetes has significant impact on the treatment process of diabetes as it helps to decrease the chances of complications. Indian people are still having lack of awareness, lack of knowledge and myths on
diabetes (Murugesan, et al., 2007; Sawant, 2016)8-9.

**Review of Literature**

There are lots of differences of opinions can be seen among researchers who are trying to find out and analyze the knowledge gap between genders in respect to diabetes. Most of the studies have showed that male populations have far better knowledge than female population regarding the complications and the preventive measures of diabetes. Some study identified that there are knowledge, attitude and practice gap existing between people of different ages, occupations and income groups. A study shows that only about 43.2% of the study population heard the term diabetes; 17% of the study population has poor knowledge and half of the study population believes that diabetes is communicable disease (Desai, et al., 2012)4. Some study shows though the people having knowledge of Diabetes Mellitus but they have poor knowledge on complication and self care practice, very few of them are taking diabetic medicine, 71% of the people believe that high sugar intake is the cause of diabetes (Singla, et al., 2017)10. Awareness is even more threatening as non diabetic patient are having poorer knowledge than those people who have diabetes. The overall knowledge of diabetes is lower in case of people who are not having diabetes than those populations who are self reported diabetic. Early prevention and control of the diabetes can be possible by implementing three positive elements - knowledge, attitude and practice (KAP) among the people. All three elements are related with each other. To prevent, to diagnose early, to control the risk factor, to do the management of disease; KAP study is playing an important role (Demaio, et al., 2013)3. There are lots of researches have done which were trying to find out the nature of existing knowledge gap among rural urban people in respect of diabetes, nearly all of them have agreed that urban people are way ahead of rural people in case of correct concept on diabetes. It is known that the level of educational qualification is more in case of urban than rural areas. Most of the study shows that the health care facilities are more accessible to them (Aung, et al., 2018)1. Apart from that, basic knowledge about diabetes, level of Knowledge of complication, level of Knowledge of way of prevention, level of Knowledge of involvement of gene in diabetes are far more in case of urban people (Deepa, et al., 2014)2. Higher educated people are showing better awareness of T2DM. Also the knowledge of diabetes differs according to marital status too (Sawant, 2016)9.

**Objective of the Study**

To determine the awareness level of Type 2 Diabetes Mellitus from KAP (Knowledge, Attitude and Practice) Studies in West Bengal, India

**Hypothesis Development**

Hypothesis (H1): There are statistically significant differences existing among different sexual category, age groups, educational qualifications, marital status, income groups, occupations and areas in respect to awareness level of Type 2 Diabetes Mellitus.

**Research Methodology**

A cross-sectional survey was executed from February 2019 to April 2019 among 1319 adult respondents. Here purposive sampling method was used to collect the responses from willing participants. Opinion and advice were taken from experts from related fields for preparing the questionnaire. The questionnaire was prepared in different languages i.e. Bengali, Hindi and English. For analysis, a total of 30 variables were incorporated with 10 variables each in knowledge, attitude and practice section. The maximum attainable score for knowledge related questions with 10 variables was ‘10’ and the minimum score was ‘0’. In case of attitude and practice, maximum and minimum attainable score were same. Here 3-point Likert scale (‘yes’, ‘no’ and ‘do not know’) was used to measure the awareness level of the respondents. The response ‘yes’ was assigned a score of ‘1’ and other responses as a score of ‘0’. Average scores of ‘below 5’ = poor, ‘5 – 7’ = normal and ‘above 7’ were scored as good awareness scores. Written informed consent was taken from the respondents after explaining them the purpose of this study. The statistical analysis was executed using Microsoft Excel and Statistical Package for Social Science (SPSS) version 21.0. Demographic profiles (age, gender, education, marital status, income, education and area) of the respondents were depicted through descriptive statistics such as frequency and percentages. Independent sample t-test and one-way ANOVA were executed to compare the mean awareness scores among different attributes of demographic profile. The P-Value of less than 0.01 and 0.05 were considered as statistically significant at 1% and 5% level.
## Analysis and Findings

### Table 1: KAP Study according to different variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>Knowledge Score</th>
<th>Attitude Score</th>
<th>Practice Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>4.69±1.92</td>
<td>5.97±1.86</td>
<td>5.48±1.69</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4.61±1.95</td>
<td>5.77±1.94</td>
<td>5.07±2.09</td>
</tr>
<tr>
<td></td>
<td>t/p-value</td>
<td>0.727/0.372</td>
<td>1.94/0.034</td>
<td>3.88/0.001</td>
</tr>
<tr>
<td>Age</td>
<td>&lt;30 years</td>
<td>4.69±1.93</td>
<td>5.86±1.75</td>
<td>5.50±1.76</td>
</tr>
<tr>
<td></td>
<td>31-50 years</td>
<td>4.60±1.92</td>
<td>5.88±1.98</td>
<td>5.26±1.90</td>
</tr>
<tr>
<td></td>
<td>&gt;50 years</td>
<td>4.74±1.93</td>
<td>5.92±1.99</td>
<td>4.76±2.13</td>
</tr>
<tr>
<td></td>
<td>F/ p-value</td>
<td>0.487/0.615</td>
<td>0.07/0.933</td>
<td>10.409/0.001</td>
</tr>
<tr>
<td>Education</td>
<td>Illiterate</td>
<td>4.80±1.98</td>
<td>5.64±1.87</td>
<td>5.30±1.91</td>
</tr>
<tr>
<td></td>
<td>Primary to 8th class</td>
<td>4.56±1.90</td>
<td>6.09±1.97</td>
<td>5.19±1.81</td>
</tr>
<tr>
<td></td>
<td>Secondary to Higher Secondary</td>
<td>4.66±1.88</td>
<td>6.0±1.84</td>
<td>5.26±1.85</td>
</tr>
<tr>
<td></td>
<td>Graduate &amp; above</td>
<td>4.71±2.03</td>
<td>5.37±1.77</td>
<td>5.55±2.09</td>
</tr>
<tr>
<td></td>
<td>F/ p-value</td>
<td>0.705/0.549</td>
<td>8.55/0.001</td>
<td>1.785/0.148</td>
</tr>
<tr>
<td>Marital Status</td>
<td>Unmarried</td>
<td>4.62±1.96</td>
<td>5.62±1.84</td>
<td>5.39±1.88</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>4.63±1.93</td>
<td>5.97±1.91</td>
<td>5.26±1.92</td>
</tr>
<tr>
<td></td>
<td>Widow/ Widower</td>
<td>5.14±1.58</td>
<td>6.35±1.77</td>
<td>5.11±1.70</td>
</tr>
<tr>
<td></td>
<td>F/ p-value</td>
<td>2.403/0.091</td>
<td>7.30/0.001</td>
<td>1.01/0.364</td>
</tr>
<tr>
<td>Income</td>
<td>&lt; Rs.5000</td>
<td>4.64±1.95</td>
<td>5.77±1.74</td>
<td>5.37±1.94</td>
</tr>
<tr>
<td></td>
<td>Rs. 5000-&lt; Rs. 25000</td>
<td>4.45±1.79</td>
<td>6.26±2.03</td>
<td>5.14±1.68</td>
</tr>
<tr>
<td></td>
<td>Rs. 25000-&lt; Rs. 50000</td>
<td>4.78±1.86</td>
<td>6.29±2.15</td>
<td>5.22±1.75</td>
</tr>
<tr>
<td></td>
<td>&gt; Rs. 50000</td>
<td>4.75±1.99</td>
<td>5.45±1.95</td>
<td>5.13±2.05</td>
</tr>
<tr>
<td></td>
<td>F/ p-value</td>
<td>1.01/0.384</td>
<td>9.13/0.001</td>
<td>1.29/0.275</td>
</tr>
<tr>
<td>Occupation</td>
<td>Service</td>
<td>4.67±1.89</td>
<td>5.53±1.69</td>
<td>5.66±1.97</td>
</tr>
<tr>
<td></td>
<td>Business</td>
<td>4.54±1.83</td>
<td>5.92±1.84</td>
<td>5.26±1.78</td>
</tr>
<tr>
<td></td>
<td>Home Maker</td>
<td>4.82±2.06</td>
<td>5.71±1.92</td>
<td>5.15±1.97</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>4.62±1.95</td>
<td>6.51±2.03</td>
<td>5.07±1.80</td>
</tr>
<tr>
<td></td>
<td>F/ p-value</td>
<td>1.36/0.253</td>
<td>13.42/0.001</td>
<td>5.62/0.001</td>
</tr>
<tr>
<td>Area</td>
<td>Rural</td>
<td>4.23±2.25</td>
<td>5.22±2.25</td>
<td>5.21±1.87</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>5.16±1.27</td>
<td>6.66±0.85</td>
<td>5.39±1.91</td>
</tr>
<tr>
<td></td>
<td>t/p-value</td>
<td>-9.03/0.001</td>
<td>-14.88/0.001</td>
<td>-1.75/0.401</td>
</tr>
</tbody>
</table>

The above chart shows different groups of population are formed according to gender, age group, level of education, marital status, income, occupation and urban and rural areas; they all are having poor score in knowledge, attitude and practice on diabetes. According to the result it can be seen that the knowledge score on T2DM is same in case of both the gender and the difference is insignificant but in case of attitude and
the practice the male population have scored higher. The male population is more serious regarding the diabetes because they are more cautious regarding the risk and characteristics of the diabetes but the female population is being ignorant on the practice and attitude towards the diabetes though the female populations have same knowledge score on diabetes. Health education and healthy life style in both the cases the female population is still lagging behind and diabetes is not an exception. The study also revealed that the knowledge score and the attitude score are not affected by different age group of people and the difference is insignificant but in case of practice, the younger populations are more serious than older population. It is seen that the older population is showing ignorance on diabetes and they are not at all serious about the modification of their life style which is able to minimize the risk of diabetes. Due to lack of awareness camp on diabetes and lack of provision of health education, the older groups are not following healthy practice to fight against diabetes. The younger populations are more aware and more knowledgeable regarding the utilities of diabetes so they are keen to follow the healthy practices. The younger population has better outer knowledge than old population; it may play a vital role in it. Our study shows that the knowledge and the practice score do not depend on the marital status of the population that is married, unmarried and the widow or widowers. The income level does not affect the knowledge score and the practice score on diabetes. This study reveals that the highest income group and the lowest income group have scored poor in attitude portion of diabetes. Both of them are ignorant on factors affecting the diabetes though they have same level of knowledge and follow same score of practice to reduce diabetes. The study shows that the knowledge level on diabetes does not depending upon the occupation of the respondent, people of all four kinds of professions have nearly same mean score on diabetes. Significant differences can be observed in rural and urban population in respect of knowledge on diabetes and attitude score. The urban people have better knowledge and have more correct attitude towards diabetes than rural population, but though urban people have slightly better attitude than rural people but the difference is insignificant. The number of awareness program on diabetes is more organized in urban area and also the health care institutions are more accessible to the urban people than the rural people but the attitude towards the diabetes in both the cases is poor. In both urban and the rural people are showing ignorance on the healthy attitude towards the process of controlling the diabetes, so more awareness programs are required in case of both urban and rural areas.

Implications of the study

This study will be helpful to understand the level of KAP among different people of West Bengal, India. The study reveals that different people from different demography have different level of KAP score but if we consider the overall KAP score, it is poor. There are disparities of KAP score among people from different demography in West Bengal. So it can be said that the extensive awareness camp is necessary to achieve the desired score. Social awareness camp is necessary to uplift the KAP score among different people of different demography. Education is playing a vital part in the diabetes management. Some trained counselors of diabetes who are entitled to educate the people on diabetes must be associated in every hospital. Access for health education on diabetes must be available for every people of different demography. Apart from that the study shows different people of different demography have some problems regarding score of knowledge, attitude and practice, so this should be considered and special emphasis on them are needed. In this regard different social awareness program which is specialized in creating awareness on diabetes of different people from different demography of West Bengal, are to be implemented.

Conclusion

The study shows the level of awareness among the people of West Bengal is poor. The disease T2DM is a life style disease it can be controlled by slight alteration of the lifestyle. The diabetes is worsening the health condition because in many cases they remained undetected. The awareness level on diabetes is useful to identify the existence of the disease in first instance. The KAP score reveals that the gender, age, educational status, marital status, income, level of education and the area of living are having different level of KAP score. Some are significantly different among each other and some are don’t, but overall study reveals the KAP score is poor in case of people of West Bengal. Many awareness programs on diabetes are carried out but they are not enough to cover all the people of West Bengal. So there is a huge need of extensive awareness program
on diabetes is required.

**Ethical Clearance**: Ethical approval for this study has been taken from selected Municipal Authorities and Gram-Panchayats of West Bengal for executing the data collection process smoothly. Also respondents have been assured for keeping complete confidentiality of their responses regarding our research topic.

**Source of Funding**: Self

**Conflict of Interest**: Nil

**References**


Cost Effective Solution for Visually Impaired

Sudha Senthilkumar¹, Brindha K², Angulakshmi³, Kaaviya⁴

¹Associate Professor, ²Assistant Professor(SG), ³Assistant Professor(Senior), ⁴Student, School of Information Technology and Engineering, Vellore Institute of Technology, Vellore, Tamil Nadu, India

Abstract

The fundamental aim of this article is to show a developed framework that can help the visually impaired for dealing with their daily life activities such as navigation, reading, colour detection and currency detection using a very cost - effective model. 285 million human beings are estimated to be visually impaired globally: 39 million are visually impaired and 246 have problems like low vision. “About 90% of the sector’s visually impaired live in low-earnings settings.” Most of those can’t travel freely. There has been minimal carried out with appreciate to indoor navigation in cutting-edge answers, referred to as electronic Orientation Aids (EOA), owing to high cost for instrumentation and confined capacities. We will likely separate these boundaries by presenting a framework which is generally economical for both the visually impaired and the organizations that prepare their structures. Utilizing RFID labels to set up a location–tagging framework inside structures with the end goal that the visually impaired can utilize a RFIDs to find out their area and also for navigational purposes. The whole framework is actualized by utilizing Raspberry Pi Micro controller running in Universal Windows. Highlighting various technologies and methods with their effective usefulness, design and working challenges and requirements of blind people, we discuss on how this cost-effective solution can serve a great help in this undeniably essential social area.

Key Words: Blind Assist, RFID, Ultrasonic sensor, LDR, Microsoft Cognitive Services, Navigation

Introduction

Envision walking into an entirely new railway station. The spots we need to scan for, ticket counter, security registration, entryway, are difficult to find even with signs. Think about the amount of a difficulty this would be for a person who can’t even see the signs. Even some basic activities can be challenging for a visually impaired person. At the same time as shopping centers regularly have constructing maps, they’re commonly stationary shows which can be useful just while you could find and study them. For a visually impaired individual, the assignment of finding a route turns out to be almost impossible. This is where we need some advanced technologies that can help them in a cost-effective way as nearly 90% of the visually impaired people cannot afford the existing costly solutions.

Related Works

In previous approaches, only color identification module used to detect the colored object and then speaks it to the visually impaired people. Orcam is available, but is very costly and was not actually aimed for blind people. It just acts as a commercial product which can help people in reading articles and recognizing known faces. Finger Reader is currently only an idea with a prototype, however it is way more beyond the capabilities for the visually impaired for teaching children to examine or translation of languages. We already have a lot of apps in the market doing this on smartphones, and OCR is becoming more user friendly and popular but Finger Reader is more of a natural way. The Anagraphs assignment took the initiative and began planning for a tool that uses both thermos-hydraulic micro-actuation to infer Braille dots via infrared rays with the help of a micro-mirror scanning machine. It could be easily imagined as a type of fabric made of wax, which can transform from strong to warm liquid and easily made into Braille dots. Sadly, the EU funding have bankrupted and the assignment wishes greater coins to be found out. This idea first which began some years ago came back into action as Yanko layo idea. What if there is a device wherein blind humans can also digitally examine, similar to kindle? Braille education percentage
has been in regular decline because the Nineteen Sixties for diverse motives. There nonetheless exists a quandary concerning the significance of Braille and problems associated with talking computers followed through the outcomes of a research revealing that there’s a hyperlink between Braille literacy and employment. RFID based manual perusing framework which offers specialized solution for the outwardly weakened to undergo open regions efficaciously making use of RFID label matrix, RFID stick Reader, Bluetooth interface and person computerized assist. But, its beginning advancement fee may be very excessive and odds of impedance in big hobby. \[1\]

**Different Technique Results and Discussion**

**Navigation Assist**

A speakme help place discovering framework is proposed for each indoor and outdoor path. Framework incorporates of walking stick having GSM module to ship message to accredited man or woman at the season of emergency, sonar sensors and RF transmitter and recipient. For indoor locality reference RFID is used and GPS for outdoors. in this way, this GPS framework applied as a part of on foot stick decreases the price of introducing numerous RFID labels in outdoors to understand the region. This GPS based strategy is “Drishiti” which can switch the framework from an indoor to an outdoor. To give finish route framework, creators augment indoor variant of Drishiti to the outdoor variants for visually impaired people on foot by including just two ultrasonic handsets that are littler than a Master card and are labelled to the client’s shoulder.

For the approach that include in reality crossing down the passageway and stepping into every other, best crucial headings are given. On the factor while the customer involves the vacation spot wherein the room is observed, headings are detailed in minute element of ways away to move based totally on entryways they need to skip to their left aspect or right facet. Those instructions are without difficulty understandable to a blind person as they’re normally educated to path the partitions on both side and their stick permit them sense for entrance.

**Currency Detection**

The trouble of identifying forex paper money with appreciate to adjustments in length, route, torn and worn of tidy hobby in the discipline of pc vision. Takeda et al. \[3\] proposed foreign paper money identification approach by means of victimization neural community for improvement of recent shape of foreign paper money reputation machines. They projected 3 center techniques using semantic network. The little size semantic-identification machine is hired due to the fact the first approach. The second approach is the mask dedication approach victimization inheritable set of rules. The semantic-engine method, that uses virtual sign
The notion approach is based on an occasional price opt-digital device, which outputs a symbol related to the sunshine refracted via forex paper money. Takeda et al. [3] projected a manner for identification of forex paper money. The implemented math properties corresponding with the feel of the foreign paper money are identified in their paintings. The feel of the forex word photographs are characterized by assembling a co-occurrence matrix. The received co-occurrence matrix is then gained to extricate the alternatives. [11]

Pattern popularity algorithms normally intention to offer an lower priced solution for all possible combinations of inputs and to carry out “most probable” matching of the inputs, deliberating their statistical variation. That is against sample similarity algorithms, which searches for specific matches inside the input with pre-gift styles. A commonplace instance of a sample-similarity set of guidelines is overseas money notes shaping, which seems for types of a given type in textual photo and is included inside are searching for skills of many rupees notice values in intensities. [6]

Techniques to convert the uncooked function vectors (trait extraction) are occasionally used prior to software of the pattern-similarity set of guidelines. for example, function extraction algorithms try and reduce a large-amplitude trait vector into a smaller-amplitude vector that is easier to art work with and encodes a whole lot less duplicity, the usage of mathematical strategies which includes fundamental components assessment (PCA).The difference between function choice and trait extraction is that the ensuing trait after trait extraction has taken location are of a distinct kind than the authentic functions and won’t easily be interpretable, whilst the functions left after trait selection are clearly a subset of the original capabilities. [13]

Techniques to convert the raw trait component (function extraction) are from time to time utilized prior to application of the template-matching set of rules. as an instance, trait extraction algorithms try and reduce a huge-amplitude characteristic vector into a smaller-amplitude vector that is simpler to paintings with and encrypts into much less duplication, the use of mathematical techniques which includes fundamental additives evaluation (PCA). The distinction between trait selection and trait extraction is that the resulting trait after trait extraction has taken place are of a different sort than the original traits and may not easily be interpretable, while the traits left after traits selection are simply a subset of the original traits.

The paper money are different in texture, size and color. The trait values of each paper money extracted by our proposed approach do not have any overlapping with respect to the other paper money. Therefore, the removed trait are good enough to segregate different paper money based on PCA Algorithm Using Local Binary Pattern Analysis.
Obstacle Detection

Wearable and compact assistive advances are likewise utilized for supporting individuals with incapacities, for example, the visually impaired. Wearable gadgets are permitting without hands cooperation, or at slightest limiting the utilization of hands when utilizing the gadget, while versatile assistive gadgets required a consistent hand collaboration. A wearable impediment evasion hardware gadget intended to serve the route arrangement of outwardly debilitated individual. The system accentuates its qualities like free hands, free ears, wearable and easy to work.

![Ultra-sonic sensor](image)

**Figure 4. Ultra-sonic sensor**

An ultrasonic sensor based route framework for visually impaired individuals depends on microcontroller with manufactured discourse yield and convenient gadget to manage the client about urban strolling ways to call attention to what choices to make. This gadget utilizes the rule of impression of high recurrence ultrasonic pillar to identify impediments in the way. This versatility bolster guidelines are given by vibro-material shape keeping in mind the end goal to decrease route troubles. [14]

![LDR resistance vs light intensity](image)

**Figure 5. LDR resistance vs light intensity**

Considering an electrical cutting-edge would encompass motion of electrons, it drifts according to the distinction in the potential on both ends. An LDR or picture-resistor is made out of a semi-conductor cloth which has an excessive resistance, supplying much less variety of loose electrons for conduction. As mild is incident upon the semiconductor, photons are ate up with the aid of the lattice of it. a part of this energy receives exchanged to the electrons within the lattice which might then have ok power to interrupt free from the lattice and take an interest in conduction. Therefore, the resistance of the photograph resistor lessens with fluctuating strength of incidence mild.

\[
it \text{Intensity} = \frac{500}{\left(\frac{10.72}{\text{voltage}}\right) \cdot \text{volt}}
\]

Image to Speech conversion

Optical Character Recognition (Microsoft Cognitive Services), OCR distinguishes contextual information in a picture and in this way, removes the recognized content into a machine-readable character stream utilized for search and various different purposes ranging from medicinal records to security. It also supports various languages. OCR spares time and gives comfort to customers by means of enabling them to just take photographs of content in place of translating direct textual content. Right now, 21 languages are being supported by OCR. If vital, OCR rotates the photo throughout the horizontal axis. OCR offers the frame coordinates of each phrase as seen inside the determine 1.[5]

- Blurry images
- Handwritten or cursive content
- artistic textual patterns
- Small content material length
- complex backgrounds, shadows or glare over text or angle distortion
- out sized letters at the beginnings of words
- Subscript, strikethrough and superscript textual content

![OCR image correction](image)

**Figure 6. OCR image correction**

The pc imaginative and prescient set of rules extracts colors from an image. the colors are analyzed in three precise contexts, foreground, historical, past, and whole, and colors are grouped into twelve 12 dominant accessory hues (black, blue, brown, gray, inexperienced, orange, pink, red, red, teal, white, and yellow). Relying
on the colors in an photograph, smooth black and white or accent colors can be again in hexadecimal shade codes. \[12\]

**Conclusion**

Using all the effective methods stated in this paper, we can come up with a cost-effective solution for blind which is also highly efficient. Half of the work of finding the obstacle in front can be done by the LDR and the rest can be done by the Cognitive services API. However, this is limited just to indoor environments, as the distances between the VIP and the nearest obstacle in front will be high. However, this isn’t a great fall-back as the obstacle isn’t near the VIP and in a general context a person would be wanting to know only about the things that are nearer to him/her. All the previous solutions didn’t take the advantage of the new emerging cloud platforms, like Microsoft cognitive services. These platforms are highly effective and also the burden of creating all the image processing techniques can be left out by using these and more concentration can be kept on user experience.

**Ethical Clearance** - Nil

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**References**


Review Article

Avulsion –Histological Perspectives and Storage Media- A Review

Suresh Mitthra¹, Nivedita Lukram², Venkatachalam Prakash³, New Begin Selvakumar Gold Pearlin Mary⁴, Jagadeesh Shiruthi⁵, Arunajatesan Subbiya⁶

¹Associate Professor, Department of Conservative Dentistry and Endodontology, Sree Balaji Dental College and Hospital, Bharat Institute of Higher Education and Research(BIHER), Pallikaranai, Chennai, ²Private Practitioner, Takyl industrial road, Tera Loukrakpam Leikai, CIPET, Imphal, Manipur, ³Professor, Department of Conservative Dentistry and Endodontics, Sree Balaji Dental College and Hospital, Bharat Institute of Higher Education and Research(BIHER), Pallikaranai, Chennai, ⁴Reader, ⁵Post graduate Student, ⁶Head of Department & Professor, Department of Conservative Dentistry and Endodontics, Sree Balaji Dental College and Hospital, Bharat Institute of Higher Education and Research (BIHER), Pallikaranai, Chennai

Abstract

Background: The displacement of tooth completely from its socket, in the alveolar bone following trauma is known as Avulsion. It leads to periodontal damage and pulp necrosis. The consequences of tooth avulsion are less if the remaining viable periodontal ligament (PDL) does not get dehydrated. Various types of storage medium have been mentioned in literature and reviews. An acceptable storage medium should possess certain properties to enable its use in the clinical scenario. An appropriate storage media keeps the PDL cells in hydrated form, thus preserving the vitality of PDL fibroblasts in situations where an immediate replantation is not possible. The current review highlights the histological changes and the management of avulsion.

Keywords: Avulsion, traumatic injury, Storage media

Introduction

The displacement of tooth completely from its socket in the alveolar bone following trauma is known as Avulsion (Andreasen, et al., 2003). It is a relatively uncommon type of traumatic injury to the permanent dentition.¹ Following the International Association of Dental Traumatology guidelines or Andreasen’s Dental Trauma Guide it is essential to offer optimal treatment to such patients in a timely manner.

Corresponding author:
Dr. Suresh Mitthra MDS,
Associate Professor, Department of Conservative dentistry and Endodontics, Sree Balaji Dental College and Hospital, Bharat Institute of Higher Education and Research (BIHER) Pallikaranai, Chennai- 600100
Email: malu.dr2008@yahoo.com

The frequency of tooth avulsions following traumatic injuries ranges from 0.5% to 16% in permanent dentition and from 7% to 13% in primary dentition. It takes place most commonly in the age of 7–14 years with the highest incidence in maxillary central incisors.²

When a tooth is avulsed, periodontal damage and pulpal necrosis occurs. Due to the tearing of the periodontal ligament (PDL), the tooth gets detached from the socket leaving viable cells on the root cementum surface. Also, small localized cemental damage occurs due to the crushing of the tooth against the socket. If the remaining viable PDL does not get dehydrated, they will maintain their viability, allowing healing along with regeneration of new cells when replanted without causing destructive inflammation.³

Pulpal necrosis occurs after an avulsion injury. A tooth with pulpal necrosis will not continue its normal
development and is prone to bacterial contamination. The pulp space becomes infected if revascularization does not occur or effective endodontic therapy is not performed. The treatment plan is directed to limit root canal infection and peri-radicular inflammation, thus inclining the balance towards favourable (cemental) rather than unfavourable (osseous replacement or inflammatory resorption) healing.4

History

The first reported case of avulsed teeth being replanted was by Pare in 1593. In 1966 Andresen in a retrospective study, hypothesised that if the avulsed teeth were replanted within the first 30 minutes of the accident, 90% is successfully retained.5 In 1974, Cvek hypothesized that to prevent root resorption of the replanted teeth, extirpation of the pulp was necessary.6 In 1992, Trope et al reported that delayed replantation of avulsed mature teeth with calcium hydroxide treatment leads to a stable, functional position with absence of clinical ankylosis or replacement resorption.8 In 2000, Mehmet Kemal Caliskan et al reported that delayed replantation of avulsed mature teeth with calcium hydroxide treatment leads to a stable, functional position with absence of clinical ankylosis or replacement resorption.8 In 2016 Demirel S et al found that adipose tissue stem cells and fibrin sealant treatment improves PDL healing after tooth replantation.9 In 2018, Adnan S et al in a systematic review stated that milk was the most recommended medium followed by Hank’s balanced salt solution.10 Among natural products other than milk, propolis and coconut water were most frequently recommended.

Histological Changes

The physiological status of PDL, the stage of root development and the extra-oral time period predicts the prognosis of replantation of an avulsed tooth. The best prognosis is achieved with replantation within 5 minutes after avulsion. Such teeth are functional for an average of 5 years. But majority of them undergo progressive replacement root resorption or external inflammatory root resorption. Andreason reported that if the extra-oral time for an avulsed tooth is more than 2 hours, there is a 95% chance of external resorption.5 However, if treated properly, replanted avulsed teeth with a vital periodontal ligament will remain functional for some years.11

The inflammatory response increases as the extra-oral dry time prolongs. The PDL cells need to be repaired by new tissues as a large area of root surface is affected. The cementoblast cells cannot cover the entire root surface in time as they are slow moving and the bone cells come in direct contact with the root surface which leads to ankylosis. Osteoclastic activity may also be initiated, leading to resorption.

The complicating sequelae following avulsion injury is damage to the PDL resulting in root resorption with the denuded root surface being chemotactic to hard tissue resorbing cells leading to loss of pre-cementum, cementoblasts and epithelial rests of Mallassez. However the damaged PDL and cementum gets subsequently resorbed by macrophages and osteoclasts.

The combination of the above mentioned factors may lead to external root resorption at the site of injury. The damage of the periodontium at the time of trauma and the presence of bacteria within the root canal and dentinal tubules leads to the development of inflammatory root resorption. Root resorption is common, with a reported prevalence of 57-80%.12 Pre-treatment of a tooth prior to its replantation with stannous fluoride has recently been described appears to offer more encouraging results and make it more resistant to resorption.13

EFFECT OF STORAGE MEDIA ON PERIODONTAL HEALING

Teeth are usually dehydrated in the time interval between the avulsion and the replantation period. As dry storage is unfavourable for the preservation of the PDL, avulsed tooth must be prevented from drying by the use of storage media for ideal osmolality and pH. Healing of periodontal and pulpal tissues is dependent on the storage time and storage media as confirmed by various clinical studies.14

VARIous TYPES OF STORAGE MEDIA USED FOR AVULSED TEETH

There are various solutions that are used as storage medium based on properties possessed by the material. They are as follows:-

HANK’S BALANCED SALT SOLUTION (HBSS):

This is a sterile, physiologically balanced isotonic standard salt solution that is widely used in biomedical research to support the growth of many cell types.14 This solution is nontoxic, biocompatible with PDL cells. It has pH of 7.2 and osmolality of 320 mOsm/kg.
It is composed of: 8 g/L of sodium chloride, 0.14 g/L of calcium chloride, 0.1 g/L of magnesium chloride, 0.4 g/L of potassium chloride, 0.14 g/L of potassium phosphate, 0.35 g/L of sodium bicarbonate, 0.1 g/L of magnesium sulphate and 0.4 g/L of D-glucose. These ingredients endure and reconstitute the depleted cellular components of the PDL cells. HBSS is recommended by the American Association of Endodontists as the storage medium of choice for management of avulsed teeth because of its ability to provide maximum preservation of PDL cell viability in the long term.

2. VIASPAN

Basically it is a cold transplant organ storage medium. It has an osmolality of 320 mOsm/kg and pH of around 7.4 at room temperature, ideal for the growth of cells. Ashkenazi et al has evaluated the effectiveness of different storage media such as culture medium, milk, HBSS, ViaSpan and conditioned medium for the observing the viability of fibroblasts of the PDL for avulsed teeth. It was found that the stored cells kept in ViaSpan for 8 hours have high clonogenic capacity that was comparable to HBSS and superior to milk.

3. TOOTH RESCUE BOX (DENTOSAFE)

The Dentosafe is a culture medium that consists of salts, amino acids, glucose, and vitamins, similar to the medium used during pancreatic islet cell transplantation. The vitality of PDL cells are maintained for upto 48 hours at room temperature in vitro.

4. EAGLE’S MEDIUM

Eagle’s medium (EM) contains: 4 mL L-glutamine, 105 IU/L penicillin,100 μg/mL streptomycin, 10 μg/mL nystatin and calf serum (10% v/v). EM possess high viability, mitogenic and clonogenic capacity for upto 8 hours when stored at 4°C in a study conducted by Ashkenazi et al. However it was less effective than milk or HBSS when the storage time was extended to 24 hours. Temperature of 37°C helps in preserving the PDL for prolonged periods, within the recommended storage time prior to replantation.

5. PASTEURIZED MILK

Milk has a pH of 6.5-7.2 and osmolality of 270 mOsm/kg are compatible with PDL cells. However, it should be used in the first 20 minutes following avulsion. Milk contains epithelial growth factor, enhances exocrine gland secretion which stimulates the proliferation and regeneration of epithelial cell rests of Malassez and activates the alveolar bone resorption. This ultimately decreases the chances of ankylosis.

6. PROPOLIS

Margaret and Pileggi reported that there was highest viability of PDL cells in the avulsed teeth that were stored in propolis when compared to HBSS, milk and saline. Its composition includes: resins rich in flavonoids, 45-55% of resin, 23-35% waxes, fatty acids, 10% of essential oils, 5% of pollen proteins, other organic compounds and minerals.

7. GREEN TEA EXTRACT (GTE)

Hwang and Park in their study stated that there was no difference in the PDL cell viability between GTE and HBSS when used as a storage medium for avulsed teeth. However, GTE showed higher viability than milk, water and commercial green tea.

8. EGG WHITE

Egg white or egg albumin consists of high protein, vitamins, water and due to the lack of microbial contamination and easy accessibility it is a good choice for storage medium. It has a pH of 8.6 to 9.3 and its osmolality is 258 mOsm/kg. Khademi et al compared milk and egg white as storage media for avulsed teeth and found that the teeth stored in egg white for 6 to 10 hours had better repair than those stored in milk for the same amount of time.

9. COCONUT WATER

It is liquid endosperm of coconut which is rich in amino acids, proteins, vitamins, and minerals. Gopikrishna et al stated that coconut water is superior than HBSS, milk or propolis in maintaining the viability of PDL cells. However, an acidic pH of 4.1 was observed by Moreira-Neto et al in coconut water which is harmful for cell metabolism.

10. ASCORBIC ACID

Ishikawa et al studied the effect of ascorbic acid on PDL cells and observed it to increase the alkaline phosphatase activity which is required for the binding of PDL cells to type I collagen through 2 β 1 integrin were ascorbic acid again increases their expression. As
the production of type I collagen is considered to be an initial process in differentiation of PDL cells, it is considered as a potential storage medium.\(^\text{17}\)

**11. SALIVA**

According to Weine, patient’s own saliva is the best immediate transport medium for an avulsed tooth. However, more recent studies have indicated that saliva is not the most appropriate medium if storage time is greater than 1 hour.\(^\text{14}\)

**SPLINTING OF AVULSED TEETH**

Splinting is the repositioning of teeth to stabilize it that enhances healing outcomes for the pulp and PDL. A splint is defined as a tool which is used to support, protect or immobilize teeth that have been loosened, replanted, fractured or exposed to certain endodontic or surgical procedures.\(^\text{22}\)

Flexible splints became popular in the clinical scenario when a lower incidence of ankylosis was reported in animal experimentation when tooth were subjected to masticatory forces, which suggested that some functional movement was provided by the flexible splints in the traumatized teeth which a rigid splint could not during immobilization of injured teeth.

A recent systematic review and meta-analysis on auto transplanted teeth reported that the rate of ankylosis was three times higher with wire and composite resin splinting when compared with suture splinting, suggesting the importance of physiological movement on outcomes of healing.\(^\text{23}\) The International Association of Dental Traumatology (IADT) guidelines recommend flexible splinting rather than rigid splinting.

**Currently Employed Types Of Splints:**

- Composite splints
- Fiber splints
- Composite and fishing line splints
- Titanium trauma splints
- Composite and wire splints
- Orthodontic wire and bracket splints
- Arch bar splints
- Wire ligature splints

**DURATION OF SPLINTING**

Splinting duration time as advocated in the IADT guidelines for Avulsion is 2 weeks and for avulsed tooth with extra-oral dry time greater than 60 minutes, it is 4 weeks. However, a systematic analysis of splinting duration and periodontal outcomes for replanted avulsed teeth found that periodontal outcomes were not affected by splinting duration when comparing short-term splinting (14 days or less) and long-term splinting (over 14 days).\(^\text{23}\)

**Conclusion**

An appropriate storage media is recommended for protection and maintenance of the viability of PDL cells following trauma. A number of storage media have been proposed, HBSS being the best. The use of tooth rescue box, Via Span and Eagles’s Medium is not practical as it is expensive and not readily available. The use of pasteurized milk, egg white, propolis and coconut water have shown promising results and are readily available. According to IADT guideline, for avulsion injuries, a flexible splint for 2 weeks is recommended. For teeth that have been avulsed and the extra oral dry time is more than 60 minutes, the recommendation duration of splinting is 4 weeks.

**Ethical Clearance :** Nil

**Source of Funding:** Self

**Conflict of Interest:** Nil

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Cost of Primary Care during Episodes of Child Diarrhoea in Uttar Pradesh

Surya AV¹, Rahul Sharma²
¹South Asia CEO, Kantar Public, ²Associate Professor - Jaypee Business School

Abstract

Treatment of diseases entails different costs; both direct and indirect. These costs can be a deterrent to healthcare seeking leading to increased disease morbidity and mortality. This is especially so for diseases like diarrhea which is more prevalent among children from the lower economic strata. This can cause huge economic burden to a nation like India where a significant portion of the population is economically weak. Thus it is imperative that each element of the healthcare cost is well investigated and understood to formulate pragmatic health policies aimed at reducing the disease burden. This study is an attempt to quantify the treatment cost per episode of under 5 diarrhoea, one of the leading cause of childhood morbidity and mortality in India, by accounting for all direct and indirect elements in the household expenses incurred in treating an episode of the same.

Keywords: childhood diarrhea, child mortality, child morbidity, direct and indirect costs, private and government health facility.

Introduction

Diarrhoea continues to be a major cause of child morbidity and mortality in India and many other developing countries. In India diarrhoea kills more than 3 lakh children every year and accounts for 15% of all under 5 child deaths (Lakshminarayanan and Jayalakshmy 2015)¹. The total Disability Adjusted Life Years (DALYs) loss due to under 5 diarrhoea was calculated at 23.17 billion USD (Townsend, Greenland and Curtis 2017)². The average cost of a diarrhoeal episode in India was calculated at 3.33 USD or about 235 rupees (Rheingans, et al. 2012)³. Such high cost burden for an easily preventable disease can be attributed to various factors. Despite reasonably well-established health infrastructure, both private and public, we still find significant proportion of parents/ primary caretakers who do not access health services as much as they should for the economic reasons. Five countries - India, Ethiopia, Nigeria, Pakistan and Afghanistan- contribute to more than 50% of the diarrheal deaths; which otherwise is preventable as well as treatable (Unicef 2018)⁴.

Literature Review

Economic variables have a significant impact on the overall health seeking behaviour within the family (Savitha and Kiran 2013)⁵. There are various variables that impact the economics of a household – urbanization, regularity of the income, number of earning members of the family etcetera. The rapid speed at which the urbanization has happened has significant impact on the diversity across the families within the urban areas. Many of the urban slums have not kept pace with the rapid urbanization. Poor access to water and sanitation and higher rate of diarrhoea has resulted in higher cost of health seeking for the urban poor living in slums. The cost to the household if one person is affected of diarrhoea is around Rs.205 (Patel, et al. 2013)⁶ which can go up to Rs.400 in an urban slum and accounts for 7-8% of the total monthly income spent. Other studies have indicated to an expenditure of 10% of monthly income on single episode of diarrhoea depending on the demography and geography of the household (Dongre and Garg 2010)⁷.

The paper also finds that private medical providers are
the preferred source of treatment for acute illnesses and in such cases the direct and indirect costs are likely to go up significantly compared to public health providers. The cost escalation is also compounded by delay in health seeking and home remedies; which contribute to complications and further hospitalization. As child hospitalization needs attendants it will add up significantly to the indirect costs incurred; like lost wages of the attendant.

Though diarrhoeal treatment is usually not expensive, across the world, for a single episode; it is the frequency of the episodes/ recurrences sometimes that increases the overall economic burden of the family (S. D. Shillcutt, et al. 2017). Some research has also indicated that the introduction of zinc along with the increased promotion of ORS was associated with the decrease in the economic burden of diarrhea among children. Caregivers, who could execute the medication including Zinc with the help of medical service providers, have reported significant reduction in medical expenses in their households (S. D. Shillcutt, et al. 2016). The use of ors and Zinc also significantly reduced the use of antibiotics and adjuvant treatments bringing down the overall cost of diarrhoeal treatment. However the awareness levels about their usage is still low despite government interventions and shows a varying trend across the geographies. Successive governments have ensured continuous programs to promote the prevention and timely treatment of child diseases like diarrhoea. Despite this, various unhealthy behaviours like open defecation etc lead to significant increase in the prevalence of child diarrhoea (Surya, Vyas et al 2016). Governments along with multi-lateral agencies also have started vaccination schemes to prevent Rotavirus induced diarrhoea in children – a very common form of diarrhoea among the Indian children (Rashmi and Soumya 2016). All this has lead to increased utilization of public health facilities, especially among the poor, leading to reduction in direct costs associated with diarrhoeal treatment. The rotavirus vaccination is also expected to reduce the outpatient visit and hospitalization of patients by 28.1% and avert the cost per disability-adjusted life year (DALY) by 3429 rupees (about USD 50) per patient (Rose, et al. 2017).

The economic burden of diarrhoea is affected by various factors which may include the education of parents/ primary care givers (P/PCG), their access to health care (geographic access), their economic status, their attitude towards healthcare, prior experience in handling diarrhoea and other social influence (Surya, Sanjeev and Rahul 2019). The burden of treatment seems to be unusually high on the families from lower wealth quintiles – mainly due to their lower economic status and lower access to the private healthcare system, which still dominates the healthcare provision in India. This also means more complications and longer treatment for children from economically weaker sections. However, all studies seem to have primarily included only the direct expenses and not the indirect expenses that also need to be considered while calculating the economic burden of the disease.

**Research Objectives**

This study is an attempt to comprehensively assess the economic burden of under 5 diarrhoea to households considering the direct and indirect costs incurred in the treatment. The two critical objectives of the study are

Firstly, the study aims to identify the various direct and indirect costs involved in treating childhood diarrhoea not needing hospitalization.

The secondary objective was to calculate the overall cost of treatment for the diarrhoeal episode based separately for urban and rural patients.

**Research scope & methodology:**

The study was conducted in select geographies in the state of Uttar Pradesh. Two districts which high incidence of diarrhoea and two districts with the lowest incidence of diarrhoea have been selected for the study using National Family Health Survey (NFHS) data to generate the sampling frames. With that, Jalaun, Hardoi, Barelliey & Rai Bareli were chosen as districts for the coverage. A total of 960 parents/ primary care givers (P/PCG) of the children who were affected of diarrhoea have been identified through random sampling methods. A detailed interview which captures their demographics, family wealth status and treatment methods adopted has been captured along with the variables that capture the economic burden of the last episode of child being affected with diarrhoea. Both direct and indirect expenses born by the P/PCG in providing treatment to the child was captured in a structured manner using quantitative research tool. Wherever possible, the information provided by the parents has been validated through reviewing the prescriptions and bills. A detailed...
analysis has been conducted of these variables. The distribution of the sample has been proportionate to the population distribution in each of these districts, making it self-weighted.

**Analysis & Discussion**

The data has been analysed using SPSS version 23.0 © Copyright SPSS Inc. 1989, 2010). This particular paper focuses primarily on the expenditure on the last diarrhoeal episode. The purpose of the discussion is to compare the economic burden on the families due to diarrhoea and how it impacts the overall treatment seeking behaviour including provision of timely treatment to the child. The paper focuses only on the burden of the primary care.

**Descriptive:**

More than 95% of the responded to the survey as either the parent of the child or a primary care giver is a female. 56% of the respondents who participated in the survey are literates (50% of them can write whereas 6% of them can only read). Out of those who said they can read/ write, more than 85% of them have only studied up to class X. In 3.6% of the cases neither parents were working and in rest either or both were working and the same can have a significant impact on the health seeking behaviour.

**Types of treatment sought for diarrhoeal episode**

As per the survey only in 1.3% of the cases the parents had to seek secondary treatment (hospitalization) and in 82.7% of the cases primary treatment was sought and in 16.1% of the cases no treatment was sought.

Only in 75.7% of the cases timely treatment was provided (treatment from a medical facility within one day of observing the symptoms); rest of the cases either there has been a delay in seeking treatment or no treatment was sought. The delay in providing immediate medical treatment always results in the loss of fluids from the body and the child ends up with secondary care.

**Type of medical facility used**

It is important to understand the types of medical facilities from where the treatment is sought as it affects the expenditure. It was observed that in 51.16% of cases (out of those who sought primary treatment for the child) the P/PCG opted for government hospital and the rest private medical-providers. The private medical providers include both formal and informal (qualified and unqualified) medical service providers. It is important to note that the proportion of respondents who reported to have sought treatment from a government facility is significantly higher in the rural areas (58.9%) as compared to the urban areas (34.7%).

**Expenditure by the type of treatment facility:**

The expenditure for each diarrhoeal episode has been captured as a part of the study to understand the burden of the expenditure on the families. It has been observed that the overall cost for each diarrhoeal episode per child is roughly Rs. 319.5 at an aggregate level. This is significantly higher in case of urban areas where the total expenditure can reach up to Rs. 383 as compared to Rs. 289.3 in the rural areas; which is 32% higher. The proportion of direct cost reported was 68% of the total cost of the treatment and the rest 32% was indirect cost (Figure. 1). It is interesting to note that the family has some rough idea of the total direct costs (the accurate costs have been obtained through a head-by-head probing by the researcher) whereas the family could not report the total indirect costs readily. However, they do understand that there is a wage loss in case where both parents or the primary care giver is employed and had to skip work to take the child to a medical service center.

**Expenditure by the type of facility:**

There was no significant difference in the cost of treatment by the type of health facility providing treatment and the government facility was just 8% economical in comparison to the private health facility. However, the primary difference is in the direct expenses. Those who seek treatment from the private hospitals spend 50% more on the direct expenses. However, the parents who visit the primary facilities are likely to save almost half of their indirect expenses (Rs.69.4 to Rs.113.9) (Figure. 2).

A detailed review of expenditures, both- direct and indirect, between rural/ urban geographies and government/ private hospitals paint an interesting picture (Table. 1). The main component of the increased direct expense between government and private hospitals, both urban and rural, is due to the consultation fees charged by private hospital which is done for free in government institutions, though they charge a nominal registration fee. The difference in medicine cost is a mere 5-10%
which indicates that even patients seeking government hospital treatment also end up paying a similar amount. This might be due to the non-availability of free medicines in the hospital pharmacy or lack of trust in the government distributed medicines or a nexus between the consultant and the pharmaceutical company.

<table>
<thead>
<tr>
<th>Table. 1: Direct &amp; Indirect expenses of Diarrhoal treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct Costs</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Rural</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>N (Total) = 794</td>
</tr>
<tr>
<td>Registration Costs</td>
</tr>
<tr>
<td>Consultation Fees</td>
</tr>
<tr>
<td>Medicines</td>
</tr>
<tr>
<td>Direct costs</td>
</tr>
<tr>
<td>In-direct Costs</td>
</tr>
<tr>
<td>Wage Loss</td>
</tr>
<tr>
<td>Transportation</td>
</tr>
<tr>
<td>Other Misc Expenses</td>
</tr>
<tr>
<td><strong>Indirect costs</strong></td>
</tr>
<tr>
<td><strong>Total Expenses</strong></td>
</tr>
</tbody>
</table>

However, the indirect costs associated with seeking treatment in government facilities are more and expresses itself in higher wage loss (due to longer waiting times at hospitals) and transportation costs (poor access due to lesser number of facilities). The total cost of treatment is similar in rural areas and a tad higher (5%) in urban areas between private and government facilities (Table.1).

**Conclusions**

The study quantifies the economic burden of the child diarrhoeal episode can be at an average of Rs. 319.5 on the families. This can range significantly anywhere from Rs. 289.8 in the rural areas where the treatment is sought from the government facilities to Rs. 391.1 in the urban areas where the treatment is sought from the private facilities. This is the primary reason for P/PCGs not seeking treatment or timely treatment in case of childhood diarrhoea which further increases the morbidity and mortality. The government can improve the primary healthcare facilities so as to ensure timely treatment of childhood diarrhea reducing its morbidity and mortality. In case of government inability in doing so a private-public partnership can be thought of through direct cost transfers to private healthcare providers for treating childhood diarrheal episodes. Technology like tele-medicine also can be roped in to ensure quick treatment of the same.

**Limitation of the survey:**

The distances from the home to hospital have not been normalized. Most P/PCGs have relied on their recall on the quantum of expenses on various elements of the cost. Though the researcher could verify the costs wherever there is a record available at the household, in a significant proportion of cases the reliance is only on the reported data. The survey is limited in its geographic scope and the costs may differ in other geography with difference in healthcare infrastructure and policy.
Funding: The study was self-funded.

Conflict of Interest: NIL.

Ethics Clearance: Reviewed and certified by Social Research Institute (SRI)-IRB registered with the division of Assurance and Quality Improvement of the Office for Human Research Protections (OHRP), USA with Registration No. -: IORG0009562.

References
Exploring Teachers’ Perspectives on Mental Health Disorders– A Preliminary Study

Vidya Prabhu¹, Lena Ashok², Veena G. Kamath³, Asha Kamath⁴, Varalakshmi Chandrasekaran¹

¹Lecturer, Department of Community Medicine, Melaka Manipal Medical College, ²Associate Professor, Coordinator MSW, Prasanna School of Public health, ³Professor, Department of Community Medicine, Kasturba Medical College, ⁴Head of Department of Data Science, Manipal Academy of Higher Education, Manipal, Karnataka, India

Abstract

Background: Unfavorable attitude towards mental health disorders are prevalent in the general population. Since teachers are considered as key resources in the promotion of adolescent’s mental health, assessing their attitudes and beliefs are crucial.

Materials and Method: A descriptive cross-sectional study was conducted in Udupi Taluk. A semi-structured questionnaire was used to assess their perceptions of regarding mental health disorders. A total of 93 high school teachers were included in the preliminary study.

Results: Out of 93 respondents, 45(48.4%) were in the age group 30-39 years and 38 (40.9%) of the respondents had 5-9 years’ teaching experience. About (58.1%) of the respondents indicated that mental health problems were not a real medical illness and 80.6% of the respondents stated that mental health disorders were signs of personal weaknesses. About 53.8% cited that people with mental health problems were not dangerous to others and 55.9% of them reported that it is easier to give advice to someone else to seek help than for themselves in relation to mental health.

Conclusion: Preliminary findings indicated that teachers were willing to participate in the study. There is a need to provide interventions to teachers to develop a positive attitude towards mental illnesses, which is very much essential in the promotion of mental health of the adolescents

Keywords: attitude, teachers, mental health problems

Introduction

According to WHO, mental health is “a state of well-being in which the individual realizes his or her own abilities can cope with the normal stresses of life, can work productively and fruitfully and is able to make a contribution to his or her community”. Mental health disorders are a state of dysfunction in the psychological, biological or developmental aspects fundamental to mental functioning, which results in a serious disturbance of a person’s cognitive, emotional or behavioral functioning². Mental health disorders are generally considered as one of the major contributors to the overall burden of disease among the adolescents and the prevalence among them is increasing ³,⁴ including suicides which are highly correlated with mental illnesses ⁵,⁶ and can appear as early as 14 years of age ⁷.

There are numerous studies conducted globally to assess the prevalence of mental illness among children and adolescents. The lifetime prevalence of mental illnesses among American adolescents ranged ⁸ from 11-32% while in India it ranged ⁹ from 3.2-36.5% with depression, anxiety, schizophrenia and substance
abuse contributing majorly to the burden of disease. Globally, the prevalence of mental health disorders are increasing among adolescents and only 18-34% seek professional help. In India, there is a paucity of literature on help-seeking behavior for mental illnesses augmented by the stigma surrounding mental health. Mental health disorders are associated with labeling as a psychiatric patient which usually results in delayed diagnosis and treatment initiation, poor prognosis and adverse outcomes including risky behavior and suicide which could be prevented if timely treatment were instituted.

Untreated mental illness can negatively influence academics including increased absenteeism rates and school dropouts. Since most of the teens are students and spend half of their waking time every day interacting with their peers and teachers in the school setting, teachers play a vital role in the recognition of behavioral changes and the promotion of mental health of their wards in schools and providing timely referral. However, their perception of mental ill-health may influence their attitude toward adolescent mental health.

Given the prevalent negative attitudes towards mental health disorders in all sections of society and teachers being an integral part of society, understanding their perspectives towards mental health is of importance. So, this study was undertaken to understand teachers’ attitudes and beliefs towards mental health disorders as well as to assess the feasibility of conducting a prospective study among teachers in the school setting.

**Materials and Method**

Based on educational blocks of Udupi, Taluk, schools were sampled from Udupi and Brahmavar blocks. The data collection was conducted from March-August, 2017. Ethical clearance was obtained from the Manipal University ethics committee. Permission was obtained from Deputy Director of Public Instruction (DDPI) and Block education officer (BEO) Udupi and Brahmavar to conduct the study.

This pilot study was designed as a descriptive cross-sectional study. The sampling frame included high school teachers who had five years and above teaching experience and taught at least six hours in a week were included from the schools of Udupi Taluk. A total of 93 consenting high school teachers from English medium and Kannada medium schools were assessed using a pre-tested, self-administered questionnaire. The tool was developed from “Australian National Mental Health Literacy and Stigma Youth Survey”. Permission has been obtained from the author for the use of the questionnaire.

Data analysis: The data was analyzed using SPSS version 15. The data was presented in the form of percentages and frequency tables. Chi-square test was used to find the association. The p-value of less than 0.05 was considered statistically significant.

**Findings**

Socio-demographic details of the respondents have shown that, out of the 93 respondents, 45(48.4%) were in the age group 30-39 years and were largely females (71 and 76.3%). A larger proportion of the teachers (45 and 48.4%) had completed post-graduation and 40.9% had 5-9 years’ teaching experience. The majority (82 and 88.2%) of them taught in private schools with English as the medium of instruction in urban areas.

**Teachers’ beliefs about mental health conditions:**

Regarding beliefs related to mental disorders, more than half (58.1%) of the respondents opined that mental health disorders were not real medical illnesses. Nearly half (49.5%) of the respondents reported that women suffered from mental illnesses as compared to men. Nearly 48.4% cited that people with lower socio-economic background were less likely to suffer from mental illnesses but largely, they indicated that young people (71%) and the unemployed (76.3%) were more likely to suffer from these problems (Table 1).
Table 1: Teachers’ belief towards mental health conditions

<table>
<thead>
<tr>
<th>Characteristics (n=93)</th>
<th>Yes (n %)</th>
<th>No (n %)</th>
<th>Don’t know (n %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental illnesses are not a real medical illness</td>
<td>54(58.1)</td>
<td>23(24.7)</td>
<td>16(17.2)</td>
</tr>
<tr>
<td>People who experience mental illnesses should tell someone</td>
<td>75(80.6)</td>
<td>10(10.8)</td>
<td>8(8.6)</td>
</tr>
<tr>
<td>Characteristics (n=93)</td>
<td>More likely</td>
<td>Less likely</td>
<td>Don’t know (n %)</td>
</tr>
<tr>
<td>Women are more likely to suffer from mental illnesses than men</td>
<td>46(49.5)</td>
<td>17(18.3)</td>
<td>32(32.3)</td>
</tr>
<tr>
<td>Poor people are more likely to suffer from mental illnesses</td>
<td>13(14)</td>
<td>45(48.4)</td>
<td>35(37.6)</td>
</tr>
<tr>
<td>Young people are more likely to suffer from mental illnesses</td>
<td>66(71)</td>
<td>13(14)</td>
<td>14 (15)</td>
</tr>
<tr>
<td>Unemployed people are more likely to form mental illnesses</td>
<td>71(76.3)</td>
<td>9(9.7)</td>
<td>13(14)</td>
</tr>
</tbody>
</table>

Teachers’ attitudes towards mental health conditions:

Regarding attitudes on people with mental disorders, the majority (80.6%) of the respondents felt that mental health issues were signs of personal weaknesses. More than half (53.8%), opined that people with mental health problems were not dangerous to others. It is of importance to note that 62.4% of the respondents were willing to be neighbors to people with mental health issues with 71% willing to work closely on school duties with them. Interestingly 55.9% of them reported that it was easier to give advice to someone else than to seek help than for themselves in relation to mental health (Table 2).

Table 2: Teachers’ attitude towards mental health conditions

<table>
<thead>
<tr>
<th>Characteristics (n=93)</th>
<th>Yes (n %)</th>
<th>No (n %)</th>
<th>Don’t know (n %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental health issues are signs of personal weaknesses</td>
<td>75(80.6)</td>
<td>11(11.8)</td>
<td>7(7.5)</td>
</tr>
<tr>
<td>People with mental illnesses are dangerous to others</td>
<td>22(23.7)</td>
<td>50(53.8)</td>
<td>21(22.6)</td>
</tr>
<tr>
<td>People with mental illnesses are unpredictable/unstable</td>
<td>34(36.6)</td>
<td>41(44.1)</td>
<td>18(19.4)</td>
</tr>
<tr>
<td>I am willing to be a neighbor to people with mental illnesses</td>
<td>58(62.4)</td>
<td>13(14)</td>
<td>22(23.7)</td>
</tr>
<tr>
<td>I am willing to work closely on school duties with people having mental illnesses</td>
<td>66(71)</td>
<td>11(11.8)</td>
<td>16(17.2)</td>
</tr>
<tr>
<td>It is easier to give advice to someone else than to look help for self</td>
<td>52(55.9)</td>
<td>21(22.6)</td>
<td>20(21.5)</td>
</tr>
<tr>
<td>Ever suggested to talk to others about their emotions</td>
<td>53(57)</td>
<td>40(43)</td>
<td>-</td>
</tr>
</tbody>
</table>
Association between socio-demographic details with beliefs and attitudes of the teachers:

The attitude among respondents that mental health problems were signs of personal weaknesses (p = 0.001) and that they were dangerous to others were associated (p = 0.04) with the location of the school. The attitude of respondents that people with mental illness were unpredictable (p = 0.04) was associated with the religion of the respondents. The respondents’ belief that mental illnesses were not real medical illnesses were associated with gender (p = 0.04) and the location of the school (p = 0.001). The belief among respondents that poor people were more likely to suffer from mental illnesses was associated with age (p = 0.004), level of education (p = 0.01) and location of the school (p = 0.009).

Discussion

Teachers’ attitudes and beliefs towards mental illness plays an important role in early identification and referral. In this regard, this preliminary study was conducted to investigate attitudes and beliefs among high school teachers towards mental illnesses and to assess the feasibility of conducting a study with the goal of providing interventions based on the findings.

The study showed that the respondents showed that the majority of them believed that mental illnesses were not real medical illnesses. Similar findings were reported in a study conducted by Ogorchukwu et al. among male adolescents. The belief that women had a higher likelihood of becoming mentally ill was not supported by existing literature in the Indian context on mental health disorders as observed by Malhotra and Shah et al., in their study on women and mental health where internalizing disorders were higher in women while externalizing disorders were higher in men. Majority of the respondents believed that unemployed people had a higher chance of becoming mentally ill and this was supported by the literature as well. The impact of unemployment has been studied by Batic-Mujanovic et al. among the working population of Herzegovina and Bosnia and found that unemployment had a negative influence on mental health.

Regarding attitude towards mental illness, the present study reveals that the majority (80.6%) of the teachers indicated mental illnesses were signs of personal weaknesses. In comparison, the survey conducted by Coppens et al. in Portugal, Germany, Ireland, and Hungary stated that 31%, of the respondents, reported depression as a sign of personal weakness. The respondents’ beliefs that people from lower socioeconomic background had a lesser possibility of becoming mentally ill was in contrast to the statement that mental illnesses were closely linked with poverty as reported in the WHO mind project. In this study, most of the respondents opined that people with mental illnesses were not dangerous to others but this was in contrast to the study from Lahore conducted by Javed et al., where more than 70% indicated that people with mental illnesses such as depression, drug abuse, and schizophrenia were thought to be dangerous. The majority of the teachers in this study reported that people with mental illnesses were generally predictable, which is a positive attitude towards mental health disorders. In contrast, in the survey conducted by Coppens et al., where about half of the respondents (48%) felt that people with depression were unpredictable. Similarly in the study by Javed et al., more than three-fourths of the participants including University teachers and students felt that people with mental illnesses such as depression, drug abuse, and schizophrenia, were unpredictable. In the current study, more than half of the respondents indicated a willingness to be neighbors to people with mental illnesses and were willing to work closely on school duties with them, which are signs of positive attitudes towards people having mental health issues. Teachers’ attitude toward providing advice to someone else to seek help than for themselves in relation to mental health was supported by the literature. According to the systematic review conducted by Gulliver et al., stigma, embarrassment and poor literacy related to mental health and preference on self-reliance were the barriers for seeking help with regard to mental health.

Conclusion

Positive aspects related to people with mental illness as not posing a danger and not being unpredictable were gleaned from the study. The findings of the study indicated both positive and negative attitudes and beliefs among high school teachers. The findings of this preliminary study also indicate the feasibility of conducting a larger school-based study with the development of an interventional module.

Conflict of Interest: Nil

Financial support: Self source
Acknowledgment: We are grateful to the Deputy Director of Public Instructions, Block education officer and heads of the schools in Udupi for giving permission to conduct the study. We are thankful to all teachers participated in the study. We are also grateful for the help extended by Dr. Anthony F. Jorm, Ph.D., DSc., at the University of Melbourne, Melbourne, Victoria, USA.

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21. Jugal K, Mukherjee R, Parashar M, Jiloha RC,


Relationship between Service Quality Dimensions and its Impact on Patients’ Satisfaction: A Case Study of Jawaharlal Nehru Medical College

Yogendra Pal Bharadwaj

Assistant Professor, IBM, GLA University, Mathura and PDF Fellow, ICSSR, Ministry of HRD, New Delhi & Department of Commerce, AMU, Aligarh (U.P)-India

Abstract

Purpose: The purpose of this paper is to identify the relationship between service quality dimensions and their impact on patients’ satisfaction and that improves the organizational image of Jawaharlal Nehru Medical College (JNMC).

Design/Methodology/Approach: Data was collected from 2,900 patients visiting JNMC through self-administered questionnaire on five point Likert scale and convenient sampling approach. A descriptive and inferential statistical technique was adopted while structural equation model also used to examine the relevance of proposed model.

Findings: The results showed that empathy is the most paramount determinant of patients’ satisfaction, followed by reliability, responsiveness, security, tangibles and assurance. They almost share the same relationships in terms of strengthen of patients’ satisfaction. However, patients’ satisfaction laid down the greatest impact on the organizational image of JNMC. While, responsiveness emphasized greatly on organizational image of JNMC and the least on patients’ satisfaction among all the six dimensions of service quality.

Practical Implications: It will greatly help both JNMC officials and health care industry experts in developing appropriate strategies to increase the propensity of patients’ satisfaction for an effective cum desired services for a better health policy.

Originality/Value: The study is pioneering in the sense that the construct patients’ satisfaction had relatively been less explored in the Indian context of JNMC and it is acting like a source that provides regular stuff for effective medical service to the patients.

Keywords: Service Quality Dimensions, Patients’ Satisfaction, Organizational Image and Jawaharlal Nehru Medical College (JNMC).

Introduction

In the modern dynamic environment, service sector has been challenging aspect for continuous performance and quality improvement and in the last few years, it has become extremely multifaceted in the health care industry. It is true to sustain in the health care industry but it requires both technical and functional aspect of ingredient to make it success. Technical aspect deals with the technical accuracy and diagnosis of a medical concern, while functional aspect talks about the manner of delivery of required health care services to cover up that problem. The basic objective of any medical college or institution is to provide basic medical aid with proper treatment and availability of services...
and to satisfy patients became a paramount concern for medical organization\textsuperscript{2, 6, 8}. This study is motivated to identify the relationship between dimensions of service quality and patients satisfaction with respective to Jawaharlal Nehru Medical College, which is in Aligarh. It is one of the leading government medical college that provides medical education in terms of theoretical as well as practical aspects for treatment of medical patients\textsuperscript{7}. In this study, six dimensions of SERVQUAL method (tangibles, reliability, responsiveness, assurance, empathy and security) are used to evaluate the relationship between perceptions of patients towards these dimensions in Jawaharlal Nehru Medical College cum hospital\textsuperscript{6, 8, 9}. After a brief outlining of service quality dimensions, patients’ satisfaction and organizational image of JNMC, the research hypotheses are proposed with a conceptual model of the research and proved with certain inferential remark and a path diagram\textsuperscript{11, 12}. 

In the last few years, service quality has considered pivotal in terms of retaining and satisfaction of customer and that proves to be more significant especially in core service industries\textsuperscript{12, 13}. Previous studies have primarily focused upon service performance methodologies in healthcare industry but that have not analyzed in such a manner, where, a best practice could be developed to alter the perception of patients for better delivery of services\textsuperscript{2, 6, 8}. A patient feels more contented, once, he is technically look after and functionally controlled, then only, he expects his matching desire with the required one and there the relationship seems to be positively enlarge\textsuperscript{1, 2}. The Indian healthcare system is mainly public oriented, where, most of the services are being characterised for different society people and this phenomena led to the birth of Jawaharlal Nehru Medical College cum hospital in 1962 which is running under the monitoring of Medical Council of India and Aligarh Muslim University, Aligarh- Uttar Pradesh\textsuperscript{7}. Several studies were conducted on the thrusting area of service quality between patients’ satisfaction and organizational image but we could not come across any study that specifically identified the relationship between patients’ satisfaction and service quality that affects organizational image of JNMC\textsuperscript{8, 9, 11}. Thus, authors chose six different dimensions of service quality (tangibles, reliability, responsiveness, assurance, empathy and security) that directly affects the organizational image and a model of relationship framework is formulated, that clearly explains the nature of this study\textsuperscript{8, 12}. 

![Figure I shows conceptual model of the study](image)

Source: Prepared by the researcher

The following hypotheses, based on different studies, provide the scope and depth of the study:-

\begin{itemize}
  \item H1: Tangible has a significantly positive influence on patient satisfaction in JNMC.
  \item H2: Reliability has a significantly positive influence on patient satisfaction in JNMC.
  \item H3: Assurance has a significantly positive influence on patient satisfaction in JNMC.
  \item H4: Responsiveness has a significantly positive influence on patient satisfaction in JNMC.
  \item H5: Empathy has a significantly positive influence on patient satisfaction in JNMC.
  \item H6: Security has a significantly positive influence on patient satisfaction in JNMC.
  \item H7: Patient satisfaction has a significant impact on organizational image of JNMC.
  \item H8: Tangible has a significantly positive influence on organizational image of JNMC.
  \item H9: Reliability has a significantly positive influence on organizational image of JNMC.
  \item H10: Assurance has a significantly positive influence on organizational image of JNMC.
  \item H11: Responsiveness has a significantly positive influence on organizational image of JNMC.
  \item H12: Empathy has a significantly positive influence on organizational image of JNMC.
  \item H13: Security has a significantly positive influence on organizational image of JNMC.
\end{itemize}
Materials and Method

Research Design

It is based on a conclusive research, where, the dependent variable is organizational image (OI) and independent variables are dimensions of service quality. Patients’ satisfaction (PS) plays a mediating role between organizational image and dimensions of service quality\textsuperscript{13}. The items of tangible, reliability, responsiveness, and assurance were derived from the studies of Parasuraman et al.,\textsuperscript{11} (1988), Maxwell\textsuperscript{10} (1984). The studies exercised by Andaleeb\textsuperscript{1} (2001), Duggirala et al.,\textsuperscript{6} (2008), have identified for empathy and security for the evaluative purpose of patient satisfaction. While, the studies of S.M. Irfan et al.,\textsuperscript{13} (2012), and Ramaiah Itumalla\textsuperscript{12} (2012) have adopted for patient satisfaction. Moreover, for the purpose of organizational image, few studies conducted by Kazemi et al.,\textsuperscript{8} (2013), Alhashem et al.,\textsuperscript{2} (2011), and Ladhari et al.,\textsuperscript{9} (2008) have adopted to select the relative items.

Sample Design and Procedure

Bilingual questionnaire based on a five-point Likert scale was used through convenience sampling approach. The first part comprised of demographic profiles (age, occupation, education level, treatment availing period and gender) of the patients, while, the second section dealt with the independent variables, mediate variable and the dependent variable. The data were collected in two stages from September 2018 to December 2018. In the first stage, data was generated from 500 respondents for the purpose of pilot study. In the second stage, data was generated from larger sample size of 2900 respondents. According to the annual reports published by central record section of JNMC, an average 2350 patients are being treated daily in the hospital\textsuperscript{7}. Considering this, we had distributed 3500 questionnaires as previous studies have observed a degree of non-response\textsuperscript{7}. Out of 3500, only 2900 respondents returned the questionnaires. This indicates 82 percent of response rate which is higher than the average of response rates reported in such type of studies\textsuperscript{12, 13}. The overall reliability of the scale was .701 which is considered to be acceptable\textsuperscript{5}.

Table I: Reliability value of the Scale

<table>
<thead>
<tr>
<th>Variables</th>
<th>No. of Items</th>
<th>Cronbach’s Alpha ((\alpha))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empathy</td>
<td>8</td>
<td>.775</td>
</tr>
<tr>
<td>Assurance</td>
<td>6</td>
<td>.762</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>5</td>
<td>.657</td>
</tr>
<tr>
<td>Reliability</td>
<td>6</td>
<td>.710</td>
</tr>
<tr>
<td>Security</td>
<td>9</td>
<td>.702</td>
</tr>
<tr>
<td>Tangible</td>
<td>4</td>
<td>.696</td>
</tr>
<tr>
<td>Patient Satisfaction</td>
<td>13</td>
<td>.781</td>
</tr>
<tr>
<td>Organizational Image</td>
<td>5</td>
<td>.704</td>
</tr>
</tbody>
</table>

Source: Survey data and prepared by the researcher

Descriptive statistics, factor analysis, regression analysis, analysis of diverse and ultimately structural path were created to put forth the model, with the help of SPSS 20.0 and AMOS 20.0. The second table explains the estimates of the variable and its significance for the structural path analysis through confirmatory factor analysis and underlying factors of 56 items\textsuperscript{3, 4, 5}.

Table II: Estimates of constructs of study

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Items</th>
<th>Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empathy</td>
<td>EMP1</td>
<td>.864</td>
</tr>
<tr>
<td></td>
<td>EMP2</td>
<td>.483</td>
</tr>
<tr>
<td></td>
<td>EMP3</td>
<td>.527</td>
</tr>
<tr>
<td></td>
<td>EMP4</td>
<td>.973</td>
</tr>
<tr>
<td></td>
<td>EMP5</td>
<td>.519</td>
</tr>
<tr>
<td></td>
<td>EMP6</td>
<td>.519</td>
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<tr>
<td></td>
<td>EMP7</td>
<td>.799</td>
</tr>
<tr>
<td></td>
<td>EMP8</td>
<td>.853</td>
</tr>
<tr>
<td>Assurance</td>
<td>AS1</td>
<td>.673</td>
</tr>
<tr>
<td></td>
<td>AS2</td>
<td>.775</td>
</tr>
<tr>
<td></td>
<td>AS3</td>
<td>.485</td>
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<tr>
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Cont.. Table II: Estimates of constructs of study

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Dimensions of service quality\(^6,^8\). In terms of occupation, majority of the patients belonged to business class (56.9 per cent) and service class (43.1 per cent), as far as education profile, 48.6 per cent were literate, 30.7 per cent were graduate, and 19.0 percent were post graduate and above, while 1.7 per cent were illiterate\(^8,^9\). It means majority of patients know the paradigm approach to judge judiciously. As far as treatment availability duration is concerned, 34.1 per cent patients were of more than ten months period, 26.2 per cent were of 6 to 10 months duration, 22.1 per cent were of 1 to 2 months period, and 17.6 per cent were of 3 to 5 months duration which means still patients are reluctant enough to follow the service quality procedure of JNMC\(^2,^5,^8\).

Analysis of Model and Findings

In terms of hypotheses testing, the results proved positively significant influence of service quality dimensions such as tangible on patient satisfaction (\(\beta = .56\)) which shows 56 per cent tangible dimension motivate patient to opt for services, while the critical ratio (CR=6.647) intensifies it as an important determinant of patient satisfaction\(^2,^6,^8\). Other dimensions like reliability (\(\beta = .61\)), responsiveness (\(\beta = .51\)), assurance (\(\beta = .59\)), empathy (\(\beta = .64\)), and security (\(\beta = .57\)) positively influenced patient satisfaction that motivate them to choose better services\(^1,^2\). While, patient satisfaction (\(\beta = .76\)) is positively influenced towards organizational image, where, patients are more reluctant to avail JNMC services on a regular basis\(^12,^13\). It also stated that the hospital workforce is more concerned about patient’s issues to build good rapport. In order to test the relationship between dimensions of service quality and organizational image, all dimensions were found having significantly influence on OI\(^8,^8,^10\). Hence, the analysis further stated tangible (\(\beta = .42\)), reliability (\(\beta = .56\)), assurance (\(\beta = .44\)), responsiveness (\(\beta = .64\)), empathy (\(\beta = .57\)), and security (\(\beta = .49\)) also have significant impact on organizational image of JNMC\(^12,^13\).

Data Analysis and results

Descriptive Analysis of Demographic Factors

As per the respondents profile based on gender, 2,030 were males and 870 were females. While, 42.8 per cent were aged 30 to 39 years, 41.4 per cent were aged 40 years and above, and 15.9 per cent were aged 20 to 29 years that means most of the patients are matured enough to understand the parameter of medical care and
### Table III: Regression paths of research model, estimates, critical ratio and P-value

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Effects</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Inference</th>
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<tr>
<td>H1</td>
<td>PS ← Tangible</td>
<td>0.557</td>
<td>0.084</td>
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<td>PS ← Reliability</td>
<td>0.607</td>
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<td>H3</td>
<td>PS ← Assurance</td>
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<td>0.074</td>
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<td>Significant</td>
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<td>H4</td>
<td>PS ← Responsiveness</td>
<td>0.509</td>
<td>0.067</td>
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<td>Significant</td>
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<td>H5</td>
<td>PS ← Empathy</td>
<td>0.636</td>
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<td>H6</td>
<td>PS ← Security</td>
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<td>OI ← Reliability</td>
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<tr>
<td>H12</td>
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<td>OI ← Security</td>
<td>0.491</td>
<td>0.049</td>
<td>5.924</td>
<td>0.05</td>
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**Source:** Survey data and prepared by the researcher

After extracting the entire model concurrently, empathy ($\beta = 0.64$) is one of the most paramount determinant of patient satisfaction, while reliability ($\beta = 0.61$), assurance ($\beta = 0.59$), security ($\beta = 0.56$), and responsiveness ($\beta = 0.51$) trying hard to share the same relationship between patients satisfaction and service quality$^{10,12,13}$. However, patients satisfaction identified the greatest influence on organizational image ($\beta = 0.76$) to develop positive proximity of relationship between these two variables$^{8,9,10}$. The subsequent factors of organizational image are also influenced by dimensions viz., responsiveness ($\beta = 0.64$), empathy ($\beta = 0.57$), reliability ($\beta = 0.56$), security ($\beta = 0.49$), assurance ($\beta = 0.44$) and tangible ($\beta = 0.42$). It shows responsiveness signifies the most influencing factor for organizational image and the least associated factor for patients’ satisfaction$^{10,12,13}$.

### Table IV: Estimated Model’s Test Statistics

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<tr>
<th>Constructs</th>
<th>Chi</th>
<th>D.F</th>
<th>Chi/D.F</th>
<th>GFI</th>
<th>IFI</th>
<th>CFI</th>
<th>NFI</th>
<th>AGFI</th>
<th>RMSEA</th>
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<td>0.918</td>
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<td>≥0.90</td>
<td>≥0.90</td>
<td>≥0.90</td>
<td>≤0.08</td>
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</tbody>
</table>

**Note:** D.F – Degree of Freedom, GFI – Goodness of Fit Index, IFI - Incremental Fit Index, CFI – Comparative Fit Index, NFI - Normated Fit Index, AGFI – Adjusted Goodness of Fit Index, RMSEA – Root Mean Square Error of Approximation

**Source:** Survey data and prepared by the researcher
RMSEA scores below 0.10 are generally considered to signal good fit, and our value is 0.08, which is a good fit of the model\(^1\)\(^4\). Considering this, it is proved all hypotheses are significantly influencing the relationship between dimensions of service quality and patient satisfaction that improve the organizational image of JNMC\(^10, 12\).

Discussion and Implications

This study identified the relationship between the dimensions of service quality and patients’ satisfaction, and examined the impact of these dimensions on organizational image of JNMC involving a sample of 2900 participants to whom structured questionnaire was administered. The results highlighted the empirical evidence for the identification of statistically significant and positive influence of these dimensions on patients’ satisfaction and improvisation of organizational image of JNMC\(^10, 11, 12\). Empathy is considered to be the most paramount factor among all the dimensions for patients’ satisfaction. The notion is that higher empathetic consideration leads to improvised organizational image, so it could be another strategic factor that acts as a source of differentiator in the medical industry\(^11, 12, 13\).

In addition, patient satisfaction exerts the greatest impact on organizational image which means the service parameters are properly implemented with due care of patients and by providing effective and efficient medical treatment\(^6, 8\). On the other hand, in terms of organizational image, responsiveness proved to be the highest exerting factor among all the dimensions that means the willingness and responsible behaviour of the employees are much effective in the minds of targeted patients, while, as far as patient satisfaction is concerned, responsiveness seems to be the least dominating factor among all the dimensions in JNMC\(^2, 11, 13\). All these findings could serve as suggestions for JNMC officials to evaluate their relationship and its outcomes for patients’ so that it can provide practical output for the medical care industry\(^9, 12\).

Limitations and future research directions

The study was limited to investigating the relationship of dimensions of service quality on patients’ satisfaction in JNMC. Further investigation in other types of institutions may provide different insight into the findings of this study. According to the requirement of the respective industry, these dimensions could be added or modified to fit the organization specific attributes and extra research is suggested to be done longitudinally in order to assess the relationship over time, nature and region wise\(^12\). The sample consisted of patients availing medical care only and it may be further conducted among categorical of patients\(^8, 9, 10\). Further research can be conducted in terms of government and private medical organizations and other countries medical organizations could be added for a comparative purpose\(^5, 6\).

Conflict of Interest- Nil

Source of Funding- Self

Ethical Clearance- Not required as per study.

References


Oral Health Considerations in an Achondroplastic Child: A Case Report

Yogesh Chhaparwal¹, Vineetha R², Keerthilatha M Pai³, Shubha Chhaparwal⁴

¹Associate Professor, ²Professor and Head, ³Dean and Professor, Department of Oral Medicine and Radiology, Manipal College of Dental Sciences, Manipal (Karnataka), ⁴Department of Conservative Dentistry and Endodontics, Manipal College of Dental Sciences, Manipal Academy of Higher Education, Manipal, Karnataka, India

Abstract

Achondroplasia is the most common form of skeletal dysplasia and is typically characterized by short stature and disproportional limb shortening. It is inherited as an autosomal dominant trait with full penetrance and consistent expression. Here we report general and dental findings in a 12 year old boy with achondroplasia with emphasis on special considerations during dental treatment.

Key Words: stature, dwarfism, malocclusion.

Introduction

Achondroplasia is the most common form of short-limb dwarfism, which is reported to occur in 1 of 25,000 births.¹ It is caused by mutation in fibroblast growth factor 3 (FGFR3) on chromosome 4, causing a defect in the maturation of chondrocytes in the cartilage growth plate which results in defective bone formation.² The complications of achondroplasia often involve multiple organs, and are secondary to atypical bone growth. The diagnosis is essentially based on clinical and radiographic features which are specific to this genetic disorder. General features of this disorder include short stature, lumbar lordosis, shortening of limbs, short stubby trident hands, prominent buttocks and protuberant abdomen.³ The most common skull changes include prognathic mandible, macrocephaly, prominent forehead, depressed nasal bridge, hypoplasia of maxillae, otolaryngeal system dysfunction, and stenosis of foramen magnum.³ The most common dental manifestation is malocclusion. Fortunately individuals with achondroplasia have normal intelligence quotient and are able to lead normal productive life.⁴

Case Report

A 14 year old boy presented with a complaint of maligned upper and lower front teeth which interfered with normal chewing and caused esthetic concern. He also reported of difficulty in speaking. He was diagnosed with achondroplasia at three months of age and advised bilateral limb lengthening procedure at six years of age which was not done because of financial constraints.

General examination revealed short stature with long narrow trunk and short limbs, short stubby trident hands, bow legs and lumbar lordosis (Figure 1). His height was 115cm and average normal height of his age is 147cm. Examination of face revealed brachycephalic skull, bossing of the frontal region, depressed nasal bridge and ocular hypertelorism. There was a typical underdevelopment (hypoplasia) of the midface with cheek bones that lacked prominence. A concave facial profile with prognathic mandible was noted.

Corresponding author:
Shubha Chhaparwal
Assistant Professor, Department of Conservative Dentistry and Endodontics, Manipal College of Dental Sciences, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India – 576104
Email: srathi18@gmail.com
Figure 1: Achondroplastic boy with short stature

Intraoral examination showed poor oral hygiene and generalized marginal gingivitis. Full complement of teeth were present with clinically absent third molars which was in accordance to his age. Maxillary arch was constricted with blocked out lateral incisors and highly placed right canine. Lower arch showed severe crowding. There was posterior cross bite and anterior open bite relation (Figure 2a, 2b). Panoramic radiograph showed developing third molars. Lateral cephalogram revealed prognathic mandible and retruded maxilla and a skeletal class III jaw relation (Figure 3). Treatment plan was formulated which involved fixed orthodontic therapy to correct the dental malocclusion. Due to severe mandibular prognathism orthognathic surgery was planned after correction of dental malocclusion.

Discussion

Achondroplasia is a genetic disorder of cartilaginous bone formation, often inherited as an autosomal dominant trait. This genetic defect results in a reduction in functional fibroblast growth factor receptor-3 (FGFR-3). Most of the cases (80%) arise due to spontaneous mutation of this gene whereas remaining arise denovo. It is reported that approximately 2, 50,000 individuals globally have achondroplasia and is the most common form of dwarfism.1,2

Our case showed typical general and oral features of achondroplasia. The short stature with long narrow trunk and short limbs were attributed to the defect in the endochondral bone formation particularly at epiphysis of long bones. The digits were broad and stubby giving the appearance of trident hand which is considered to be a diagnostic sign.3,4 The patient complained of difficulty in speaking which was due to severe malocclusion.
There is no data available about the prevalence of this disorder in Indian population and not many reports of Indian patients with achondroplasia.\(^5\)\(^6\).

The delayed eruption of teeth due to defective endochondral bone formation has been reported in children with achondroplasia but our case did not show this feature\(^6\). There was midface hypoplasia with prognathic mandible with skeletal and dental class ii, posterior crossbite and anterior open bite which are consistent features of achondroplasia\(^7\). The American Academy of Paediatrics recommends review of orthodontic problems in achondroplastic children after 5 years of age.\(^8\) However early orthodontic evaluation and subsequent intervention with interceptive orthodontics is the most desired management approach\(^9\).

One of the common medical complications associated with short stature is stenosis of spinal cord. The spinal stenosis occurring in late childhood or early adolescence can result in chronic backache. The position of dental chair during dental treatment may be modified by lowering the height. Furthermore, special consideration should be taken to stabilize the head during dental procedures, as poor head control can lead to cranio-cervical instability, foramen magnum stenosis and restricted neck movement which can lead to respiratory complications\(^10\). In addition, macroglossia and large mandible may lead to the increased difficulty of airway management in case of emergency. Treatment under general anaesthesia poses certain complications due to small pharynx and larynx, lumbar lordosis, narrowing of spinal cord and small chest.\(^11\) This holds importance for general dental practitioners treating these patients to recognize potential risk factors and complications when procedures under anesthesia are required.

**Conclusion**

The dental care in patients with achondroplasia requires special considerations. The presence of disproportionate short stature causes societal problems and can result in treatment delay. Acondroplastic children require restoration of emotional and social care apart from regular treatment needs. The present case signifies the need for the dental clinician to be versed with oral manifestations and be competent enough to manage any potential complications and thereby provide a comprehensive dental care.

**References**

Type of article: Original

Study of Menstrual Hygiene among Adolescent Girls in a Rural Area

Aakruti Ganla1, Patil Supriya Satish2, Patil Satish R3, Durgawale PM4
1MBBS Student, 2 Associate Professor, Department of Community Medicine, Dean Academics, 3 Prof, Dept of Microbiology, 4 Professor & Head, Department of Community Medicine, Krishna Institute of Medical Sciences, (KIMS), Karad

Abstract

Background: Adolescence in girls is marked by menstruation. The lack of mention of the topic leads to unawareness about the basic physiological phenomenon that occurs in every woman's life on a monthly basis. Good hygienic practices are essential during menstruation.

Aims and Objectives: To assess the knowledge, sources of information and beliefs regarding menstruation among adolescent girls and identify hygiene practices and restrictions that are followed by adolescent girls during menstruation.

Materials and Method: School based cross-sectional study was carried out in a rural school in Malkapur. Data was collected using a pre-designed questionnaire from 107 adolescent girls.

Results: Among the 107 girls, maximum 56(52.34%) were 14 years old. Maximum number of girls had menarche at 13 years – 42(39.25%). 52(48.60%) girls had no knowledge of menses prior to menarche. Source of information for the remaining 55(51.40%) was mother for 40(72.73%) of the girls. 72(67.29%) girls commented that bleeding occurs from the uterus. 58(54.21%) used sanitary pads while 18(16.82%) used old cloth pieces. Absorbents were wrapped in newspaper and disposed by 88(82.24%) girls. Multiple restrictions were practiced and only 22.43% girls did not have any restrictions.

Conclusion: There is an urgent need for spread of awareness regarding menstrual hygiene practices especially in the rural area as it can play a major contributory role in uplifting overall health of adolescent girls and women in the region.

Keywords: Menstrual, hygiene, adolescents, rural

Introduction

Adolescence is an important stage of development that occurs from puberty to legal adulthood. In girls, it is marked by menstruation. Menarche marks the onset of this period in which she becomes reproductively active.

Menstruation is generally considered as unclean in the Indian society. The lack of mention of the topic leads to unawareness about the basic physiological phenomenon. Girls are not educated regarding menstruation so most don’t know how to respond to the first incident. Isolation of the menstruating girls and restrictions being imposed on them in the family, have reinforced a negative attitude towards menstruation(1).

Adolescent girls often have incomplete and inaccurate information about the menstrual physiology and hygiene. Mothers, television, friends, teachers and relatives are the main sources of information on menstruation to the adolescent girls which without proper guidance may be misleading and inadequate.

With this backdrop a study was conducted among adolescent girls in a school in the rural area of Karad, Maharashtra to assess the knowledge, beliefs, sources of information, practices of menstrual hygiene, patterns and problems and also to identify restrictions practiced...
by adolescent girls during menstruation.

Materials and Method

A school based cross-sectional study was carried out in a rural school in Malkapur area, Karad Taluka in Satara district in the state of Maharashtra. The study was undertaken among 107 adolescent girls aged between 13-16 years. According to a study, out of 190 respondents, 80(42%) girls were aware about menstruation prior to attainment of menarche. Consequently, the sample size is calculated using the formula:

\[ N = \frac{4pq}{l^2} \]

Where, \( p \) = the proportion of girls who are aware about menstruation prior to menarche,

\( q \) = the proportion of girls who are unaware about menstruation prior to menarche,

\( l \) = allowable error (10). According to data collected from above mentioned study, minimum sample size is 97. The data was collected in two months from March 2018-April 2018. Report writing was done in 1 month i.e. July 2018.

A list of schools in rural area of Karad Taluka was prepared which formed the sampling frame from which one school was randomly selected. The purpose and the process of the study were explained to the school principal and teachers. Among all the girls in the school who have attained menarche, 107 randomly selected girls made up the study population after acquiring informed consent from the parents or guardians and assent from the girls and assuring them regarding confidentiality of their information.

Data was collected using a pre-designed questionnaire. It consisted of socio-demographic details, knowledge about menstruation, menstrual patterns and practices, hygiene followed and lastly, any restrictions followed during menstruation. At the end of the interview the girls were educated about facts relating to menstruation and the importance of hygiene during menses.

Statistical analysis: Data was fed to Microsoft excel 2007 and was analyzed in the form of proportions and percentage.

Results

Distribution of the girls according to socio-demographic factors is given in Table 1. Among the 107 girls, maximum 56(52.34%) were in 14 year age group. 90(84.11%) were Hindu. 44(41.12%) girls’ fathers were found to be educated upto higher secondary. 50(46.72%) girls’ mothers were educated till higher secondary (11th-12th std.) while only 1(0.94%) of the mothers was illiterate. Majority, that is, 57(55.88%) fathers were semi-skilled workers while 84(78.51%) mothers were home-makers.

| TABLE 1: Distribution of study population according to socio-demographic factors |
|-----------------|-----------------|-----------------|
| **Age**         | **Number of girls** | **Percentage** |
| 13              | 12              | 11.21           |
| 14              | 56              | 52.34           |
| 15              | 36              | 33.65           |
| 16              | 3               | 2.80            |
| **Religion**    | **Number**      | **Percentage** |
| Hindu           | 90              | 84.11           |
| Muslim          | 15              | 14.02           |
| Others          | 2               | 1.87            |

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<th><strong>Fathers’ Education</strong></th>
<th><strong>Number</strong></th>
<th><strong>Percentage</strong></th>
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<tr>
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Post-graduate 10 9.35
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<th>Mothers’ Education</th>
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<th>Percentage</th>
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<td>0.94</td>
</tr>
<tr>
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<td>11.22</td>
</tr>
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<tr>
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<td>20.56</td>
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<th>Fathers’ occupation</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unskilled worker</td>
<td>15</td>
<td>14.71</td>
</tr>
<tr>
<td>Semi-skilled worker</td>
<td>57</td>
<td>55.88</td>
</tr>
<tr>
<td>Skilled worker</td>
<td>30</td>
<td>29.41</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mothers’ occupation</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housewife</td>
<td>84</td>
<td>78.51</td>
</tr>
<tr>
<td>Unskilled worker</td>
<td>5</td>
<td>4.67</td>
</tr>
<tr>
<td>Semi-skilled worker</td>
<td>14</td>
<td>13.08</td>
</tr>
<tr>
<td>Skilled worker</td>
<td>4</td>
<td>3.74</td>
</tr>
</tbody>
</table>

**TABLE 2: Pattern of Menstruation among school-going adolescent girls**

<table>
<thead>
<tr>
<th>Age at menarche</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>2</td>
<td>1.87</td>
</tr>
<tr>
<td>12</td>
<td>34</td>
<td>31.78</td>
</tr>
<tr>
<td>13</td>
<td>42</td>
<td>39.25</td>
</tr>
<tr>
<td>14</td>
<td>27</td>
<td>25.23</td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>1.87</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Amount of flow</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very scanty</td>
<td>6</td>
<td>5.61</td>
</tr>
<tr>
<td>Scanty</td>
<td>62</td>
<td>57.94</td>
</tr>
<tr>
<td>Moderate</td>
<td>26</td>
<td>24.30</td>
</tr>
<tr>
<td>High</td>
<td>12</td>
<td>11.22</td>
</tr>
<tr>
<td>Very high</td>
<td>1</td>
<td>0.93</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration of flow in days</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>11</td>
<td>10.28</td>
</tr>
<tr>
<td>4-5</td>
<td>89</td>
<td>83.18</td>
</tr>
<tr>
<td>6-7</td>
<td>6</td>
<td>5.61</td>
</tr>
<tr>
<td>&gt; 7</td>
<td>1</td>
<td>0.93</td>
</tr>
</tbody>
</table>
Maximum girls were found to have menarche at 13 years – 42(39.25%). The menses were irregular in 95(88.78%) girls. The amount of blood flow was scanty in majority, 62(57.94%) girls. The duration of blood flow was found to be between 4-5 days in 89(83.18%). 82(76.64%) girls experienced dysmenorrhea whereas only 1(0.93%) had menorrhagia.

### TABLE 3: Knowledge of adolescent girls regarding menstruation

<table>
<thead>
<tr>
<th>Knowledge before menarche</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>55</td>
<td>51.40</td>
</tr>
<tr>
<td>No</td>
<td>52</td>
<td>48.60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother</td>
<td>40</td>
<td>72.73</td>
</tr>
<tr>
<td>Sister/Relative</td>
<td>2</td>
<td>3.64</td>
</tr>
<tr>
<td>Teacher</td>
<td>6</td>
<td>10.90</td>
</tr>
<tr>
<td>Friend</td>
<td>7</td>
<td>12.73</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knowledge of organ that bleeds</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not know</td>
<td>35</td>
<td>32.71</td>
</tr>
<tr>
<td>Uterus</td>
<td>72</td>
<td>67.29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knowledge of cause of bleeding</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not know</td>
<td>12</td>
<td>11.21</td>
</tr>
<tr>
<td>Physiological</td>
<td>92</td>
<td>85.98</td>
</tr>
<tr>
<td>God-given</td>
<td>3</td>
<td>2.81</td>
</tr>
</tbody>
</table>

52(48.60%) girls had no knowledge of menses prior to menarche. Source of information for the remaining 55(51%) was mother for most, 40(72.73%) of the girls. Only 72(67.29%) commented that bleeding occurs from the uterus. 3(2.81%) girls thought it was a ‘god-given gift.’

![FIGURE 1: Absorbent used during Menstruation](image)

Figure 1 shows that 58(54.21%) girls used sanitary pads while 18(16.82%) used old cloth pieces. 30(28.04%) bought new cloth every 3 months and only 1(0.93%) used both cloth and pads.
Table 4 shows that of the girls who used cloth pieces as absorbent 32(29.91%) stored the same with their routine clothes. 40(83.33%) girls dried the cloth outside the house in sunlight. 91(85.05%) did not feel the need to change absorbent in school. 94(87.85%) changed the absorbent multiple times daily. An unusual practice of burying used absorbents in the mud by 2(1.87%) girls was observed in our study.

Majority, 77(71%) girls attended school even during menses despite the dysmenorrhoea experienced by them as seen in Table 2.

Only 24(22.43%) girls did not practice any restrictions while the remaining practiced or were subjected to one/multiple restrictions such as not visiting temples during menses was seen in 83(77.57%) girls. Not touching stored food was observed in 18(16.82%) girls while some, 3(2.80%) were isolated and not allowed to sleep on their routine bed during menstruation.

**Discussion**

Among the 107 girls, maximum 56(52.34%) were in 14 year age group. Maximum number of girls were found to have menarche at 13 years – 42(39.25%) followed by 34(31.78%) at 12 years of age. A study by Thakre

### TABLE 4: Practices of menstrual hygiene

<table>
<thead>
<tr>
<th>Storage of absorbent</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not store</td>
<td>59</td>
<td>55.14</td>
</tr>
<tr>
<td>Bathroom</td>
<td>16</td>
<td>14.95</td>
</tr>
<tr>
<td>With routine clothes</td>
<td>32</td>
<td>29.91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Problems while washing cloth</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortage of water</td>
<td>2</td>
<td>33.33</td>
</tr>
<tr>
<td>Lack of privacy</td>
<td>4</td>
<td>66.67</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Place of drying</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inside house</td>
<td>4</td>
<td>8.33</td>
</tr>
<tr>
<td>Outside house without sunlight</td>
<td>4</td>
<td>8.33</td>
</tr>
<tr>
<td>Outside house with sunlight</td>
<td>40</td>
<td>83.33</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change of absorbent in school</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>16</td>
<td>14.95</td>
</tr>
<tr>
<td>No</td>
<td>91</td>
<td>85.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency of changing/washing</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>8</td>
<td>7.48</td>
</tr>
<tr>
<td>Multiple times daily</td>
<td>94</td>
<td>87.85</td>
</tr>
<tr>
<td>Only after completely soaked</td>
<td>5</td>
<td>4.67</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disposal of absorbent</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burn it</td>
<td>17</td>
<td>15.89</td>
</tr>
<tr>
<td>Wrap in newspaper</td>
<td>88</td>
<td>82.24</td>
</tr>
<tr>
<td>Bury it in the mud</td>
<td>2</td>
<td>1.87</td>
</tr>
</tbody>
</table>
reveals that the age of the menstruating girls ranged from 12-17 years, with the maximum number of girls being between 13-14 years of age.\[3\] In our study 84.11% girls are Hindus whereas in a study done in South India 90.2% girls were Hindus.\[4\]

The education of the parents, especially mothers, played an important role in knowledge and hygiene practices followed by the girls. We found that maximum, 44(41.12%) fathers and 50(46.73%) mothers were educated till higher secondary (11th-12th std.). According to a study carried out in an urban slum area,\[5\] a majority of 47% of the mothers were illiterate which had a direct relationship with the hygiene practices of girls in the area. In another study, 14% of fathers and 12% of mothers had no education.\[6\]

Here, most fathers 57(55.88%) were semi-skilled workers while mothers 84(78.51%) were home-makers whereas in a study done in Nigeria\[7\] indicated that employment of mothers showed significant statistical association with respect to the practice of good menstrual hygiene. Mothers are primary source of such knowledge for daughters and having a job that provides exposure and access to information can increase awareness about the importance of menstrual hygiene.

The duration of blood flow was found to be between 4-5 days in 89(83.18%) followed by 1-3 days in 11(10.28%) girls. Studies have indicated differences in duration of flow, the mean duration being 5.3±1.32 days and stretched to more than 7 days for Indians. Long duration of flow has been reported ranging from 1 to 4 % of women.\[8\]

The amount of blood flow was scanty in majority, 62(57.94%) girls while 26(24.30%) had moderate blood flow. The menses were irregular in 95(88.78%) in our study. Further studies have also found the irregular and excessive flow as the two most common menstrual disorder.\[9\] Only 1(0.93%) girl had menorrhagia. Studies indicated large variations in menstrual blood loss (excessive flow) among adolescent population, 23.5% from West Bengal; some encountering moderate while other having heavy discharge.\[10\]

Most of the girls, 82(76.64%) had dysmenorrhea however 77(71.96%) attended school despite the same. A study in Delhi\[11\] reported that among adolescent girls, dysmenorrhea was the most common problem followed by pre-menstrual syndrome. This affects the daily routines of majority of the girls leading to absenteeism from school/college and work.

In our study, 52(48.60%) girls had no knowledge of menses prior to menarche. A study conducted by Verma et al. in Gujarat indicated that 88.1% girls had knowledge regarding menstruation.\[12\] We found the source of information for the remaining 55(51.40%) was mother for 40(72.73%) of the girls. In a study conducted by Dudeja et al. 60.7% girls revealed mother as their source of information while 31.8% declared that they obtained information from their friends.\[13\] Only 72(67.29%) girls commented that bleeding occurs from the uterus. 92(85.98%) knew that menstruation is a physiological phenomenon. In a study by Juyal et al., 29.1% of the girls were having knowledge about the reproductive system as the source of bleeding, 20% of girls believed it to be a physiological process and 76% were unaware of the reasons for menstruation.\[14\]

As per our data, 58(54.21%) girls used sanitary pads while 18(16.82%) used old cloth pieces. Studies by Dasgupta and Sarkar\[15\] showed the usage of sanitary pads to be 40% and 32.2% respectively. Of the girls who used cloth pieces as absorbent 32(29.91%) stored the same with their routine clothes. 40(83.33%) girls dried the cloth outside the house in sunlight while 4(8.33%) dried it inside their houses. In another interventional study, reusing of cloth declined from 84.8% to 57.1% and among the reusers of cloth, the practices of washing it with soap and water and sun drying increased from 86.2% to 94.2% and 78.4% to 90.0% respectively.\[16\]

An unusual practice of burying used pads or cloths in the mud by 2(1.87%) girls was observed in our study. According to a study by Despannde,\[5\] 51.67% of the girls used proper disposal technique of wrapping the sanitary pad with paper and then throwing it into a dustbin as was followed by a majority of 76(71%) girls in our study while others 17(15.89%) burned it.

Only 24(22.43%) girls did not practice any restrictions while the remaining were subjected to one/multiple restrictions such as, not visiting temples during menses was seen in 83(77.57%) girls and not touching stored food was observed in 18(16.82%). A study in Delhi, India shows that 92% girls were restricted in religious and social activities.\[17\] Studies show a rather harsh situation for girls and women who are considered untouchable while menstruating and as a consequence
kept away from normal activities of life by not leaving the home, presumably missing work and school, or being unable to attend places of worship or to swim or exercise.

**Conclusion**

Overall knowledge regarding menstruation was comparatively less as compared to other studies carried out in various places. The usage of sanitary pads was lower than seen in other studies mainly due to lack of access and also cost efficiency. Hygiene practices to wash, dry and store the cloth, regularity of changing was poorer than seen in more developed parts of the country. Restrictions practiced during menstruation were not as widespread as in some other parts of the country but certain religious and social restrictions were imposed nonetheless.

There is an urgent need for spread of awareness regarding menstrual hygiene practices especially in the rural area as it can play a major contributory role in uplifting overall health of adolescent girls and women in the region.

**Conflict of Interest:** There are no conflicts of interest.

**Source of Funding:** Nil

**Ethical Clearance:** The study was approved by Ethical Committee of Krishna Institute of Medical Sciences ‘Deemed to be’ University, Karad, Maharashtra.

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Firmicutes – The Lesser Known Flora Playing Greater Roles in Periodontitis

Anitha Balaji1, K.Mahalakshmi2, Mohan Valiathan3, Krishna Prasanth4

1Professor, Department of Periodontics, 2Professor & HOD, Department of Microbiology, 3Professor, Department of Periodontics, 4Assistant Professor, Department of Epidemiology

Abstract

Background: In the complex issue of oral microbiome, the clear floral recipe for periodontitis is yet a unachieved milestone. Lesser known species are being associated with periodontal lesions. The role of Firmicutes is still not completely described.

Aim: To identify and explore the role of clinically significant Firmicutes in chronic and aggressive presentations of periodontal lesions.

Methodology: Subgingival plaque samples were isolated from six patients (three chronic and three aggressive lesions) and metagenomics was performed. Those Firmicutes that differed significantly were identified and discussed.

Conclusions: Firmicutes as thought earlier are not insignificant and have great potential in periodontal dysbiota. Molecular pathways have to be determined to aid in arriving at a floral recipe for periodontitis.

Keywords: Firmicutes, Metagenomics, Periodontitis

Introduction

Oral microbiome is a complex study issue, owing to its great and unpredictable diversity. Its variation has been uncharted till date and is impossible to do so. The oral cavity is predominated by two major infectious diseases viz., Caries and periodontitis, of which periodontal diseases dominate the human race. In case of periodontitis, associating a particular species to disease and attributing a causal relationship has always been a difficult problem. In the past, many researchers have tried to associate single species to periodontal pathology in vain.1 Subsequently, the concept of grouping bacteria for associating them to respective pathologic lesions was proposed and accepted, such as red complex bacteria and so on. As evidences began to grow, the rationale of such grouping is now questioned. This is due to introduction of newer methods to identify un-cultivable flora and possible relations to previously identified lesions.

Recent classification of periodontal diseases has attempted to eliminate these confusions around the etiology and management of such lesions. This classification is supported by ubiquitous presence of previously declared pathogens in all kinds of infectious periodontal lesions. As defined by Hill et al., (1965) the disparity between causal and casual relation is still a major issue in periodontal microbiology.2 Hence, etiology is now considered to be of polymicrobial synergism rather than keystone pathogen concept.3

Hence, rather that arriving at a causal relationship of a pathogen to disease, the contribution of the flora to dysbiota provides a picture of evolution of the microbial ecosystem. This will yield valuable information on stages of disease and prognosis. If there is a significant difference in the prevalence of a species in various manifestations of periodontitis, then detecting the levels of such species might predict not only the risk, but also the possible course of the disease. This can offer better control to the clinician in treating such patients.

However, the definition of pathologic dysbiota, which will give the actual floral recipe for periodontal disease, is not completely arrived at. This is a huge and complex problem, varying with ethnicity, diet and
other variations. Hence, it requires various investigators around the world to conduct studies and report it. For arriving at such results, metagenomics paves clear way to identify the microbiota in various samples. Firmicutes are a group of bacteria that are present in oral cavity in lesser numbers and have been known for long time. But their small numbers did not attract considerable attention of clinicians and researchers. But, recent improvements in metagenomics have paved way to elucidate the role of these flora. In this direction, this study is conducted to identify the contribution of Firmicutes group of bacteria in the various presentations of periodontitis.

**Materials and Method**

This study was conducted in Sree Balaji Dental College and Hospital, with approval of institutional human ethics committee and with informed consent of the subjects involved in the study. Samples of subgingival plaque were obtained from 6 periodontitis patients, who were grouped into chronic and aggressive presentations of the same disease. The samples were collected using absorbant paper tips and metagenomic analysis was conducted using standard protocol.

Of the bacterial species noted in every sample, difference in prevalence between group A and B was analysed using independent student t-test. Only those Firmicutes, which showed statistically significant difference in prevalence between the groups, were included in this analysis. Further, only those Firmicutes that showed prevalence above 10 (arbitrary value) were considered for discussion.

**Results and Discussion**

Out of 1,534 species found, only 40 species showed statistically significant difference in prevalence, of which 27 were Firmicutes. Of these species, only 7 bacteria showed prevalence above 10. Hence, their presence is discussed below.

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Group A (Chronic Presentation)</th>
<th>Group B (Aggressive Presentation)</th>
<th>P- Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finegoldia magna</td>
<td>2</td>
<td>11</td>
<td>0.0016</td>
</tr>
<tr>
<td>Mitsuokella multacida</td>
<td>22</td>
<td>5</td>
<td>0.0059</td>
</tr>
<tr>
<td>Megasphaera elsdenii</td>
<td>15</td>
<td>5</td>
<td>0.0130</td>
</tr>
<tr>
<td>Megasphaera micronuciformis</td>
<td>11</td>
<td>3</td>
<td>0.0136</td>
</tr>
<tr>
<td>Streptococcus parasanguinis</td>
<td>10</td>
<td>2</td>
<td>0.0149</td>
</tr>
<tr>
<td>Selenomonas ruminantium</td>
<td>91</td>
<td>38</td>
<td>0.0348</td>
</tr>
<tr>
<td>Parvimonas micra</td>
<td>20</td>
<td>87</td>
<td>0.0476</td>
</tr>
</tbody>
</table>

Finegoldia magna is a well-known pathogen in polymicrobial orthopedic and soft tissue infections. It is insensitive to common antibiotics and hence is a threat to periodontium. It is a common pathogen of bone infection and is frequently found after injury. These facts suggest that this bacteria may be an opportunistic pathogen exploiting the disintegrity of periodontium. Nevertheless, it can precipitate further damage and worsen the prognosis. Further, it is also associated with prosthetic joint infections. Implication of this fact in periodontology is still unclear, but, since periodontium is also related to implants and other reconstructive materials, it can be expected that this bacteria can play a major role. In this study it is seen that its count was higher in aggressive presentation of periodontitis.

Mitsuokella multacida has been seen as adjunct pathogen in lower respiratory tract infections. It is not much reported in systemic microbiology. But, as a pathogen, it can play a small but definitive role in periodontal disintegration. Further, it is not clear on how these bacteria enter the oral cavity. It may find its way from the respiratory tract or from gastric reflux. In this study, it shows higher presence in chronic presentation of
periodontitis. However, since its actual role is uncertain, in future, studies have focus on presence and molecular role this species in periodontium.

*Megasphaera elsdenii* is a known lactose fermenting ruminal bacteria present in cattle. Since its role in fermentation is known, one should foresee that it will make the environment acidic, favouring inflammation. This is contributory to progression of preexisting periodontal destruction. Its presence normal flora may be significant, but only after a destruction occurs, this shows its role. Further, it can be augmented by other lactose fermenting bacteria to worsen the prognosis. In this study, this bacteria was abundant in chronic presentation.

*Megasphaera micronuciformis* is seen in healthy individuals and is found to exhibit commensal lifestyle in the human oral cavity. It is reported to be reduced in pregnancy. Hence, its level in periodontium is influenced by numerous systemic factors. In this study, its level was found to be different in various presentations of periodontal diseases. This means that they take up an opportunistic role in the process and hence should be included in the “Recipe” for periodontal destruction. In this study, this bacterium was also abundant in chronic presentation.

*Streptococcus parasanguinis* is seen in periodontitis in association with *A. actinimycetemcomitans*. It is found in good concentrations before bone loss happens. Hence, its role in slow destruction of bone support can be explored in future. Its level in aggressive presentation was very less in this study. Though it cannot take up a “Keystone pathogen” status, it contributes significantly to slow and definitive destruction of periodontal apparatus.

*Selenomonas ruminantium* is a sugar fermenting bacteria found widely in cattle. Given its strictly anaerobic nature, its presence in periodontium implies that it the inflammation has progressed to a level, where the environment can provide strict anaerobic niche. Hence, more than its pathogenicity, its presence indicates worsened periodontal prognosis. In addition, its fermenting action will not only promote inflammation, but also signal other fermentors to take-up the niche. In current study, its presence is seen in chronic presentation of periodontitis.

Parvimonas micra is known to be associated with periodontitis. Though it is a commensal, it is frequently isolated in periodontal destruction. It is a known pathogen in other mixed anerobic infections like tonsillitis and endodontic abscess. That being said, its presence offers a negative shift to periodontal prognosis.

**Conclusion**

Irrespective of their presence in healthy individuals, their presence is significantly variable in chronic and aggressive presentations. In summary, these are known commensals in either human or animal ecosystems. Their role in pathogenesis seems to be opportunistic. Arora et al., have remarked that a lion’s share of literature is devoted to red complex bacteria, but little has been spoken about these minor, nevertheless significant groups of species. In future, metagenomic results have to be combined with biochemical pathways to aid periodontologists in arriving at a recipe of dysbiota.

**Conflict of Interest:** none.

**Ethical approval:** Ethics committee approval obtained from Sree Balaji Dental college & Hospital (SBDCH/IEC/08/2017/5)

**Funding:** Self funded

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Parents Perception on General Anaesthesia in Paediatric Dentistry: A Questionnaire Study

Anupama Nayak P1, Srikant N2, Karuna YM3, Kiran N Baliga4, Ashwin Rao5

1Assistant Professor, Department of Paedodontics and Preventive Dentistry, 2Professor and Head of the Department, Department of Oral Pathology and Microbiology, 3Assistant Professor, Department of Paedodontics and Preventive Dentistry, Manipal College of Dental Sciences, Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, India, 4Associate Professor, Department of Paediatrics, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, India, 5Associate Professor, Department of Paedodontics and Preventive Dentistry, Manipal College of Dental Sciences, Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, India

Abstract

Introduction: Managing an uncooperative child is the major issue in paediatric dentistry. In such cases general anaesthesia provides safe and effective dental treatment. Thus this study aims to elucidate the knowledge gaps and preconceived ideas that parent brings into a discussion with a paediatric dentist about GA through a questionnaire given to parents.

Material and Method: A 17- question questionnaire, administered to parents of children presenting for care in paediatric dental practices, collected demographic information, media exposure, and parental knowledge/opinions regarding GA procedures, and parental acceptance of treatment scenarios.

Results: Maximum respondents were not aware (56.3%) and only few were aware (43.7%) that dental treatments for children is sometimes carried out under GA; 68% of respondents think that GA is safe and 32% think it’s not safe; 52.5% respondent said GA and conscious sedation are not same, 24.1% said yes and 23.4% said they don’t know. Cross tabulations and Pearson’s chi-square statistics were used to examine relationships between categorical variables.

Conclusion: Previous GA experience in the family or child had improved parents knowledge on GA but education level of the parents had no influence. Father feels GA is safe. Parents are generally unaware of news coverage pertaining to GA use in Paediatric Dentistry.

Key-Words: General anaesthesia (GA), Paediatric dentistry, child, Questionnaire, Paediatrician.

Introduction

Many children due to lack of co-operation for dental treatment, their treatments are postponed and ultimately lead to severe pain and affects quality of both oral and general health. To avoid these undesirable consequences, behaviour management becomes an important part of the paediatric dental practice.1,2

Behaviour management of children in paediatric dental clinic, consist of two techniques- non pharmacological and pharmacological.3 While majority of the children can be treated with non-pharmacological techniques, treatment of few children with definitely negative behaviour demands pharmacological behaviour management techniques.4
General anaesthesia (GA) is one of the pharmacological behaviour management techniques and can be beneficial for paediatric patients who are unable to cooperate; experience ineffective local anaesthesia; are extremely fearful, anxious, or uncommunicative; requiring significant surgical procedures thus protecting them from psychological trauma and/or reducing medical risks; and requiring immediate, comprehensive oral care. The easy accessibility and availability of the internet sources, and the news allows parents to know all kinds of uncommon adverse events occurred during the course of a dental treatment under GA. Though these unwanted events do not always occur, it’s not unusual for parents to become anxious. Thus, proper communication and the ability to address the concerns/ misconceptions of the parent become an integral part of the informed consent process.

Thus, this study was conducted to elucidate the knowledge gaps and preconceived ideas that parent brings into a discussion with a paediatric dentist about GA through a questionnaire given to parents.

Materials and Method

This was a cohort questionnaire study initiated after approval from the institutional ethics committee with the protocol reference number 16124 and conducted on the outpatient in the Department of Paedodontic and Preventive Dentistry and to the outpatient of the paediatrician clinic at Mangalore.

398 samples were taken to achieve 80% power to detect a difference of 0.2 using a two-sided binomial test. The target significance level was 0.05. The actual significance level achieved by this test was 0.049.

Primary caregiver of the children who are indicated for the dental treatment under GA were included and respondents who could not speak and read English and incompletely filled questionnaire were excluded. Informed consent was obtained from Caregivers who met the above criteria.

The questionnaire was constructed both in English and Kannada (local language) and consisted of 17 pretested questions or statements. Basic socioeconomic and demographic information (age, education level, type of insurance) was collected along with past GA experience with categorical response types. Some of the questions allowed for a “yes” or “no” response.

Questions regarding media coverage of GA events asked parents if they had seen/ heard coverage of dental general anaesthesia and, if so, through which media and how this coverage would influence their decision. Few questions like reasons and advantages to undergo GA allowed multiple choices. Respondents were not given any information or knowledge regarding GA prior to the administration of the questionnaire.

The collected data were entered into a Microsoft Excel. Percentage statistics were calculated for all categorical variables by Cross tabulations and Pearson’s chi-square statistics.

Results

Out of 398 respondents, 316 (79.4%) were females and 82 (20.6%) were males. Among females, 0.8% were guardians and 77.9% were mothers. Among males, 19.8% were fathers and 1.5% were guardians. Level of education of the parents/ guardians showed that, 26.6% had studied up to 10th standard, 15.3% up to PUC, 47.5% up to degree/ diploma and 10.6% had obtained post-graduation. 29.9% of the respondents had previous experience and 70.1% had no previous GA experience. While more than half of the respondents had no insurance (69.3%), among the ones who had, the government/public and private insurance type were almost equally divided (13.3% and 17.3% respectively).

When parents were evaluated to know their awareness on GA, maximum respondents were not aware (56.3%) and only few were aware (43.7%). When awareness of the parents regarding needs of the child to be on empty stomach before GA was assessed, majority of them were not aware (54%) and few had known about this (46%). When respondents were asked if GA and conscious sedation are the same, maximum respondent said no (52.5), few said yes (24.1) and some said they don’t know (23.4%). When previous experience of any treatment done under GA was co related with their awareness about the GA as an option for dental treatments of uncooperative children, there was a statistically significant association (p=0.048). When association of the same was assessed with their knowledge on GA and conscious sedation, respondents with previous experience said that they are not same with a statistically significant (p= 0.01). (Table 1)
Table 1: Knowledge gap of respondents on GA use for Paediatric dental treatments

<table>
<thead>
<tr>
<th>Education of the respondents</th>
<th>Have you got any previous experience of treatment under GA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 10th standard</td>
<td>Upto PUC</td>
</tr>
<tr>
<td>Are you aware of the dental treatments for children is sometimes carried out under GA</td>
<td>N</td>
</tr>
<tr>
<td>Yes</td>
<td>36</td>
</tr>
<tr>
<td>No</td>
<td>70</td>
</tr>
</tbody>
</table>

Chi square value of 5.925 and p value of 0.115

Chi square value of 3.924 and p value of 0.048

| Are you aware that child needs to be on empty stomach before General Anesthesia? | Yes | 34 | 42.5 | 24 | 44.4 | 82 | 44.3 | 26 | 61.9 | 49 | 43.0 | 117 | 47.4 |
| No | 46 | 57.5 | 30 | 55.6 | 103 | 55.7 | 16 | 38.1 | 65 | 57.0 | 130 | 52.6 |

Chi square value of 4.934 and p value of 0.177

Chi square value of 0.604 and p value of 0.437

| General anesthesia and conscious sedation are the same | Yes | 24 | 31.6 | 14 | 34.1 | 46 | 29.1 | 12 | 30.0 | 43 | 40.2 | 53 | 25.5 |
| No | 52 | 68.4 | 25 | 61.0 | 106 | 67.1 | 26 | 65.0 | 59 | 55.1 | 150 | 72.1 |
| Don’t know | 0 | 0.0 | 2 | 4.9 | 6 | 3.8 | 2 | 5.0 | 5 | 4.7 | 5 | 2.4 |

Chi square value of 3.963 and p value of 0.682

Chi square value of 9.228 and p value of 0.010

When parents were asked about preconceived ideas on GA use for children dental treatment, 68% of respondents said GA is safe and majority of them were either fathers (72.2%) or mothers (67.5%). On the other hand among those who felt GA to be unsafe, majority of them were guardians (77.3%).

Only 25% of respondents had seen negative episodes in news coverage from television and/or internet. However, news exposure did not influence the likelihood of choosing GA as a treatment modality. When this was co-related with the education level of the respondents, there were no differences seen but when co-related with respondents relation to the child, it was seen that fathers were less likely to undergo GA (48.8%). This correlation was seen to be statistically significant (p=0.03). (Table 2)
Table 2: Influence of media on parental attitude towards GA use in Paediatric dentistry

<table>
<thead>
<tr>
<th>Relation to the child</th>
<th>Education</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aunt</td>
<td>Father</td>
<td>Guardian</td>
<td>Mother</td>
<td>Upto 10th standard</td>
<td>Upto puc</td>
<td>Degree/ diplaid</td>
<td>Post-graduation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>N%</td>
<td>N</td>
<td>N%</td>
<td>N</td>
<td>N%</td>
<td>N%</td>
<td>N%</td>
<td>N%</td>
<td>N%</td>
<td>N%</td>
<td>N%</td>
</tr>
<tr>
<td>On television</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>35.5</td>
<td>0</td>
<td>0</td>
<td>31</td>
<td>21.7</td>
<td>13</td>
<td>33.3</td>
<td>5</td>
</tr>
<tr>
<td>On the internet</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>16.1</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>7.7</td>
<td>2</td>
<td>5.1</td>
<td>0</td>
</tr>
<tr>
<td>On television and internet</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>9.7</td>
<td>0</td>
<td>0</td>
<td>29</td>
<td>20.3</td>
<td>7</td>
<td>17.9</td>
<td>8</td>
</tr>
<tr>
<td>No coverage seen</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>38.7</td>
<td>3</td>
<td>100</td>
<td>72</td>
<td>50.3</td>
<td>17</td>
<td>43.6</td>
<td>13</td>
</tr>
</tbody>
</table>

Chi square value of 9.496 and p value of 0.148
Chi square value of 19.120 and p value of 0.024

Because of the news coverage I have seen, I would be:

<table>
<thead>
<tr>
<th></th>
<th>Less likely</th>
<th>More likely</th>
<th>Unchanged in my decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>N%</td>
<td>0.0</td>
<td>0.0</td>
<td>100</td>
</tr>
<tr>
<td>On television</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>On the internet</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>On television and internet</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>No coverage seen</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

Chi square value of 13.937 and p value of 0.030
Chi square value of 6.819 and p value of 0.338

When parents were asked about their opinion regarding justification on the need for undergoing dental treatment under GA in paediatric dentistry, out of 398 parents, 140 of them responded that, GA for dental emergency in uncooperative child, like severe pain or swellings justified. Others reported GA is justified in children having recurring pain in an unco-operative child ultimately resulting missing school hours, special children, children having extensive treatment requiring multiple visits and in very young children less than 2 years. (GRAPH 1)
However when respondents were asked about advantages, 67.8% did not agree that under GA all dental procedures can be done in a single visit, 53% of the respondents disagreed GA increases patient comfort level. On the whole, Majority of the respondents (85.1%) agreed that GA is justified. (GRAPH 2)

When it came to convincing parents on subjecting their child for treatment under GA, it was seen that paediatrician had major role (57%), followed by dentist (32%) and least by other parents who had previously experienced GA (11%). 64.9% respondents preferred day care anaesthesia and 35.1% preferred GA after administration.

Discussion

The relationship between the child–parent–dentist is very important in paediatric dentistry. Parents play an important role in deciding treatment choices, for their child and also the methods of delivering it. Hence, recognizing the acceptable treatment techniques to the parents is critical for a paediatric dentist. In spite of the availability of multiple efficient behavioural management options, there exists a need to carry out the treatment under GA for a small group of children.

Modern parents are willing to abdicate disciplinary actions and opt for pharmacological techniques. Parental acceptance is impressively increased for pharmacological behaviour management techniques and similar result was seen in a study conducted in Kuwait by Muhammad S et al.

The result in our study showed that maximum respondents were not aware and very few respondents had awareness that dental treatments for children are sometimes carried out under GA and also level of education of the respondents had no influence on the awareness of the respondents. This is in contrast to the findings of the study conducted in Kuwait by Alkandari et al., where, parental education had a significant direct association with their acceptance of nitrous oxide sedation technique.

The knowledge on GA is not constant and needs to be updated. Nonetheless, media also influences parental views on dental care as doe’s internet. Eaton et al., proposed that an increased exposure to GA on television could be contributing to the increase in acceptability toward GA and conscious sedation. However, results of our study showed that maximum respondents had not seen or were not exposed to news coverage. Present study showed that previous GA experience by respondents on themselves or on child improved their knowledge.

In the present study, it was also seen that parents were more convinced for getting treatment under GA when paediatricians told them. The reason for the same could be that, Paediatricians are the primary care providers who usually see children during the first 3 years of life. Paediatricians help the children and their families during challenging and stressful times like when a child is unwell. Thus, the parents are comfortable
and confident that the paediatrician will identify and treat conditions appropriately that affect their children. Parents also tend to share a bond of trust with their paediatricians’ guidance and referral tooth sources of improving the health and parents view paediatricians as respected advisors and counsellors.

The limitation of this study was that few questions did not include details, such as; “How long ago did your child experience GA?” “Did your child have all of his/her dental needs completed?” “Did your child receive local anaesthesia?” Hence, a positive response to previous experience did not guarantee that participants underwent a homogenous experience. Thus, in future probably a focus group discussion with the parents on their knowledge and perceptions about their children undergoing dental treatment under GA would be more appropriate.

**Conclusion**

Parents were not aware that the dental treatments for children is sometimes carried out under GA. Previous GA experience in the family or child had improved parents knowledge on use of GA in Paediatric Dentistry. Education level of the parents had no influence on their knowledge on GA. Parents, mainly father feels GA is safe. Parents are generally unaware of news coverage pertaining to unwanted events occurred during use of GA in Paediatric Dentistry.

**Conflict of Interest:** Nil.

**Source of Funding:** Self.

**Ethical Clearance:** Obtained.

**References**


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Correlation Between Autistic Endophenotypes and Associated Risk Factors

Chandrakala E1, Nagaraj K1

1Molecular Genetics Laboratory, Department of Applied Zoology, Kuvempu University, Jnana Sahyadri, Shankaraghatta, Shivamogga, Karnataka, India

Abstract

Background: Autism is a neurodevelopmental disorder, it is a widely diagnosed in nowadays all worldwide. In India, its prevalence is not precisely known and research on autism has not been reported in central Karnataka region, India. Moreover, correlation between autistic endophenotypes has not been reported earlier. Hence, this made us take a step towards this work.

Aims: To analyse the correlation between autistic endophenotypes, and to assess the teaching and caretaking/treatment methods adopted for autistic children in this region.

Method: Autistic children were identified by using questionnaires and interview was carried out personally with parents/caretakers. The data was analyzed for correlation of autistic endophenotypes. Endophenotypic impairment varies among autistic patients, and it is classified into seven groups. SPSS-21 was used for statistical analysis.

Results and Conclusion: 43 autistic patients were identified from 532 developmentally challenged children, and categorised into seven groups. This data reveals that incidence of autism is three times more in males. Special teaching and individual caring for autistic patients has been found to be implemented to overcome the autistic symptoms.

Keywords: Autism, associated risk factors, treatment programs, and correlation of endophenotypes.

Introduction

Autism is the neurodevelopmental disorder and the symptoms of this disorder can occur in any combination with varying degrees of severity, and affect three distinct areas of child life; a) Social interaction, b) Communication (both verbal and non-verbal), and c) Behaviours and interests[1]. Autistic children pay out their time-bound in puzzling and disturbing behaviours that are obviously different from those of typically developed children. These behaviours make them to pursue some repetitive activities with no apparent purpose and do not like to mingle with other people even also with their parents. Autism affects children differently and different children can meet different combinations of diagnostic criteria. It manifests in the first few years of life usually around three to four years[2,3] and occurs three to four times more in males than that of females[4,5]. The prevalence of autism has increased noticeably in recent years and the earlier investigations reveal a drastic increase in the incidence of autism[6,7]. Although autism is prevalent in all over the world, there is no prominent study reported in India.

Corresponding Author:
Dr. Nagaraj K.
Professor, Molecular Genetics Laboratory, Department of Applied Zoology, Kuvempu University, Jnana Sahyadri, Shankaraghatta, Shivamogga, Karnataka, India-577451.
E-mail: knagarajv@gmail.com
Mobile: +91 9620485338
Caring an autistic child is different from caring a normal child. Autistic children require special and individual care[9], and cannot be normalized completely, but the symptoms can be overcome by various therapies as the age rolls on. The family and caretaker play a crucial role to minimize the severity of autism. In Indian scenario, many of the parents don’t keep their mentally challenged children with them in home, so they admit those children to the special schools. Our study describes the Correlation between autistic endophenotypes, age and gender. The present study also reveals the caretaking or treatment programs adopted by family and caretakers to overcome the autistic features.

Material and Method

Diagnosis and identification of autistic children: Participants were selected from some special schools of few places of Central Karnataka region, India. A total of 532 mentally challenged individuals were examined for autism. Autistic patients were diagnosed by following Diagnostic and Statistical Manual of mental disorder-IV (DSM-IV) criteria. According to this criterion questionnaires were prepared and detailed interview was carried out personally with parents/caretakers of the patients with the help of doctors.

Endophenotypes: The collected data of participants were analysed and categorised. Autistic endophenotypes were grouped into seven different groups on the basis of affected region such as motor, behaviour, physical/medical, sensory, social interaction and speech (Table-1).

Associated risk factors: As there are lot of risk factors involved in autism, the present study also accomplished for associated risk factors. During interview, parents/caretakers were asked for all kinds of incidence taken place during their developmental stage. Autistic children’s medical certificate was verified for associated diseases.

Caretaking: Parents/caretakers and management of special schools were interviewed for kind of caretaking methods they have adopted and its significance. Different kinds of methods were followed by different schools. Parents/caretakers were inspected in this aspect to check the method which is more effective to overcome the autism.

Data analysis: Statistically data was analysed using Statistical Package for the Social Sciences (SPSS) version 21, to examine the relationship between endophenotypic features, age and gender.

Results

Total 532 mentally challenged children were examined and 43 were diagnosed as autistic. In 43 autistic children, 76.74% (33) of them are males and remaining 23.25% (10) are females. This reveals that males are utmost affected than females (Fig.1).

Endophenotypes

In the present study, we found variation in the expression of autistic endophenotypes, which were different from one individual to another. Table-1 represents the categorization of different endophenotypic groups based on features such as motor, behaviour, physical/medical, sensory, social interaction and speech. This categorization was made on the basis of impairments of endophenotypic features, and individuals are represented in table-1. Majority of the autistic children were belonged to the group-1 and followed by group-3, 4,2,5,6,7. This proves that autism shows dreadful impairment in the development of a person.

Age of the patients during the study

In all cases, autism was onset in early infancy. During the study, age of the patients was considered and categorized into seven groups, such as 1-5, 6-10, 11-15, 16-20, 21-25, 26-30, and 31-35 years (Fig.2). Among these 11–15 years were predominant and there were no evident in the group of 26-30 years.

Relationship between endophenotypic features, age, and gender

In the present study population, among all endophenotypes, autistic children with speech and language are found to be in the higher degree of impairments. In some cases, the autistic children showed complete mutism. Motor, behaviour and physical/medical endophenotypes were found to be high in the age group of 0-5 years, followed by sensory, and social is moderate in all the age groups (Fig.3). The level of impairments is represented in terms of scoring (1-Not affected; 2-Less affected; 3-Moderately affected and 4-Severely affected).

The relationship between age, gender, and endophenotypic features was analysed by Pearson
correlation (SPSS version 21). There is a strong positive correlation between behaviour and sensory (P < 0.01), social and sensory (P < 0.001), social and speech (P < 0.01), motor and physical (P < 0.05), behaviour and physical (P < 0.05). It suggests that when the impairment in behaviour is increased sensory impairment also increases. However, there is a significant negative correlation between age and motor in which, age and the motor is indirectly proportional to each other (P < 0.05), i.e., in the higher age group motor impairment is less when compared to lower age group. As the age increases autistic children improve in functioning due to treatment and therapies. Further, it is revealed that there is no correlation between gender and any specific endophenotype group (Table-2).

Risk factors associated with autism

This present study reveals different kinds of factors associated with autism. There are both genetic as well as environmental factors. 19 children showed to have been associated with the other monogenic conditions, which are in the proportion of 14 children with epilepsy, one with epilepsy and ADHD, one with epilepsy and physically challenged, two with downs syndrome and 1 with physically challenged.

Consanguineous marriages were identified in parents of seven autistic children. In addition, there are some factors which influence the foetal development including both prenatal and postnatal condition. In one of the cases of the present study mother was found to have mental stress during gestation, and in two other cases, severe maternal ill-health was found to be reported. Maternal age is also one of the colossal factors. In one case, maternal age was 35 years and in another it was 40 years. One of the mother had attempted to have abortion during gestation, and the drug taken to abort the foetus might have caused the child to develop autism. In addition, the time of parturition also influences the risk factor. In this aspect three preterm births and one post-term birth were found. As a postnatal factor, in two cases the child with brain fever was reported after a few days of birth. All of these suggest that environmental factors play a huge role in the cause of autism.

Treatment programs

In the present study, two forms of teaching namely, creative teaching and regular teaching have been found to be implemented in special schools of study region. Creative form of teaching involves use of objects, pictures painted on the walls of classrooms, charts, toys, puzzles of alphabets and numbers etc. to improve the cognition. Some of the schools have implemented special and individual caring for autistic children. These schools have implemented Mental retardation Development Program System (MDPS) for the improvement of autistic children. In the MDPS they train the children step wise manner making them to lead life comfortably. By this system the autistic children develop self-help skill. Depending on IQ, teachers train the children about self-life improvement. For instance, they train the children for working in book-binding shop, stitching cloths etc. In addition to teaching adaptations and caring methodologies implemented, some of the important therapeutic measures have been found to be adopted. In these schools they have adopted some sort of exercise, physical therapy, speech therapy, dance, playing activities to improve the motor and speech impairments of children. They examine each child’s skills and depending on IQ, percentage affected they edify each child.
Table 1: Classification of autistic children based on endophenotypes.

<table>
<thead>
<tr>
<th>Group No</th>
<th>Endophenotypes diagnosed</th>
<th>Impairments absent in the group</th>
<th>No. of cases</th>
<th>Male/Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Motor Behaviour Physical/Medical Sensory Social Speech</td>
<td>Nil</td>
<td>35</td>
<td>28 M 7 F</td>
</tr>
<tr>
<td>2</td>
<td>Motor Physical/Medical Sensory Social Speech</td>
<td>Behaviour</td>
<td>01</td>
<td>M</td>
</tr>
<tr>
<td>3</td>
<td>Motor Behaviour Physical/Medical Sensory Social Speech</td>
<td>Social</td>
<td>02</td>
<td>M</td>
</tr>
<tr>
<td>4</td>
<td>Behaviour Physical/Medical Sensory Social Speech</td>
<td>Motor</td>
<td>02</td>
<td>M</td>
</tr>
<tr>
<td>5</td>
<td>Motor Physical/Medical Social Speech</td>
<td>Behaviour Sensory</td>
<td>01</td>
<td>F</td>
</tr>
<tr>
<td>6</td>
<td>Motor Behaviour Physical/Medical Speech</td>
<td>Sensory Social</td>
<td>01</td>
<td>F</td>
</tr>
<tr>
<td>7</td>
<td>Physical/Medical Social Speech</td>
<td>Motor Behaviour Sensory</td>
<td>01</td>
<td>F</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>43</td>
<td></td>
</tr>
</tbody>
</table>
The results presented here are based on study carried out in special schools. Data reveals that autism was observed in 8.08% of the studied group. We have identified 76.74% of autistic males and only 23.25% of females, indicating that males are 3 times at higher risk to autism which is correlated with the earlier reports [4,5,9,10,11].

Statistical analysis reveals both positive and negative significance between the endophenotypes.

Discussion

The results presented here are based on study carried out in special schools. Data reveals that autism was observed in 8.08% of the studied group. We have identified 76.74% of autistic males and only 23.25% of females, indicating that males are 3 times at higher risk to autism which is correlated with the earlier reports [4,5,9,10,11].

Statistical analysis reveals both positive and negative significance between the endophenotypes.
In the present study, the age of onset was found to be at early infancy which is within three to four years of life and this is in congruence with the earlier studies\textsuperscript{[2]}.

As the age increases, the impairment of motor was decreased, whereas in speech and language impairment was more with increase in age. Correlation between age and motor showed negative significance at $P < 0.05$ level which represents impairment of motor was subordinate in higher age group. A strong positive association was found between behaviour and sensory, social and sensory, speech and social at $P < 0.01$ level, which follows motor and physical, behaviour and physical at $P < 0.05$ level. However, awful impairments were seen in speech and language when compared to other endophenotypic features, which clearly indicates as one of the defining features of autism.

Earlier research has revealed that causes of autism may be due to genetics or environmental factor\textsuperscript{[2,12]}. An environmental factor includes exposure to alcohol or medications such as sodium valproate during pregnancy, premature birth, gestational age, maternal illness, etc\textsuperscript{[13]}.

There is no permanent cure for autism. But significant improvements can be made in several aspects of the lives of autistic children, especially in social interaction, behavior, physical activities etc. All teachers in special schools are specially trained for taking care of disabled children. In some schools separate classroom for children was setup based on severity, and each class will be monitored by individual teachers. In order to avoid the loneliness and make autistic children active, caretakers pay special attention towards them. This was very effective and is clearly evidenced in one of the autistic child who was severely affected in the beginning stage, but in the later years he was recovered so that he could perceive and live better.

One particular school has followed the method of MDPS, in which they teach self-help skills for 6-16 years old children. Teachers edify the children stepwise like custodial, trainable and educable steps. In custodial step, they first take the child into their control, and trainable step includes self-help skills like taking food, wearing dress, toilet training etc. In educable step they provide education according to child’s perception. To reduce the child’s hyperactivity and to improve the concentration, child will be kept engaged in different activities such as arranging beads to join them in the thread, arranging puzzles, playing with them, etc. They teach only for 10-15 minutes, after that they allow the children to be free and again teach other topics for 15 minutes.

**Conclusion**

The present study has revealed the both positive and negative correlation between endophenotypes, age and gender. There are many associated risk factors for autism. Not only etiology of autism, but understanding the clinical manifestation of other associated disorders helps to treat the autistic children. Early identification of autism, proper caring and treatment help the autistic children to cope up with autism and to live a comfortable life.

**Conflict of Interest:** We declare that we have no competing interests.

**Funding Source:** We are thankful to Science and Engineering Research Board, Department of Science and Technology (DST- SERB), Government of India, New Delhi for supporting financially.

**Ethical Clearance:** The present study was approved by an Institutional Ethical Committee of the University (registration number KU/IEC/05-10/2014-15) and Shivamogga Institute of Medical Sciences (SIMS), Shivamogga, Karnataka.

**Acknowledgement:** We are grateful to all the study participants (autistic children), their parents and caretakers. We also thank Doctors and Management of special schools. We are also thankful to the Kuvempu University for providing the facilities.

**References**


Femoral Tunnel and Lateral Femoral Condyle Measurements in Anterior Cruciate Ligament Reconstruction

Divya Sethi¹, Surendra U Kamath²
¹Final MBBS Student, ²Professor and Head, Department of Orthopaedics, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, India

Abstract

Anterior Cruciate Ligament footprint size is normally correlated with the height and area of the lateral wall of femoral inter condylar notch. Pre-operative anthropometric parameters are also helpful in predicting length and thickness of quadrupled hamstring graft for reconstruction in adults.

In our study, aim was to determine the average length of a femoral tunnel along with lateral femoral condyle measurement and to correlate this with patient gender, height and Body Mass Index. Also, another aim was to measure the value of some anthropometric measurements to predict the length of hamstring graft diameter before surgery.

A total of 91 patients were analysed during the study period. The length of Femoral Tunnel varied from 29 mm to 41 mm (Range 12 mm). The mean length is 35.08 mm, with a Standard Deviation of 2.557 mm. This is a low standard deviation which implies that the length of femoral tunnel would generally be close to the mean value of 40.08 mm. The Lateral Femoral Condyle measurements vary from 35 mm to 67 mm (Range 32 mm). The mean value is 43.22 mm with a Standard Deviation of 4.002 mm. The Hamstring graft diameter varies from 6 mm to 10 mm (Range 5 mm). The mean is 7.86 mm with a Standard Deviation of 0.811 mm. This is a very low standard deviation indicating that the in most cases the Hamstring Graft Diameter is likely to be close to the mean value of 7.86 mm.

Keywords: Anterior Cruciate Ligament Reconstruction, Femoral Tunnel, Hamstring Graft Diameter, Lateral Femoral Condyle Measurements

Introduction

Surgical treatment with reconstruction has now become common in management of Anterior Cruciate Ligament injuries. The main aim in this surgery is to reproduce the normal kinematics of the knee and provide stability in the sagittal and coronal plane. There is better patient satisfaction associated with better stability and kinematics.

In most cases, the surgical technique is still a matter of preference of the surgeon. In the last few years, the most important innovation is to create the femoral tunnel through the antero medial portal. This technique allows an independent creation of the femoral tunnel and a more anatomic placement. The available studies on this subject have analysed the tunnel length with respect to knee flexion during femoral tunnel drilling or axial angle of guide wire. However, there is no study objectively analysing the three dimensional relationship between tunnel orientation and length.

ACL footprint size is normally correlated with the height and areas of the lateral wall of femoral inter condylar notch. Pre-operative anthropometric parameters are also helpful in predicting length and thickness of quadrupled hamstring graft for reconstruction in adults. Studies have also been conducted to determine...
the average length of a femoral tunnel created using a medial portal technique and to correlate this with patient gender, height and Body mass index\textsuperscript{3,4}.

In our study, aim was to determine the average length of a femoral tunnel created using a medial portal technique and to correlate this with patient gender, height and Body mass index. Also, another aim was to measure the value of some anthropometric measurements to predict the length of hamstring graft diameter before surgery.

**Patients and Method**

Between July 2016 and December 2016, a total of 91 patients, including 68 male and 23 female Indian patients, who underwent ACL reconstruction by a single surgeon using the hamstrings tendon auto graft, were studied. All those patients who were not willing to participate in the study and patients with associated major ligament injuries were excluded from the study.

The length of femoral tunnel was measured during the surgery. Other clinical information was collected including gender, age, body mass index, method of tibial fixation and so on. Lateral femoral condyle length measured on a standardized radiograph of knee. A standard arthroscopic antero lateral portal and a far medial portal were used. A spinal needle number 18 was used to identify the position of the far medial portal from where visualisation of the Anterior Cruciate Ligament footprint was optimal. Delineation of the anatomic landmarks of the lateral condylar ridge and bifurcate ridge was facilitated by electrothermal ablation. With the knee in maximal hyperflexion, a guide pin was introduced into the femur and a 4.5 mm cannulated drill bit was used to create the femoral tunnel. The femoral tunnel length was measured with a depth gauge. The femoral tunnel was then reamed with a femoral reamer.

All data was entered into the computerized relational database to analyze and compare using correlation analysis. Correlations of femoral tunnel length with gender, body height, and Body Mass Index were determined. Femoral tunnel lengths were compared using the 2-sided independent t-test. A p value of <0.05 was considered statistically significant. Analysis of Variance (ANOVA) was used to compare means between 3 or more groups. This test for homogeneity of variance provides an F-statistic and a significance value (p-value). We are primarily concerned with the significance value – if it is greater than 0.05 (i.e., p > .05), our group variances can be treated as equal. However, if p < 0.05, we have unequal variances and we have violated the assumption of homogeneity of variances.

**Results**

A total of 91 patients were analysed who had undergone surgery for ACL Reconstruction in the study period. Out of these, 68 were males (74.7%) and 23 females (25.3%). Also, injuries to the right knee were 53 (58.2%) and to the left knee were 38 (41.8%). Maximum injuries were sustained in road traffic accidents (37 patients) followed by fall and twisting injuries.

The length of femoral tunnel varies from 29 mm to 41 mm (Range 12 mm). The mean length is 35.08 mm, with a Standard Deviation of 2.557 mm. This is a low standard deviation which implies that the length of femoral tunnel would generally be close to the mean value of 40.08 mm. The Lateral femoral condyle measurements vary from 35 mm to 67 mm (Range 32 mm). The mean value is 43.22 mm with a Standard Deviation of 4.002 mm. The Hamstring graft (semitendinosus) diameter varies from 6 mm to 10 mm (Range 5 mm). The mean is 7.86 mm with a Standard Deviation of 0.811 mm. This is a very low standard deviation indicating that the in most cases the Hamstring Graft Diameter is likely to be close to the mean value of 7.86 mm (Table 1)

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ANOVA: In this case the Significance Value was 0.169 which is greater than 0.05, which implies that the group variances (male / female, Right knee / left knee, modes of injury), will be equal and hence a reasonably accurate estimation of Femoral Tunnel And Lateral Femoral Condyle Measurements can be made based on the above group data.

Discussion

Major injuries of the ligamentous structures of the knee joint are being increasingly reported. Advances in imaging modalities and arthroscopy have contributed to better understanding of the derangement patterns and in diagnosis of associated intra articular injuries. Surgical treatment with reconstruction has now become gold standard in management of Anterior Cruciate Ligament injury. Young active individuals should be offered early surgical intervention to minimize the progressive damage to intra articular structures and prevent arthrosis.

In a study by Wang et al, the incidence and extent of bone tunnel expansion in arthroscopic ACL reconstruction with hamstring tendon autograft are more significant in femoral tunnel than in tibial tunnel. Bone tunnel expansion is correlated to patients’ age, height, BMI and location of the tunnel. The main factors related to bone tunnel expansion are the location and angle of the tunnel.

Body height positively correlates with femoral tunnel length. As height varies in different races so should femoral tunnel length. Preoperative assessment of femoral tunnel length can determine the success of Anterior Cruciate Ligament reconstruction with femoral fixation by endobutton.

The graft length within the tunnel should be at least 15 mm with a 10- or 15-mm endobutton loop, the femoral tunnel length should be at least 25 mm or 30 mm, respectively. If the femoral tunnel length falls short of the sum of the graft length in the tunnel and the endobutton loop length, the graft can be fixed with a tight rope.

van Eck and others did arthroscopic evaluation which included establishing a classification for notch shapes, identifying the shape frequency, measuring notch dimensions, and determining correlation between notch shape, notch dimensions, and demographic patient data.

In a cadaveric study by van Zyl R assessed that individual’s Femoral Epicondylar Width can be used to predict Anterior Cruciate Ligament length preoperatively. These results could improve pre-operative planning of Anterior Cruciate Ligament reconstruction.

Our study determines the relationship between height and area of lateral wall of inter condylar notch and native Anterior Cruciate Ligament size prior to surgery. Also, it has showed that anthropometric parameters can serve as a guide to plan hamstring graft diameter and length before reconstruction. Patient height may be a useful clinical tool to indicate the potential for a short femoral tunnel. The statistical data has brought out clearly that the variances in the mean for different groups would tend to be equal, thus enabling a reasonable estimation of Length of Femoral Tunnel and Hamstring Graft Diameter, prior to surgery.

Conclusion

Anthropometric parameters, especially height and thigh length, can serve as a guide to plan hamstring graft diameter and length before ACL reconstruction. Also, it has been well established that patient parameters like height, gender, age and demographic pattern can assist in
ascertaining the length of femoral tunnel before surgery.

Acknowledgement: Manipal Academy of Higher Education, Manipal, Kasturba Medical College, Mangalore and its Department of Orthopaedics for offering this opportunity to conduct this research.

Patients Declaration Statement

“The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.”

Conflict of Interest – Nil

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Ethical Clearance – Taken from Institutional Ethics Committee

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Avocado Consumption and Immune Response: A Review on Ethiopian Context

Dhar Gargi

1 Assistant Professor, Department of Reproductive Health and Nutrition, Wolaita Sodo University, Ethiopia,
2 Academic Counsellor, IGNOU, India

Abstract

This article is talking about avocado in terms of varieties, nutritional fact, scientific evidences of immune response of avocado and its nutrients with special emphasis on Ethiopian situation. According to the United States Department of Agriculture National Nutrient Database; avocados contain carbohydrate, protein, mono-unsaturated fatty acids, dietary fiber, minerals and vitamins. Early published literature showed that avocado can boost up immune systems, having antioxidant and anti-inflammatory potency. Avocados are available throughout the year in Ethiopia, but price, quality and accessibility may vary. Ethiopians, irrespective of age, sex and social class are fond of eating avocados. Based on Institute for Health Metrics and Evaluation, USA data; immuno-deficiency diseases have been enlisted within the top five leading causes of death in Ethiopia, 2017. Malnutrition and dietary practice have been identified within top five mortality related behavioural risk list. Considering this information, Ethiopia has to search any low cost food based dietary approach, which can support to handle immunity mediated disease burden with the limited resources and health service implementation challenges. In this respect, avocado can be considered for its nutritional value and It’s availability, accessibility and affordability issue. Unfortunately, there is no published data available related to avocado consumption and health benefits specially immune response in Ethiopian context. Along with in depth research on nutritional characteristics of avocado; exploration and attention are required on avocado farming and processing technology, awareness creation on “what-when-how” to consume food and multi-sectoral coordination between Government, Non-Governmental organisation and other stakeholders.

Keywords: Avocado, Immune response, Ethiopia

Introduction

The avocado (Persea americana) is a tree, are cultivated in tropical and Mediterranean climates throughout the world but long thought to have originated in South Central Mexico. It is often called “alligator pear,” as it tends to be pear-shaped and has green, bumpy skin like an alligator. Based on Food and Agriculture Organization of United Nations Database of avocado production in 2016-2017, top five producers are Mexico, Dominican Republic, Peru, Indonesia and Colombia. Ethiopia stands at 20th position in terms of production [1]. According to United States Department of Agriculture (USDA) nutrient database, a typical serving of avocado (100 g) is moderate to rich in carbohydrate, protein, mono-unsaturated fatty acids, dietary fiber, minerals and vitamins, phytochemicals (carotenoids, phytosterols etc) [2]. It is well documented by the researchers that incorporating avocado into daily diet can strengthen immune system, lower cholesterol, reduce risk of heart disease and help to manage weight, skin health, cancer, eye health, osteoarthritis [3].

According to Institute for Health Metrics and Evaluation, USA; the top five leading causes of death in Ethiopia (2017) are Neonatal disorders; Diarrhoeal diseases; Lower respiratory infection; Tuberculosis; Ischaemic heart disease; mostly body immunity response...
related diseases. Among the identified mortality related behavioural risk; malnutrition and dietary practice are within top five list [4]. Considering this information, Ethiopia has to think about any low cost food based dietary approach, which can support existing double burden of disease in long run. In this regard, avocado is an unique in terms of nutritional value and already been accepted in Ethiopian diet. Moreover, it is available, accessible and affordable almost all over the country throughout the year. Unfortunately, there is no published information available related to avocado consumption and health benefits specially immune response in Ethiopian context. Along with researchers, policy makers also did not pay more attention on organized and improved avocado farming, processing and marketing in the country.

This article is going to highlight on avocado varieties, nutritional fact, scientific evidences of immune response of avocado and its nutrients with special emphasis on Ethiopian situation. The information and analysis of this review may guide the country to combat disease burden even with the limited resources and health service implementation challenges.

Cultivation of Different Varieties of Avocado in Ethiopia

Avocado was first introduced to Ethiopia in 1938 by private orchardists in Hirna and Wondo-genet and production gradually spread into the countryside where the crop was adapted to different agro-ecologies [5]. The first governmental orchards were formed at Tepi and Gera, bypass of the Great Rift Valley by the year 1979. To date, the avocado commands 75 percent of the total fruit acreage in these areas. Principally, Hass (clean texture, and deep purple skin upon ripening), the most important avocado variety in the southwest part of Ethiopia; season May to October. It is characterized by a darkish purple hue and has a sumptuous flavour that belies its smooth external skin. Next is Fuerte (nutty flavour, notably creamy texture, and maintains green colour while ripening), which is also available between May and October. The other variety is Ettinger (green smooth-skinned), which looks exactly like Fuerte, only that it is available for April to August. Nabal (exceptionally creamy flesh and a gentle coconut flavour), is not easy to spot in many orchards, is accessible between May and October. The only variety that is outside the prime season is Pinkerton, visually closest to Hass. It bears a simple fruit with plenty of pulp and tiny stone. It is available between December to April. So in Ethiopia, avocados are available throughout the year ignoring the varieties. Avocado farming till not yet fully organised in most part of Ethiopia, mostly small-scale production, somewhere as a house-plant, some where it is cultivated alongside other crops, including tea/coffee [6].

Nutritional Facts of Avocado

Amount of nutrients present in 100gm of raw avocado has been compared from two sources: one from USDA Database [2] and another from Ethiopian Food Composition Table [7]. Nutrients like protein, carbohydrate, dietary fibre, fat, energy, calcium, iron, phosphorus, Vitamin C, thiamine, riboflavin, and niacin values are available in both the cases with small difference. These differences may be due to techniques used for analysis; irrigation and soil type, time of harvest, degree of ripening, lack of access to improved varieties those are prone to attacked by pests and diseases; poor post-harvesting techniques etc. Micro-nutrient like Vitamin A, E, K, B6, folic acid, magnesium, potassium, sodium, zinc, copper, selenium values are not available in case of Ethiopian Data.

Immune Response of Avocado in terms of Nutrient Content

Immune System: An Overview

The immune system protects the body against infections and other external and internal threats by utilizing three distinct layers, depending on the nature of the threat: physical (e.g., skin, epithelial lining of the gastrointestinal and respiratory tracts) and biochemical barriers (e.g., secretions, mucus, and gastric acid), numerous different immune cells (e.g., granulocytes, CD4 or CD8 T and B cells), and antibodies (i.e., immunoglobulins).

The first line of defense is innate immunity, which combines physical and biochemical barriers with a non-specific, leukocyte-mediated cellular response to defend against pathogens. The adaptive immune system involves an antigen-specific response mediated by T and B lymphocytes that is activated by exposure to pathogens; this works with the innate immune system to reduce the severity of infection. The complement system can work with both the innate and adaptive immune systems (Figure 1) [8].
Life-style factors affecting immune function: An overview

Immunological maturity is achieved by adolescence, and young adults should be well fortified against attack by pathogens [9]. Nevertheless, several lifestyle-related factors affect immune competence in healthy adults and increase their risk of infection (Figure 2). In particular, energy-dense, micronutrient-poor food combined with a sedentary lifestyle, make less bioavailable the immune-competent nutrients, increased risk of infection [10]. However, prolonged and excessive exercise, over-training are also thought to impair immune function [11-13]. Pollution and cigarette smoking with poor nutrition compromise immune function [14]. Chronic, psychological stress is another factor that can impact immune function [15]. Alcohol consumption has variable effects on immunity; moderate amounts of polyphenol-rich alcoholic beverages potentially provide some immune protection, but excessive consumption can suppress many aspects of immune function [16]. Sleep is an important homeostatic regulator of immune function [17]. It is clear that optimal immuno-competence depends upon nutritional status [18]. The risk of infection is also influenced by gender, age, genetics, early programming, vaccination history, pathogen exposure, specific health conditions, and diseases [19].

Nutrients have vital roles throughout the immune system that are independent of life stage. The nutrients are essential to sustain an immune-competent include protein, fat, vitamins A, C, D, E, B6 and B12, folic acid, iron, selenium, copper and zinc and the literature suggested that avocado comprised of all above mentioned immuno nutritional elements except Vitamin D, B12 [20].

Avocado and Immune Response: Scientific Evidences

Avocado contains substantial amounts of bioactive compounds such as phytosterols, β-sitosterol. The β-sitosterol in avocado also has a special effect on immunity, contributing to the treatment of diseases such as cancer, HIV and infections. In relation to cancer, it works by suppressing carcinogenesis and in HIV by strengthening the immune system [21]. This compound enhances lymphocytes proliferation and natural killer cell activity, which inactivates invading microorganisms [22].
Avocado can help in absorption antioxidants. It has been documented that eating carotenoids (antioxidants including lycopene and beta-carotene) with avocado or avocado oil increased their absorption, which is attributed primarily to the lipids present in avocado [23]. The critical review results indicated that compounds in avocado are unique antioxidants, by suppressing radical generation, acting as effective neuroprotective agents [24].

Jaquelin and his colleagues (2013) reported that antimicrobial activity of avocado with the help of antimicrobial peptides (AMP) to control of pathogens [25]. Researches indicated that 300 mg of avocado and soybean unsaponifiables (ASU; an extract prepared from avocado and soybean oil) per day (with or without glucosamine and chondroitin sulfate) appears to be beneficial for patients with hip or knee Osteoarthritis. This is indicating anti-inflammatory function of avocado [26].

California Hass avocados have the highest content of lutein among commonly eaten fruits, lipophilic extract of avocado can inhibit the growth of both androgen-dependent (LNCaP) and androgen-independent (PC-3) human prostate cancer cell lines in vitro [27]. Avocado extract selectively induced apoptosis in human oral cancer cell lines by modulation of reactive oxygen species [28]. In the same year, Castillo-Juarez et al. concluded that antibacterial activity of a methanolic avocado extract against Helicobacter pylori, a cause of gastritis implicated in the etiology of gastric cancer [29].

**Ethiopian Context**

In Ethiopia, avocados is very popular to everybody irrespective of age, sex, socio-economic class. Ethiopians are preparing juice by mixing avocado with sugar and milk or water, frequently served with “Vimto” (locally called, brand name may be different, made up of grapes juice mostly). Avocados are also used to make salads and sandwiches as well as consumed raw. But avocado farming and marketing is not that much organised. Even, there is no specific database available related to avocado consumption in any part of Ethiopia. According to Ethiopia National Food Consumption Survey (2013), overall Vitamin A rich fruits and vegetables consumption is very low throughout the country [30]. The researchers have already documented that tobacco use, physical inactivity, unhealthy diet (low dietary diversity and faulty dietary practices), excessive alcohol use, as well as “Khat” consumption are widely prevalent in Ethiopia [31], those behaviours are antagonist for bioavailability of immune-competent nutrients.

**Conclusion**

It can be concluded that Ethiopia is lacking in Immune-competent individuals and malnutrition-dietary practice have been identified under the top five mortality related behavioural risk list. This is the prime time, when nutritionist and food scientist of Ethiopia have to consider any low cost, culturally accepted food based dietary approach to handle the immunity related disease burden from infant to adult. Another interesting point to be noted that researchers have suggested avocado as a complementary and transitional food for infants and toddlers in terms of its taste, consistency and nutritional value to ensure their optimal health [32]. Considering nutritional potential and existing scientific evidences, avocado can be warranted for further exploration in terms of immune response and related health benefits over the life course in Ethipians. A number of actions need to be undertaken in order to promote the health benefits of avocado with special emphasis on immune response. These includes:

- Capacity building, plant breeding-protection activities, implementing improved varieties, post-harvest technology, standardized packaging, organised marketing etc.
- Establishment of local processing industry, especially for avocado pulp processing or oil extraction, considering its composition and the health benefits, which can be used for manufacturing new food products/supplements.
- There is a need to revise existing food composition tables for Ethiopia by using the more sensitive technology, because existing one is very old.
- Development of dietary awareness program based not only what to be consumed, how and when to be consumed. Faulty dietary practices making nutrients not bioavailable for physiological and biochemical functions in the body, so deficiency symptoms will come up even after adequate consumption of nutrients.
- Finally, suggested collaboration from Government sectors like health, agriculture, trade and industry, education, urban planning, and transportation along with
Non-government organizations and other stakeholders.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Nil (as it is a review article, so not used any human /animal data).

**References**


Evaluation of Immunostimulant and Chemprotective Activity of *Chicoreus Ramosus* against Cisplatin Induced Toxicity in Balb/C Mice

J. Bindhu¹, Arunava Das²

¹Research Associate cum Assistant Professor, ²Associate Professor, Molecular Diagnostics and Bacterial Pathogenomics Research Laboratory, Department of Biotechnology, Bannari Amman Institute Technology, Sathyamangalam, Erode District, Tamil Nadu, India

Abstract

Traditional plant medicines are used for a range of cancer displays. The *Chicoreus ramosus* is an enormous proteinaceous gastropod for human consumption. In this research evaluation of chemoprotective activities *Chicoreus ramosus* (CR) in cisplatin-triggered immunosuppressed mice was studied. Cisplatin (100mg/kg, intraperitoneally [IP]) brought on immunosuppressed mice changed into treated with *Chicoreus ramosus* (150 mg/dose/animal/IP) for a duration of 10-day. The influence of the extract on lymphoid organ weight, bone marrow cellularity, alpha esterase hobby and on enzyme degrees such as SGOT,SGPT, Urea, Creatinine changed into estimated to choose out the chemoprotective impact of CR. Administration of CR in cisplatin treated mice, found to enhance bone marrow cellularity and α- esterase exquisite cells, which were appreciably decreased in cisplatin best handled control animals indicates that cisplatin brought on myelosuppression changed into reversed or inhibited by CR management probably via its chemoprotective activity. Cisplatin binds to DNA and reasons damages ensuing in chromosome breaks,micronucleus formation and cell loss of life.CR contains several center-chain aliphatic alcohols, aldehydes and ketones, which can be believed to be the quit yields of fatty acids. Administration of CR in cisplatin handled mice, boosts the bone marrow cellularity and α- esterase advantageous cells, which have been notably reduced in cisplatin best indicates that cisplatin caused myelosuppression was reversed or inhibited via *Chicoreus ramosus*.

Keywords: *Chicoreus ramosus*; Chemoprotective; Cisplatin; Alpha Esterase, SGOT,SGPT

Introduction

Cancer isn’t one unwellness, however several diseases that occur in several areas of the body. every variety of cancer is characterised by the uncontrolled growth of cells. below traditional conditions, cell replica is rigorously controlled by the body. However, these controls will malfunction, leading to abnormal cell growth and therefore the development of a lump, mass, or tumor. Some cancers involving the blood and blood-forming organs don’t type tumors however flow into through alternative tissues wherever they grow. [¹] [²] Common locations of metastasis are the bones, lungs, liver, and central system nervosum. All cancers begin in cells, the body’s basic unit of life. The body is formed from many sorts of cells. These cells grow and divide during a controlled thanks to turn out additional cells as they’re required to stay the body healthy. once cells grow up or broken, they die and are replaced with new cells. However, generally this orderly method goes wrong. The genetic material (DNA) of a cell will become broken or modified, manufacturing mutations that have an effect on traditional cell growth and division. once this happens, cells don’t die after they ought to and new cells type once the body doesn’t want them. the additional cells could type a mass of tissue referred to as a tumour. [³⁻⁶]
Materials and Method

IDENTIFICATION AND PURIFICATION OF BIOACTIVE COMPOUNDS

Animals:

Inbred BALB/C (6-8 weeks) mice, consideration 23-28g, were obtained from biologist Institute, breeding section, Coonoor. The animals were housed in airy plastic cages at thirty seven ± 1°C, 40±10% humidity and 12/12-hrs light/dark cycles throughout for night period of time period of adaptation to laboratory conditions and throughout the whole experimental period. The animals were fed with traditional mouse chow (Sai Feeds, Mumbai, India) and given water ad libitum.

Preperation and administration of Extract

Chicoreus ramosus (Gastropod) were collected from native shell meat dealers Tuticorin, South East Coast of India. The mollusc meat was washed in water and dried during a hot air kitchen appliance at 50°C. The dried meat was small-grained and extracted long by stirring with ten volumes of 75 % methyl alcohol. Supernatant was collected when centrifuging at 3000 rpm for ten minutes. The yield of the extract was 35%.

For animal administration the extract was dissolved in minimum amount of methyl alcohol, then resuspended in gum acacia in phosphate buffered saline and given at a degree of 25 mg /dose/animal intraperitoneally.

Experimental Design:

The animals were divided into three groups of six animals each as follows:

Group 1: Normal animals, without any treatment.

Group 2: Treated animals received cisplatin alone dissolved in 1% gum acacia intraperitoneally for 10 continous days.

Group 3: Treated animals received Chicoreus ramosus (0.5mg) methanolic extracts dissolved in 1% gum acacia intraperitoneally for 10 consecutive days.

Determination of the consequences of Chicoreus ramosus on relative organ weight in Cisplatin treated animals

Eighteen animals were indiscriminately divided into 3 teams, containing six animals in each tea, the primary cluster had traditional animals, that failed to receive any treatment. The second cluster had animals, treated with cisplatin alone. The third cluster had animals treated with cisplatin and Chicoreus ramosus.3 animals from every cluster were sacrificed at 2 totally different time intervals (7th and eleventh day) by cervical dislocation. weight of every animal was taken before sacrifice and organs like lungs, liver, kidney, thymus and spleen were excised, weighed and expressed as relative organ weight.

Determination of the influence of Chicoreus ramosus on alpha esterase activity in Cisplatin treated animals (Azodye coupling method, Bancroft and Cook, 1984)

Femurs was separated to PBS, washed thrice and smeared over the slides. Slides were fixed after air drying in freshly prepared fixative 30 sec at 4°C and dipped in double distilled water thrice. After that the fixed slides were incubated in freshly prepared filtered solution, 1.2 ml solution. After hematoxylin staining slides were washed in water for long time and viewed using microscope (100x, oil immersion) for scoring positive and negative alpha esterase cells out of 4000 cells.

Determination of the consequences of Chicoreus ramosus on Bone marrow physiological state (BMC) in cisplatin treated animals

Bone marrow physiological state was done in line with the strategy of Sredni et al (1992). Bone marrow was collected from the femur into the medium containing a pair of liquid body substance and created into single cell suspension. the amount of cells was firm employing a haemocytometer and expressed as total cells determined by trypan blue (1% in saline) exclusion methodology per femur.

Determination of alpha-esterase activity in Cisplatin treated animals (Azodye coupling method) (Bancroft and Cook, 1984)

Bone marrow from femurs of mice was collected in PBS, washed thrice and dirty over the slides. Air dried slides were fastened in freshly ready fixative for thirty seconds at 4°C and swayback in double water thrice. During incubation slides were washed in double water for ten min and counter stained with haematoxylin for one min. when staining slides were washed in water for a while and discovered below magnifier (100X, oil
immersion) for evaluation positive and negative alpha esterase cells out of 4000 cells.

**Estimation of SGPT (Span medical specialty Ltd., Surat, India)**

Alanine aminotransferase (ALT) catalyses the transamination of L-Alanine and α- Ketoglutarate to form pyruvate and L- Glutamate. Pyruvate so formed is coupled with 2,4- Dinitrophenyl hydrazine (2,4- DNPH) to form a corresponding hydrazone, a brown coloured complex in alkaline medium and this can be measured colorimetrically.

**Estimation of SGOT (Span Diagionostics Ltd., Surat, India)**

Aspartate aminotransferase (AST) catalyses the transamination of L-Aspartate and α-ketoglutarate to make L- salt and salt. salt thus shaped is not to mention a pair of,4- Dinitrophenyl reducing agent (2,4- DNPH) to make a corresponding hydrazone, a brown colored complicated in base-forming medium and this will be measured colorimetrically.

**Statistical Analysis:**

The results are expressed in mean ± standard deviation (SD). Statistical analysis were performed by using Students ’ t ’ test. p Values < 0.05 were considered to be statistically significant.

**Result & Discussion**

**Chemoprotective activity of Chicoreus ramosus:**

**Impact of Chicoreus ramosus on Relative Organ Weights in Cisplatin treated Animals:** The Cisplatin treated animals showed high reduction within the weight of all the organs like zero.2848± 0.04772g/100g weight of spleen, 0.0455± 0.0733 g/100 g weight of thymus, 4.6081± 0.402g/100g weight of liver, 0.98873± 0.04351g/100g weight of excretory organ, 0.5385± 0.03630g weight of lungs. The Chicoreus ramosus treated together with cisplatin mice showed a major increase (p < zero.001) within the weight of all the organs in treated cluster as zero.3995± 0.1355g / a hundred g weight of spleen, 0.1435± 0.02192g/100g weight of thymus, 5.5575± 0.3104g /100g weight of liver, 1.1095± 0.2171g / 100g weight of excretory organ, 0.6885± 0.06859g /100g weight of lungs (Table:1).

**Impact of Chicoreus ramosus on bone marrow physiological state and α-esterase activity on Cisplatin administration:**

Impact of Chicoreus ramosus on bone marrow physiological state and α-esterase activity is given in the Table 2: The amount of bone marrow cells similarly as α-esterase positive cells was shrieved drastically in Cisplatin alone treated management animals, however this was considerably reversed (p < zero.001) by administration of Chicoreus ramosus. In Cisplatin alone treated management animals, on the seventh day there was a forceful reduction within the variety of bonemarrow cells(25.5 × one zero five ± one five.414cells / femur) and α – esterase positive cells (63.4.5± 4.95 positive cells / 4000 cells) compared to Chicoreus ramosus treated together with cisplatin animals. Treatment with Chicoreus ramosus may elevate the bone marrow physiological state and variety of α-esterase positive cells. In treated cluster of animals, bonemarrow physiological state and α- esterase positive cells was found to be sixty seven.6 ×105± 18.385cells / femoris and 1208.5± 101.12cells / 4000 bone marrow cells on 11t h day severally compare to the Cisplatin alone treated animals twenty.93 ×105± 3.055cells / femur and 620.66± 3.055cells/4000 bone marrow cells). The results are given in table 2. The impact of Biophytum sensitivum on the bone marrow physiological state and α-esterase positive cells when the administration of the methanolic extract of Biophytum sensitivum showed a major (p<0.001) sweetening within the bone marrow physiological state (28.3 x 106 cells/femur) compared to the traditional management (17.3 x 106 cells/femur) animals. In Cisplatin alone treated animals, on the seventh day there was a forceful reduction within the variety of bonemarrow cells(25.5 × one zero five ± one five.414cells / femur) and α – esterase positive cells (63.4.5± 4.95 positive cells / 4000 cells) compared to Chicoreus ramosus treated together with cisplatin animals. Treatment with Chicoreus ramosus may elevate the bone marrow physiological state and variety of α-esterase positive cells. In treated cluster of animals, bonemarrow physiological state and α- esterase positive cells was found to be sixty seven.6 ×105± 18.385cells / femoris and 1208.5± 101.12cells / 4000 bone marrow cells on 11t h day severally compare to the Cisplatin alone treated animals twenty.93 ×105± 3.055cells / femur and 620.66± 3.055cells/4000 bone marrow cells). The results are given in Table 2. The impact of Biophytum sensitivum on the bone marrow physiological state and α-esterase positive cells when the administration of the methanolic extract of Biophytum sensitivum showed a major (p<0.001) sweetening within the bone marrow physiological state (28.3 x 106 cells/femur) compared to the traditional management (17.3 x 106 cells/femur) animals. In Cisplatin alone treated animals, on the seventh day there was a forceful reduction within the variety of bonemarrow cells(25.5 × one zero five ± one five.414cells / femur) and α – esterase positive cells (63.4.5± 4.95 positive cells / 4000 cells) compared to Chicoreus ramosus treated together with cisplatin animals. Treatment with Chicoreus ramosus may elevate the bone marrow physiological state and variety of α-esterase positive cells. In treated cluster of animals, bonemarrow physiological state and α- esterase positive cells was found to be sixty seven.6 ×105± 18.385cells / femoris and 1208.5± 101.12cells / 4000 bone marrow cells on 11t h day severally compare to the Cisplatin alone treated animals twenty.93 ×105± 3.055cells / femur and 620.66± 3.055cells/4000 bone marrow cells). The results are given in table 2. The impact of Biophytum sensitivum on the bone marrow physiological state and α-esterase positive cells when the administration of the methanolic extract of Biophytum sensitivum showed a major (p<0.001) sweetening within the bone marrow physiological state (28.3 x 106 cells/femur) compared to the traditional management (17.3 x 106 cells/femur) animals. [8]

**Impact of Chicoreus ramosus on protein levels on Cisplatin administration:**

Administration of Chicoreus ramosus considerably accrued the amount of SGOT (65.76± 1.471IU/L) and SGPT (56.925± 0.9546IU/L) in liver. the degree of SGOT and SGPT values are given in Table 3 and Table 4. Cyclophosphamide treated mice showed accrued liquid body substance SGOT and SGPT levels. This increase is often attributed to the broken structural integrity of the liver and excretory organ, as a result of these enzymes are discharged into circulation when cellular harm. [9]
Impact of *Chicoreus ramosus* on the biochemical parameters on Cisplatin administration:

The nephritic functions are often calculable by organic chemistry parameters like organic compound, breadstuff and Creatinine given in the Table 5 and Table 6. Cisplatin administration in mice was found to extend the breadstuff concentration in liquid body substance on seventh day eight.0884± 0.01980mg/dL and eleventh day 8.31723± 0.07966 mg/dL however this was considerably reduced (p < 0.05) to mg/dL on seventh day six.8785± 0.1054 and 7.1655±0.07566 mg/dL on eleventh day by the administration of *Chicoreus ramosus*. Cisplatin treated animals showed a rise within the level of organic compound seventeen.32± 0.04243 mg/dL on7th day and seventeen.81± 0.1706mg/ metric capacity unit on eleventh day in liquid body substance that was considerably reversed ( p < 0.001) to 14.73± 0.2263mg / metric capacity unit on seven th day and fifteen.345± 0.1626 mg/dL on 11t h day by the administration of *Chicoreus ramosus*. Cisplatin treated animals showed a rise within the level of creatinine one.75± 0.04243mg/dL on seventh day and one.9266± 0.06807mg/ metric capacity unit on eleventh day in liquid body substance that was reversed ( p < 0.01) to 1.6705± 0.03748mg/ dL on seventh day and one.6405± 0.02475mg/dL on 11t h day by the administration of *Chicoreus ramosus*. a serious disadvantage of current cancer therapeutic practices like therapy and radiotherapy is bone marrow suppression leading to blood disorder and ensuant suppression of body substance and cellular similarly as non-specific and specific cellular responses.

Table 1: Effect of *Chicoreus ramosus* on Relative Organ Weights in Cisplatin treated animals

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Relative organ weight (g/100g body weight)</th>
<th>7th day</th>
<th>11th day</th>
<th>7th day</th>
<th>11th day</th>
<th>7th day</th>
<th>11th day</th>
<th>7th day</th>
<th>11th day</th>
<th>7th day</th>
<th>11th day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spleen</td>
<td>0.508 ± 0.110</td>
<td>0.695 ± 0.271</td>
<td>0.163 ± 0.004</td>
<td>0.181 ± 0.022</td>
<td>5.416 ± 0.380</td>
<td>5.982 ± 0.392</td>
<td>1.279 ± 0.178</td>
<td>1.260 ± 0.227</td>
<td>0.548 ± 0.035</td>
<td>0.592 ± 0.020</td>
</tr>
<tr>
<td></td>
<td>Thymus</td>
<td>0.234 ± 0.023</td>
<td>0.284 ± 0.047</td>
<td>0.037 ± 0.016</td>
<td>0.045 ± 0.073</td>
<td>3.789 ± 0.199</td>
<td>4.608 ± 0.402</td>
<td>1.238 ± 0.017</td>
<td>0.988 ± 0.043</td>
<td>0.524 ± 0.013</td>
<td>0.538 ± 0.036</td>
</tr>
<tr>
<td></td>
<td>Liver</td>
<td>0.245 ± 0.088</td>
<td>0.399 ± 0.135</td>
<td>0.165 ± 0.056**</td>
<td>0.143 ± 0.021***</td>
<td>3.890 ± 0.775**</td>
<td>5.557 ± 0.310**</td>
<td>1.629 ± 0.021**</td>
<td>1.109 ± 0.217**</td>
<td>0.772 ± 0.143**</td>
<td>0.688 ± 0.068**</td>
</tr>
<tr>
<td></td>
<td>Kidney</td>
<td>0.245 ± 0.088</td>
<td>0.399 ± 0.135</td>
<td>0.165 ± 0.056**</td>
<td>0.143 ± 0.021***</td>
<td>3.890 ± 0.775**</td>
<td>5.557 ± 0.310**</td>
<td>1.629 ± 0.021**</td>
<td>1.109 ± 0.217**</td>
<td>0.772 ± 0.143**</td>
<td>0.688 ± 0.068**</td>
</tr>
<tr>
<td></td>
<td>Lungs</td>
<td>0.245 ± 0.088</td>
<td>0.399 ± 0.135</td>
<td>0.165 ± 0.056**</td>
<td>0.143 ± 0.021***</td>
<td>3.890 ± 0.775**</td>
<td>5.557 ± 0.310**</td>
<td>1.629 ± 0.021**</td>
<td>1.109 ± 0.217**</td>
<td>0.772 ± 0.143**</td>
<td>0.688 ± 0.068**</td>
</tr>
</tbody>
</table>

Values are expressed as mean ± SD ,*p < 0.05,* **p < 0.01,** ***p <0.001.
Table 2: Effect of *Chicoreus ramosus* on Bone Marrow Cellularity and α-esterase activity in Cisplatin treated animals.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Bone Marrow Cellularity (Cells/femur)</th>
<th>α-Esterase activity (No. of α- esterase positive cells/4000 cells)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7th day</td>
<td>11th day</td>
</tr>
<tr>
<td>Normal</td>
<td>85.0 × 10^5 ± 2.828</td>
<td>884± 2.828</td>
</tr>
<tr>
<td>Cisplatin alone</td>
<td>25.5 × 10^5 ± 1.414</td>
<td>634.5± 4.95</td>
</tr>
<tr>
<td>Cisplatin + Chicoreus ramosus</td>
<td>67.6 ×105± 18.385***</td>
<td>1208.5± 101.12***</td>
</tr>
</tbody>
</table>

Values are expressed as mean ± SD, *p < 0.05 , **p < 0.01, ***p <0.001

Table 3: Effect of *Chicoreus ramosus* treatment on the Serum, Liver SGOT levels in Cisplatin treated animals.

<table>
<thead>
<tr>
<th>Group</th>
<th>Serum GOT (IU/L)</th>
<th>Liver GOT (IU/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7th day</td>
<td>11th day</td>
</tr>
<tr>
<td>Normal</td>
<td>9.064± 0.372</td>
<td>9.172± 0.1464</td>
</tr>
<tr>
<td>Cisplatin alone</td>
<td>76.92± 1.824</td>
<td>82.28± 2.72</td>
</tr>
<tr>
<td>Cisplatin + Chicoreus ramosus</td>
<td>46.83± 1.541***</td>
<td>43.59± 1.725***</td>
</tr>
</tbody>
</table>

Values are expressed as mean ± SD, *p < 0.05 , **p < 0.01, ***p <0.001

Table 4: Effect of *Chicoreus ramosus* Treatment on the Serum, Liver SGPT Levels in Cisplatin Treated Animals

<table>
<thead>
<tr>
<th>Group</th>
<th>Serum GPT (IU/L)</th>
<th>Liver GPT (IU/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7th day</td>
<td>11th day</td>
</tr>
<tr>
<td>Normal</td>
<td>9.39± 0.2404</td>
<td>9.29± 0.04243</td>
</tr>
<tr>
<td>Cisplatin alone</td>
<td>74.658± 1.445</td>
<td>85.22± 2.393</td>
</tr>
<tr>
<td>Cisplatin + Chicoreus ramosus</td>
<td>54.02± 1.103***</td>
<td>50.14± 1.442***</td>
</tr>
</tbody>
</table>

Values are expressed as mean ± SD, *p < 0.05 , **p < 0.01, ***p <0.001
Table 5: Effect of *Chicoreus ramosus* treatment on the serum Urea levels in Cisplatin treated animals

<table>
<thead>
<tr>
<th>Group</th>
<th>Serum(mg/dL)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urea concentration (mg/dL)</td>
<td>BUN concentration (mg/dL)</td>
<td></td>
</tr>
<tr>
<td>Days</td>
<td>7th day</td>
<td>11th day</td>
<td>7th day</td>
</tr>
<tr>
<td>Normal</td>
<td>10.985± 1.054</td>
<td>10.985± 1.054</td>
<td>10.985± 1.054</td>
</tr>
<tr>
<td>Cisplatin alone</td>
<td>17.32± 0.04243</td>
<td>17.32± 0.04243</td>
<td>17.32± 0.04243</td>
</tr>
<tr>
<td>Cisplatin + Chicoreus ramosus</td>
<td>14.73± 0.2263***</td>
<td>14.73± 0.2263***</td>
<td>14.73± 0.2263***</td>
</tr>
</tbody>
</table>

Values are expressed as mean ± SD, *p < 0.05, **p < 0.01, ***p <0.001

Table 6: Effect of *Chicoreus ramosus* Treatment on the Serum, Liver Creatinine Levels in Cisplatin Treated Animals

<table>
<thead>
<tr>
<th>Group</th>
<th>Serum(mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7th day</td>
</tr>
<tr>
<td>Days</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>1.4205± 0.01485</td>
</tr>
<tr>
<td>Cisplatin alone</td>
<td>1.75± 0.04243</td>
</tr>
<tr>
<td>Cisplatin + Chicoreus ramosus</td>
<td>1.6705± 0.03748**</td>
</tr>
</tbody>
</table>

Values are expressed as mean ± SD, *p < 0.05, **p < 0.01, ***p <0.001

Conclusion

Administration of *Chicoreus ramosus* extract in cisplatin treated mice will increase bone marrow cellularity and α- esterase high quality cells, which have been drastically reduced in immunosuppressed indicates that cisplatin brought on myelo suppression turned into reversed or inhibited via *Chicoreus ramosus* extract administration via its chemoprotective activity.

Declaration of Interest: The authors report no conflicts of interest

Ethical Clearance: This clinical study is approved by Institutional Animal Ethics committee. All the experiments are performed as per the guidelines given by CPCSEA.

Source of Funding: Nil

References


Quality of Life and Depression in Obese

K T Moly¹, Shaliya Shajan², Soniya Johny²
¹Professor cum Principal, Amrita College of Nursing, Amrita Vishwa Vidyapeetham, Kochi, ²Fourth year B.Sc Nursing Students, Amrita College of Nursing, Amrita Vishwa Vidyapeetham, Kochi

Abstract

Background: Health-related quality of life is emerging as an important outcome in obesity studies and has demonstrated a significant impairment in Quality of life (QoL). Depression is one of the common health consequences of overweight and obesity as per WHO.

Objective: To find out correlation between depression and QoL among obese.

Methods: Descriptive co-relational study was conducted on 220 obese patients attending selected OPD’s/obesity clinic of tertiary care hospital, Kerala, India. QoL was assessed using Rand Short Form (SF-36) scale and depression using Patient Health Questionnaire (PHQ-9).

Results: The mean QoL was found to be slightly above average (50.86 +/- 12.48). Of the eight domains of QoL assessed, the mean score was poor in General health (37.76), role limitations due to emotional problems (43.97) and relatively better in pain (60.88) and social function (56.37). The QoL in mental components (49.43 +/- 13.68) was found to be poor than the physical component (54.4 +/- 20.09). Major depression was found in 51 (23.20%) of patients. A moderate negative correlation was observed between QoL and depression (r = -0.502 p value <0.001)

Conclusion: The study findings highlight poor QoL especially in the mental component of obese patients. The statistically significant negative correlation found between depression and QoL in obese is a concern and needs further exploration.

Key words: Quality of Life, Depression, Obesity.

Introduction

Obesity is one of the most common, yet among the most neglected, public health problems in both developed and developing countries (WHO) [1]. Even in countries like India, which are typically known for a high prevalence of undernutrition, a significant proportion of overweight and obese people now coexists with those who are undernourished [2]. Most available recent data from India showed 12.6 % of women were either overweight or obese, while a similar percentage of women were underweight and overweight or obese in urban India (25 % underweight and 23.5% overweight or obese) [3]. Persons with obesity have been found to have a significantly lower health-related quality of life than those who were normal weight, even for persons without chronic diseases known to be linked to obesity [4].

Obesity is often co-morbid with conditions such as osteoarthritis and lower back pain, illnesses that can result in functional locomotor limitations. Chronic generalized pain and is also a common finding in obese patients secondary to factors such as fibromyalgia, osteoarthritis, sleep disorders and reduced cardio-pulmonary fitness. Studies from developed countries have shown that obese individuals often face obstacles in society and in their day-to-day lives, far beyond health risks [4].

Corresponding author:
Prof. K. T. Moly
Principal, Amrita College of Nursing
Amrita Vishwa Vidyapeetham, Kochi, Kerala
India, kmoly@aims.amrita.edu
Mob: 9447513383, Fax No: 04842802020
Quality of life (QoL) is a broad multidimensional concept that usually includes subjective evaluations of both positive and negative aspects of life. Health-related quality of life (HRQOL) is emerging as an important outcome in obesity studies. HRQOL refers to the self-reported effects of a medical condition on physical and mental functioning and well-being of patients. Obesity is associated with increased health risks and pain that can impair physical health status and impose limitations on daily activities. The fact that obesity is predominantly a life-long condition emphasizes the importance of quality of life research in this field.

A cross sectional study on QOL for obese women and men at Turkey was done by Fulden Sarac, Sebnem & Fusun. The tool used was SF 36 Questionnaire with 1752 sample. The result showed that obesity is associated with poor levels of physical & social well being. A study on QoL of pre-obese & obese patients at France was done by Laurent Letrilliant, Alain & Sarah Rosen in 2005. The researchers concluded that patient’s QoL score significantly deteriorated with increasing BMI.

Numerous studies as shown above have demonstrated that obese persons experience significant impairment in QoL as a result of their obesity, with greater degrees of obesity. QoL is defined as an individual’s satisfaction with his or her life dimensions comparing with his or her ideal life. Evaluation of the quality of life depends on individual’s value system and on the cultural environment where he lives.

Emotional suffering may be one of the most painful parts of severe obesity. Society often emphasizes the importance of physical appearance. The consequence of discrimination against individual affected by severe obesity can seriously lead to psychological depression. The negative stigma, associated with severe obesity can affect at work and can be viewed as less competent and lacking in self discipline in their life. Psychological depression is one of the common health consequence of overweight and obesity as per WHO.

One recent study found that overall, obese individuals have a 20 percent elevated risk of depression, and specifically for Caucasian college-educated people with obesity, the depression risk rises to as high as 44 percent.

In addition to societal stigma, the presence of self-directed, internalized anti-obesity attitudes are also identified in studies. Longitudinal studies have found that obesity predicts the subsequent onset of depression. Epidemiological data suggest an association between obesity and depression but findings vary across studies. Hence the investigators were interested in finding out the correlation between QoL and depression in patients who were obese.

Methodology

A descriptive, co relational study was conducted on 220 obese patients attending selected OPD’s/obesity clinic of a tertiary care hospital, India. Data was collected only from patients with a BMI ≥ 30 kg/m². The following tools were used to collect data.

**Tool I:** Interview schedule to assess the socio-demographic and clinical data.

**Tool II:** Rand Short Form (SF-36) scale to assess the QoL (Reliability > 0.80)

**Tool III:** Patient Health Questionnaire.(PHQ-9) to assess depression (Sensitivity and specificity - 88%). The PHQ-9 tool incorporates DSM-IV depression diagnostic criteria.

**Ethical Consideration:** Ethical clearance was obtained from the Institutional Ethical & Scientific Committee before data collection. Informed written consent was obtained from each subject.

Table 1: Distribution of subjects based on Mean score on QoL

<table>
<thead>
<tr>
<th>Variable</th>
<th>Min.score</th>
<th>Max.score</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>QoL</td>
<td>15</td>
<td>89</td>
<td>50.86</td>
<td>12.475</td>
</tr>
</tbody>
</table>
The mean score of QoL was found to be slightly above average 50.86 +/- 12.475

Table 2: Distribution of subjects based on mean QoL score in eight dimensions

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Min.score</th>
<th>Max.score</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>General health (GH)</td>
<td>0</td>
<td>75</td>
<td>37.76</td>
<td>19.40</td>
</tr>
<tr>
<td>Physical functioning (PF)</td>
<td>0</td>
<td>95</td>
<td>53.91</td>
<td>24.13</td>
</tr>
<tr>
<td>Role limitations due to physical health (RPF)</td>
<td>0</td>
<td>100</td>
<td>49.66</td>
<td>27.57</td>
</tr>
<tr>
<td>Energy/ fatigue (E)</td>
<td>15</td>
<td>95</td>
<td>51.73</td>
<td>13.25</td>
</tr>
<tr>
<td>Emotional wellbeing (EW)</td>
<td>4</td>
<td>92</td>
<td>52.59</td>
<td>13.76</td>
</tr>
<tr>
<td>Social functioning (SF)</td>
<td>13</td>
<td>100</td>
<td>56.37</td>
<td>18.04</td>
</tr>
<tr>
<td>Pain (P)</td>
<td>10</td>
<td>100</td>
<td>60.88</td>
<td>31.81</td>
</tr>
<tr>
<td>Role limitations due to emotional problems (REP)</td>
<td>0</td>
<td>100</td>
<td>43.97</td>
<td>32.28</td>
</tr>
</tbody>
</table>

Among the eight dimensions of QoL assessed, the mean score was relatively better in the dimensions of pain (60.88) and social functioning (56.37) and poor in general health (37.76) and role limitation due to emotional problems (43.97).

Table 3: Distribution of subjects based on mean score on depression

<table>
<thead>
<tr>
<th>Variable</th>
<th>Min.score</th>
<th>Max.score</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>0</td>
<td>22</td>
<td>11</td>
<td>4.58</td>
</tr>
</tbody>
</table>

The mean score of depression in the sample was 11 +/- 4.58.

Table 4: Distribution of subjects according to level of depression

<table>
<thead>
<tr>
<th>Level of depression</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No depression</td>
<td>18</td>
<td>8.1</td>
</tr>
<tr>
<td>Minimal depression</td>
<td>67</td>
<td>30.5</td>
</tr>
<tr>
<td>Minor depression</td>
<td>84</td>
<td>38.2</td>
</tr>
<tr>
<td>Major depression, moderately severe</td>
<td>44</td>
<td>20.0</td>
</tr>
<tr>
<td>Major depression, severe</td>
<td>7</td>
<td>3.2</td>
</tr>
</tbody>
</table>

The above table depicts that only 8.1% did not have depression. 23.2% of the sample had major depression (moderately severe and severe)
Table 5: Correlation between QoL and depression in patients who are obese
N= 220

<table>
<thead>
<tr>
<th>Variables</th>
<th>r value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>-0.502</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>QoL</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

The above table indicates a negative correlation between QoL and depression among the sample (r value -0.502, p value < 0.001).

Discussion

The present study was conducted on 220 obese subjects with males and females equal in number. 88.6% of subjects had one or more co-morbidities. The study sample showed a mean QoL slightly above average (50.86 +/- 12.48). But the result of a cross sectional study done by Ronette L & Ross D among 3353 sample on HRQOL varies among obese sub groups showed that obesity specific health related QoL was significantly more impaired in the group.

Among the eight dimensions of QoL assessed in this study, the mean score was relatively better in the dimensions of pain (60.88) and social functioning (56.37) probably due to lack of restrictions in their mobility status as 50 % (112 subjects) of the subjects were in class I obesity category (BMI 30 – 35 kg /m²). But it was poor in general health (37.76) and role limitation due to emotional problems (43.97). The QoL in mental components (minimum score -6, maximum score- 87 and the mean 49.43+/-.13.68) was found to be poor than the physical component (minimum score-8, maximum score-98 and the mean 54.4+/-.20.09).

Major depression was found in 51 (23.20%) patients. This study finding is in congruent with the findings of a study done in the US by Gregory E Simon et.al (2006) on association between obesity and psychiatric disorders on 9125 subjects which showed that obesity was associated with significant increase in life time diagnosis of major depression. Another study on relation between BMI & Depression by Aline Dragan and Noori Akhtar-Danesh in Canada on 36,984 individuals also showed that higher BMI is associated with more severe form of depression.

The present study findings are different from two studies conducted in Korea and Iran. A study on BMI & depressive symptoms in middle aged and older adults by Jin Won Noh et.al among Koreans in 7920 sample (2015) showed the highest level of depressive symptoms were among the underweight followed by the severely obese and then the obese. A study on the relationship between obesity and depression by Jaffar Askari et.al in Iran (2013) in 200 obese and 200 normal weight individuals showed that obesity does not lead to statistically significant increase in depression rate.

A moderate negative correlation was found between QoL & Depression in patients who are obese (-0.502 p value <0.001). This is in tune with a cross sectional study finding conducted by Jine choo, Melanie T. Turk &Sac young in 2015 on factors associated with health related QoL among125 over weight &obese Korean women. The tools used were Beck depression inventory & interpersonal social evaluation. Increased BMI, low self efficacy for weight control& higher levels of depressive symptoms were found to be significantly associated with greater impairment in total QOL.

A reciprocal link between depression and obesity was seen in another longitudinal study conducted by Florinia S and Luppina M on “overweight, obesity, and depression” at United States using Beck depression inventory in a sample size of 746.

Conclusion

The study findings highlight poor QoL especially in the mental component of obese patients. It points toward the individual and societal perceptions on obese. The statistically significant negative correlation found between depression and QoL in obese is a concern and needs further exploration.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Consideration: Ethical clearance was taken from the Institutional scientific and Ethical committee and written informed consent was obtained from each subject.
References


The Effect of Enzymatic Denture Cleanser on the Physical Properties of Different Types of Denture Base Resin Materials

Khushboo Singh¹, Pradeep S², Dhanasekar Balkrishanan³, Aparna I Narayana⁴
¹Post-Graduation Student, ²Additional Professor, ³Professor & HOD, ⁴Professor, Department of Prosthodontics and Crown & Bridge, Manipal College of Dental Sciences, MAHE, Manipal, India

Abstract

Aim: To evaluate the effect of Denture Cleansers on the properties of Conventional, High impact strength and Flexible denture base materials.

Materials and Method: A total of ninety disc shaped resin specimens (20mm×3mm) of different denture base materials [Trevalon Polymethyl Methacrylate (PMMA), Valplast and Trevalon HI (High Impact)] were prepared. Commercially available denture cleansers and the control were categorized into three groups [Group I- distilled water, Group II- 0.5% Sodium Hypochlorite (NaOCl) and Group III- Daiso enzymatic cleanser] used for the immersion of these specimens. The physical properties like color stability, surface roughness and micro-hardness for each specimen was evaluated at the baseline and after six months. The data obtained was statistically analyzed using Repeated Measure Anova test and post-hoc test.

Results: There was significant change in color and micro-hardness among three denture base resins when immersed in cleansers from baseline to six months. The surface roughness of denture base resins was not within the clinically acceptable range.

Conclusion: The selection of denture cleanser should consider the duration of immersion, concentration of solution, temperature of the solution, material properties and its chemical composition.

Keywords: Denture base resins, Surface roughness, Hardness, Color stability, Denture cleansers.

Introduction

In patients with removable acrylic prosthesis, denture cleanser could be one of the important tools for maintaining excellent denture hygiene. Based on the chemical constituents, denture cleansers are categorized into alkaline peroxides, alkaline hypochlorites, disinfectants, acids and enzymes.¹

Chemically formulated cleansing agents complementary to denture hygiene can also alter the major properties of denture bases.

Corresponding author:
Dr Pradeep S,
Additional Professor, Department of Prosthodontics and Crown & Bridge, Manipal College of Dental Sciences, MAHE, Manipal- 576104

Materials and Methodology

Three commercially available denture base resins (A-Trevalon, B-Valplast, and C-Trevalon High Impact)
Polishing discs of dimension (22×3 mm) was used to prepare the mold for making resin specimens of (20mm×3 mm) dimension. These Discs were invested using type IV die stone. The mold space thus obtained was used for the preparation of each 30 test specimens for Trevalon, Valplast and Trevalon HI.

Trevalon in the ratio of 3:1 (polymer: monomer) and Trevalon HI by weight 25gm-11ml (polymer: monomer) was mixed for 1 minute and bench pressed (pressure of 2000 psi) for 30 minutes. For Valplast specimens, Putty impression of polishing discs were made and then filled with molten Modelling wax. Valplast sprue wax was connected to make the channels for the molten Modelling wax to flow. The resins were then packed, pressed and polymerized based on the manufacturer’s instructions.

All 90 specimens with irregular nodules were finished with silicone carbide abrasive paper (200-800) and polishing was achieved with pumice-slurry for 1 minute. The specimens was then stored in distilled water for the excess monomer to leach out.

The three brands consisting of thirty specimens (A-Trevalon, B-Valplast, and C-Trevalon High Impact) specimens were immersed into three groups (Group I-Distilled water, Group II- 0.5% NaOCl and Group III-enzyme) of cleanser solutions. The duration of immersion followed was 10 minutes daily at room temperature according to manufacturer’s instructions for Daiso enzymatic cleanser (Daiso industries co., Ltd, Hiroshima, Japan), 0.5% NaOCl and Distilled water. After the stipulated duration of immersion, the specimens were washed and then stored in distilled water at room temperature. The same procedure was then followed daily for six months (180 days).

All the three different acrylic specimens were evaluated for the color change on the same side using a Spectrophotometer. The CIE L*a*b* system was followed to determine (ΔE) value before and after immersion into cleanser solution.

\[ \Delta E = \sqrt{(\Delta L)^2 + (\Delta a)^2 + (\Delta b)^2} \]

\[ \Delta L, \Delta a \text{ and } \Delta b \text{ are the differences of } L, a \text{ and } b \text{ values before and after immersion .To relate the color differences (ΔE) to a clinical point of view, National Bureau of Standards (NBS) units was considered through the formula :- NBS = ΔE ×0.92 \]

All the three different acrylic specimens roughness was valued using a Profilometer. The stylus of Profilometer was moved across the specimen surface at the scanning length of 4mm. The three readings were recorded with a distance of 1 mm between each scanning line. Analysis was based on the arithmetic mean of the three readings. The cut-off value was 0.8 mm, at 0.25 mm/s and the resolution of the record data was 0.02 µm. The roughness values before immersion (baseline) were deducted from the values after immersion for a period of six months (180 days) to obtain the average ΔRa (roughness differences).

All the three different acrylic specimens were evaluated for the micro-hardness using a Vicker’s hardness testing machine. A 100-gf load for 15 seconds was thereby applied. The diamond indenter created a pyramid indentation on the specimen surface. The diagonals of the pyramid indentation developed on the specimen surface were measured under the magnification. Three measurements of each ninety resin specimens before and after immersion into cleanser solution were noted. The mean arithmetic average (VHN) value for each sample were calculated to provide overall mean value of the resins after six months.

The data was analysed using statistical package SPSS version 20 (SPSS Inc, Chicago, IL). Descriptive analysis of the mean values and standard deviations of color stability, surface roughness and micro hardness of three different resin specimens before and after six months were obtained. Repeated measure ANOVA was undertaken to statistically determine the differences based on material treated with different cleanser solution before and after 6 months. Post hoc Tukey’s test was chosen to assess the significant difference between the different types of cleanser solution. All tests were performed at the confidence level of 95% and P value <0.05.

Results

The results and statistical analysis are summarized in the Tables 1-6.

There was a statistically significant differences in the effects of denture cleansers (Group I, II and III) on individual resin materials [Trevalon, Valplast and Trevalon HI] when immersed for 6 months (P<0.05)
0.5% NaOCl solution showed maximum color change in Valplast specimens when immersed for a period of 6 months.

Maximum surface roughness was shown by the Valplast (0.73) when immersed in 0.5% (NaOCl) from baseline to six months. There was no statistically significant differences (P=0.271) seen on the effects of denture cleansers on individual resin materials.

Maximum increase in micro-hardness was shown by the Trevalon HI when immersed in 0.5% (NaOCl) from baseline to six months.

Table 1. Results of repeated measure ANOVA test for color stability.

<table>
<thead>
<tr>
<th>Interaction between</th>
<th>Type III sum of squares</th>
<th>Degree of freedom</th>
<th>Mean square</th>
<th>F</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Period</td>
<td>43.022</td>
<td>1.000</td>
<td>43.022</td>
<td>30.276</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Time period × Group</td>
<td>3.011</td>
<td>2.000</td>
<td>1.506</td>
<td>1.060</td>
<td>.351</td>
</tr>
<tr>
<td>Time period × Material</td>
<td>69.911</td>
<td>2.000</td>
<td>34.956</td>
<td>24.599</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Group × Material</td>
<td>64.667</td>
<td>4.000</td>
<td>16.167</td>
<td>2.019</td>
<td>0.100</td>
</tr>
<tr>
<td>Time period × Group × Material</td>
<td>16.956</td>
<td>4.000</td>
<td>4.239</td>
<td>2.983</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Time period: 0-6 months, Groups: Cleanser solutions, Materials: Acrylic resins P<0.05: statistically significant.

Table 2. Mean and standard deviation for color stability.

<table>
<thead>
<tr>
<th>Materials</th>
<th>Groups</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Distilled water</td>
<td>0.5% sodium</td>
<td>Daiso enzymatic</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hypochlorite</td>
<td>Cleanser</td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td></td>
<td>Cleanser</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean±SD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>52.9±0.99</td>
<td>52.6±1.34</td>
<td>54.20±1.22</td>
<td>52.8±1.13</td>
</tr>
<tr>
<td>B</td>
<td>41.60±2.75</td>
<td>42.6±2.36</td>
<td>41.30±4.30</td>
<td>43.4±3.09</td>
</tr>
<tr>
<td>C</td>
<td>45.20±0.78</td>
<td>46.5±1.35</td>
<td>45.50±0.97</td>
<td>45.0±1.24</td>
</tr>
</tbody>
</table>

SD: standard deviation, A: Trevalon, B: Valplast, C: Trevalon HI
Table 3. Results of repeated measure ANOVA test for surface roughness.

<table>
<thead>
<tr>
<th>Interaction between</th>
<th>Type III sum of squares</th>
<th>Degree of freedom</th>
<th>Mean square</th>
<th>F</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time period</td>
<td>.158</td>
<td>1.000</td>
<td>.158</td>
<td>15.820</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Time period × Group</td>
<td>.002</td>
<td>2.000</td>
<td>.001</td>
<td>.093</td>
<td>.912</td>
</tr>
<tr>
<td>Time period × Material</td>
<td>.102</td>
<td>2.000</td>
<td>.051</td>
<td>5.088</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Group × Material</td>
<td>.192</td>
<td>4.000</td>
<td>.048</td>
<td>1.486</td>
<td>.214</td>
</tr>
<tr>
<td>Time period × Group × Material</td>
<td>.053</td>
<td>4.000</td>
<td>.013</td>
<td>1.317</td>
<td>.271</td>
</tr>
</tbody>
</table>

Time period: 0-6 months, Groups: Cleanser solutions, Materials: Acrylic resins
P<0.05: statistically significant.

Table 4. Mean and standard deviation for surface roughness.

<table>
<thead>
<tr>
<th>Materials</th>
<th>Group I Distilled water</th>
<th>Group II 0.5% sodium Hypochlorite Cleanser</th>
<th>Group III Daiso enzymatic Cleanser</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>6 months</td>
<td>Baseline</td>
</tr>
<tr>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
</tr>
<tr>
<td>A</td>
<td>0.26±0.05</td>
<td>0.24±0.05</td>
<td>0.26±0.04</td>
</tr>
<tr>
<td>B</td>
<td>0.77±0.22</td>
<td>0.69±0.26</td>
<td>0.86±0.26</td>
</tr>
<tr>
<td>C</td>
<td>0.33±0.11</td>
<td>0.27±0.05</td>
<td>0.30±0.10</td>
</tr>
</tbody>
</table>

SD: Standard deviation, A: Trevalon, BValplast, C: Trevalon HI
Table 5. Results of Repeated measure ANOVA test for Micro-hardness.

<table>
<thead>
<tr>
<th>Interaction between</th>
<th>Type III Sum of squares</th>
<th>Degree of freedom</th>
<th>Mean square</th>
<th>F</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time period</td>
<td>398.219</td>
<td>1.000</td>
<td>398.219</td>
<td>25.732</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Time period × Group</td>
<td>125.598</td>
<td>2.000</td>
<td>62.799</td>
<td>4.058</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Time period × Material</td>
<td>351.711</td>
<td>2.000</td>
<td>175.855</td>
<td>11.363</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Group × Material</td>
<td>593.713</td>
<td>4.000</td>
<td>148.128</td>
<td>8.411</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Time period × Group × Material</td>
<td>642.214</td>
<td>4.000</td>
<td>160.553</td>
<td>10.375</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Time period: 0-6 months, Groups: Cleanser solutions, Materials: Acrylic resins

P<0.05: statistically significant.

Table 6: Mean and standard deviation for Micro-hardness.

<table>
<thead>
<tr>
<th>Materials</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Distilled water</td>
<td>0.5 %sodium</td>
<td>Daiso enzymatic</td>
</tr>
<tr>
<td></td>
<td>Baseline</td>
<td>Hypochlorite</td>
<td>Cleanser</td>
</tr>
<tr>
<td></td>
<td>6 months</td>
<td>Cleanser</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
</tr>
<tr>
<td>Groups</td>
<td>Baseline</td>
<td>6 months</td>
<td>Baseline</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------</td>
<td>-------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>A</td>
<td>24.97±1.69</td>
<td>25.03±1.22</td>
<td>26.86±1.76</td>
</tr>
<tr>
<td></td>
<td>27.25±4.22</td>
<td>27.86±4.55</td>
<td>26.24±1.60</td>
</tr>
<tr>
<td>B</td>
<td>7.84±1.78</td>
<td>8.19±0.77</td>
<td>9.98±2.37</td>
</tr>
<tr>
<td></td>
<td>9.10±0.49</td>
<td>8.82±2.86</td>
<td>9.70±2.10</td>
</tr>
<tr>
<td>C</td>
<td>25.17±1.48</td>
<td>23.43±1.77</td>
<td>9.98±2.37</td>
</tr>
</tbody>
</table>

SD: Standard deviation, A: Trevalon, BValplast, C: Trevalon HI.
Discussion

The null hypothesis was rejected. In the present study, NBS unit of color difference for Groups [IA, IB, IC, IIA, IIB, IIC, IIIA, IIB and IIIC] are 0.27, 0.87, 0.86, 0.41, 3.16, 1.03, 0.92, 1.78 and 1.84 respectively. Vichi et al in 2004 gave the value as when $\Delta E < 1$ (appreciable), $\Delta E < 3.3$ (clinically acceptable) and $\Delta E > 3.3$ (unacceptable). Sepulveda-Navarro et al in 2011 related NBS units clinically and classified as:- 0.0–0.5 (trace), 0.5–1.5 (slight), 1.5–3.0 (noticeable), 6.0–12.0 (much) and ±12.0 (very much). In the present study, color change of Valplast resin immersed in 0.5% NaOCl was appreciable to the naked eye.

Davi et al in 2010 stated that NaOCl (0.5%) showed statistical significant change in color on the acrylic resins over the time period of 8 hour a day for 180 days. NaOCl (5.25%) is considered to be an effective solution for antimicrobial effect. But, the high concentration might alter the property of the denture base materials. Paranhos et al., Neppelenbroek et al., and Ural et al., found (0.5%) NaOCl considered to be a suitable detergent cleansers with the antimicrobial property. The present study also showed the similar result of NaOCl (0.5 %) having a greater effect on the color stability of acrylic resin than enzymatic cleanser for a time period of 180 days. Daiso enzymatic cleanser immersion time interval, range from 10 minutes for optimal cleansing and overnight for maximum results but prolonged immersion might discolor the denture. Hence, a short immersion period of 10 minutes was routinely executed and also to standardize the same time period for comparing the results of both the cleanser solution. The present study results showed maximum color change in polyamide resin as compared to PMMA and Trevalon HI when immersed in cleanser for 10 minutes. Reason being they are hydrophilic in nature, enhance more water absorption, and leaching out of plasticizers at the faster rate.

Surface roughness could become retentive areas for microorganisms. Previous studies have stated that 0.5% (NaOCl) has significantly increased the surface roughness more for PMMA compared to polyamide. Lima et al in 2006 compared enzymatic cleanser with 0.5% (NaOCl) among different resin materials for the surface roughness. The present study, showed reduce roughness values of the resins when immersed in enzymatic cleanser compared to 0.5% (NaOCl) solution. This could be because of different fabrication techniques, duration of immersion, difference in composition of the resin materials, ease in polishing, temperature of the cleanser solution and the concentrations being used. Abuzar et al. conducted the study and mentioned the cut-off value (Roughness) Ra- 0.2 µm for the resin. Among the different brands of resin material, Trevalon HI resulted in reduce roughness values in all the three groups of cleanser solution, as it contains high cross linking structure which provides smoother surface.

The chemical nature of the cleansers affects the property of micro-hardness, an important factor which needs to be consider for the longevity of the prosthesis. Moussa et al in 2016 performed an in-vivo study that PMMA had higher hardness as compared to polyamide after 3 months of immersion in denture cleanser. C. F. Carvalho, et al. in 2012 demonstrated an in vitro study with 1% NaOCl solution on acrylic denture base resin. Result obtained was insignificant for the micro-hardness. Present study showed maximum effect on micro-hardness in Trevalon HI resin than Valplast resin, when immersed in of 0.5% NaOCl solution from the baseline to six months. This could be due to difference in the structural properties of materials and high cross linking of Trevalon HI.

Pinto Lde et al in 2010 stated that the Polyamide (Valplast) resins exhibits higher fibrous content that results in lower modulus of elasticity. Also, PMMA (Trevalon) specimens due to its continuous polymerization reaction and less release of monomer strengthen its hardness property compared to polyamide resin.

Conclusion

A very few literature have revealed clinical studies on the efficacy of enzymatic cleanser on the acrylic resins. From the results obtained it was concluded that, for color stability and micro hardness test P value of 0.05 was considered to be statistically significant. Furthermore, the study did not completely simulate the clinical scenario of wearing the dentures. Such difference may affect the result of surface treatment.

Conflict of Interest – Nil

Source of Funding - Self

Ethical Clearance – Cleared
References


Life and Social Exclusion of the Third Genders: An Overview from Malabar Region in Kerala State

Leena Chandran¹, Suja M.K²
¹PhD Scholar, ²Chairperson, Department of Social Work, Amrita School of Engineering, Coimbatore, AmritaVishwa Vidyapeetham, India

Abstract

Transgender (TG) is the term which covers individuals who have a gender identity or gender expression than their assigned gender given at the time of birth. These individuals often cover themselves under one umbrella as the third gender. They are unable to identify themselves to a gender, either a male or as a female and they term themselves as the third gender. The society discriminates them since their behavior does not correlate with their congenital gender. The life of transgender is very difficult and stigmatized as they are considered as the most unwanted creatures of the society. Majority of them face discrimination from the society and the social stigma attached to them is so intense that they are ostracized from the main stream of the society.

Aim: To understand about the social exclusion and overall day to day life of the transgender. In this study Transwomen were the respondents Result: Majority of the transgender said that they are undergoing a miserable life and the stigma attached to them is much higher when compared to any other anti social people such as criminals, drug addicts or people with contagious diseases etc. There is significant association between the financial status and the stigma, education and the social exclusion, family support and social exclusion, family support and stigma, financial status and social exclusion. These variables are indirectly proportional to the exclusion and stigma towards the transgender. Conclusion: The study validates that when the financial status is high, or if the family support is more the social exclusion and stigma attached is less compared to those coming from low economic strata of the society. Transgender with lower economic standards normally have lower education level and they in due course of time are forced to leave their homes and end up as manual labor coolies or sex workers.

Key Words: Third gender, Transgender, Transwomen, Life, Social exclusion, Social stigma, Kerala

Introduction

Men and women are socialized into performing their respective genders which is similar to the sex assigned to them at the time of their birth and transgender does not fall in to that kind of parallel socialization¹. Deviations from these birth tagged socialization over a period are given a scowl look, confronted and stigmatized. Many manuscripts and historical evidences say that the third genders are celebrating their binaries since the time unknown. Even though they try to enjoy their privileges and cherish their importance in the myths and history the stigma attached to them makes “normal life” a dream and aspiration for them.
people born with female genitals and the assigned sex during birth is female but they find themselves as men and exhibit manly characters. Trans sexual are those who have undergone surgery to change their sex from the assigned one to the sex of their psychological choice (SRS- Sex Reassignment Surgery). They are also known as cross dressers.

Judgment of the Honorable Supreme court of India on 15th April 2014 says that, Often our society fails to realize the agony, fear and trauma which is faced by the Transgender community and also don’t value the innate feelings of them, especially whose gender is different from what is given at the time of birth. It is seen that the society often ill-treats and abuse TGs in the public places like bus stands, workplace, shopping areas, health systems, railways etc and they are marginalized and is treated as untouchables, neglecting the fact that it is the moral failure of the community to accept and to embrace different genders and their expressions and identity.

Methodology

This paper is based on the interview and discussions conducted with the transgender community in the Kozhikode District which comes under the Malabar Region of Kerala, India in the year 2018. The rationale behind selecting Kozhikode district for the study is that it is said to be the most TG friendly district in the state of Kerala. Semi structured interview schedule was used to know the basic living standards of transwomen and the research design was descriptive and diagnostic in nature. The age group selected for the study was between 25 years and 50 years. The researcher found that the transwomen community who dress themselves as women is very much visible to the community and they are more haunted by them. As the saying goes first impression comes from the dressing style of the person it is very easy for the public to locate them and to term them as Hijada, Transgender, Number 9, Aravanis, kothis (common terms used in Kerala). Keeping this “visibility factor” the researcher selected transwomen population for her study and collected data from 30 transwomen of the said age group using snowball sampling technique.

The real life of these trans-women is so miserable that they don’t earn minimum wages for their livelihood and in spite of the literacy rate of Kerala being high the stigma and ignorance towards this community is still prevailing in almost all walks of life.

Major Findings:

During the study it is seen that 60% of the respondents are non matriculate. When the society realized that these male individual are actually trans woman they slowly tried to avoid them from the inner circle and so this brought a stigma attached and hence they were forced to discontinue their studies. Vivek Diwan in his conversation with Kemal Ordek of Red Umbrella Sexual Health and Human Rights Association Turkey says that Discrimination in education makes many trans people quit before they finish their schooling, and they end up in sex work.

The transwomen of age group 20-25 says that they are accepted by the society and stigma attached is a bit less to them compared to Transgender of age 40 and above, the study also focused on their economic status and found that most of them (62%) comes from lower middle class families and their family members continue to be daily wage earners. Once their identity is revealed the stigma attached by the society towards the Lesbian, Gay, Bisexual, Transgender and Queer is more or less the same. The only difference is that it is not very easy to identify L,G,B or Q as cross dressed TGs. While checking the identity status more than half (56%) of the Transwomen expressed their strong desire to change their sex (Transsexual) by undergoing sex reassignment surgery. The consequential financial burden discourages them from realizing that dream. Some of them does Sex work along with daily wage works and only a few of them have single partner (38%). (16%) have a respectable job in the society like some government projects. 72 % of them are coolie workers and stage performance is done by many of them after their coolie works or whenever they are called for some local events.

To have a child is the ambition of many of them (84%) since they have inherent womanly characters in them. Almost all of them are ready to accept the fact that they can never bear a child (80%). They are in need of lenient laws in adoption covering their criteria of people. Most of the respondents wish to adopt a child (64%). The adoption policies in India are very strict and many of them can’t afford the additional cost involved. Some of them (21%) have become mothers of adolescent or teen age transgenders who came out of their home in search of their identity. Many of them are afraid to take
care of normal children (60%) because they fear that the stigma attached to them might pass to their “adopted children”. Considering marriage as criteria for leading a better life, TG marriages are not common in Kerala and they are not sure of the authenticity of such a marriage. Majority (42%) opines that their experience while “living together” is that, their partners might have multiple friends and many of such living together relationships end in separation. They admit and there is no bond between the partners (51%) as it is seen in a cis marriage (cis- person lives and performs physically and psychologically as what the gender is assigned at the time of birth).

Realization Phase: Majority (85%) of the transgender women (transwomen) realized that their gender identity is different and womanly characters are more in them during the age between 13 and 15.

Self Identity and Establishing Phase: 90% of the respondents said that they identified themselves as a woman during the age between 16 and 17.

Peer Group search: Most of the respondents (90%) tried to get out of the family in search of their peers during the age between 16 and 18.

Abuse:

Verbal – All the transgender women have faced verbal abuses within the family, from the society, and from their class mates.

Physical – 72% of them have undergone the tragedy of physical abuse and the rest 18% have heard sexual abusive comments. Among the 82% who have faced sexual abuse 23% is from their relatives and the rest from other neighbors, class mates and from other known people.

Domestic Violence – 73% of them said that they had to face domestic violence and verbal abuse from their family and they were forced to leave the house. Only 2 transwomen who was included in the study is staying within the family.

Partner Violence – A few 16% of the respondents said that they had to face violence from their partner and most of them left their partner due to this.

“I stay with my parents because they are aged and my elder sister is not willing to take care of them because she does not want to visit us due to my gender identity. I know she cannot cut off the blood relationship and in their words am her “brother “always. I know that she is showing this indifference because of her husband’s family and I too have adjusted to that. But she sometimes calls me. Thanks to mobile phones” – Remya (name changed) is worried about her aged parents and her sister’s family life.

The real difficulty of these people comes when they are visiting a hospital. The nursing and paramedical personnel , in spite of them holding high educational qualifications show indifference in their approach to these people hence many of them are reluctant to visit hospital unless and until it is such an emergency. Many of them prefer to consult doctors of the KSACS (Kerala State AIDS Control Society) who are known to them or to their family doctor, that too secretly. 56 % of them very seldom goes to a hospital for treatment because they are so stigmatized and many of them said that the other patients doubt they might be infected with HIV/AIDS. It is an irrational belief that Hijadas are infected with AIDS. Almost 86 % of them consult a personal/family doctor for having hormonal treatment and none of the respondents have undergone Sex Reassignment Surgery. Except 2 all other Transwomen included in the study are staying away from their family for one reason or the other they have inadequate support from their family. 35% of them visit their family once a month and a few of them once in 3 months and the rest once in 6 months. The advancement of modern communication technologies in mobile phones have reduced their sorrow due to isolation from their family they are able to communicate mobile phones.

“One of my neighbor don’t allow her kids to come to my house when am there, but thank God that her husband looks out for me whenever am there or he somehow manages to talk to me. What a contradiction (laughing). This is my situation and I can only assume what the neighbor man is thinking of me. This is the reality about us “– Says Remya (Name Changed)

The wide use of social media has made them much stronger and they are now getting their say in the society. Even though there is too much stigma attached to them by the society TGs find it convenient and safe to move around in the public. 40% of them say that the attitude of public is changing and they strongly believe that it is due to the influence of social medias. The awareness about
STDs and STIs is quite widespread amongst them and they periodically undergo medical checkup and follow a healthy physical relationship with their friends. They also conduct peer group counseling on the importance of use of condoms and periodic blood tests. The awareness programmes on STDs and STIs is having a high influence on their personnel hygiene.

**Evaluation:**

**Harassment and Stigma Attached to TGs.**

Between 2007 and 2014, around 1731 murders of transgender people was recorded globally and it is found that majority of those murders were very brutal - Human Rights Watch. Majority 95% of them had to face bitter experiences (mistreatment, denial of right to equality, lack of medical treatment) from the society and many of them lost the job or were not hired since the employer founds the gender difference in them. It is noted that these people find it very difficult to secure loans banks or other benefits from the government or banks. Severe harassment in educational institutions has made their education difficult hence many of them are dropouts. Gender based negative experiences and exploitation by the public and school/college mates have made them introvert due to which they lead an isolated life in the community alone.

“Poverty and gender violence have made our life miserable. We often dream of a life where people accept us and give us equality everywhere. In spite of the government identifying us a minority group, we are unable to enjoy the minority privileges and rights. Maybe we are born to suffer “ – says Rishi ( Name changed )

**Discussion and Conclusion**

“Recognition of transgender as a third gender is not a social or medical issue but a human rights issue,” - Justice KS Radhakrishnan. The study finds that majority of the TG population are still in the lower strata of the society. Even though there are policies for the uplifting of TGs the ultimate effect is not much, progress yet to be achieved. The TGs should be given the right to identify themselves as male or female or as a Transgender itself. Equality before law, self respect and dignity should be guaranteed in all strata of the society by the government. Strong laws should be enacted and agencies to monitor the same. Many of them are unaware of the basic rights enshrined in the constitution of India. They feel themselves as downtrodden, the ugliest and aversive class in the community. Lack of support from the family and society is the most fundamental issue which should be addressed strongly and there should be government run shelter homes for them if they are forced to leave their home for the reason they have self identified/realized what their gender originally is.

**Ethical Clearance:** Taken from Human Ethics Committee, Dept of Social Work, AmritaVishwa Vidyapeetham, Coimbatore, Tamil Nadu, India

**Source of Funding:** Self

**Conflict of Interest:** Nil

**References**


Identification and Analysis of L1 Syndrome Features in Patients with Mental Retardation

Madhan Srinivasamurthy¹, Nagaraj Kakanahalli¹

¹Research Scholar, ²Professor, Molecular Genetics Laboratory Department of Applied Zoology, Kuvempu University, Jnanasahyadri, Shankaraghatta, Shivamogga, Karnataka, India

Abstract

Background: L1 syndrome is an X-linked disorder with a spectrum of phenotypic features such as mental retardation, X-linked Hydrocephalus, Spastic paraplegia, Aphasia, and Adducted thumbs. The phenotypes are overlapping and Mental retardation is the most common symptom among individuals with the L1 syndrome. The L1 syndrome is caused by the mutations in the L1CAM gene and L1CAM gene is involved in the development of the nervous system.

Aims: The objective of the present study was to identify the L1 syndrome features in Mental retardation, and to assess the correlation between individual L1 syndrome features with mental retardation.

Method: We first identified the mentally retarded patients in various clinics, hospitals, and schools run by NGOs in Karnataka. Segregated the patient’s data based on the number of L1 syndrome features. And a detailed family history of the patients was collected and recorded.

Results: It was found that 77.39% of the MR patients have shared one or more clinical features of the L1 syndrome. Among them, 31.87% of patients have aphasia, 23.50% of patients have spastic paraplegia, 8.36% of patients have adducted thumb. The mean age at the referral of the patients was 14.53±5.53.

Interpretation & conclusions: This data revealed the co-occurrence of L1 syndrome features with Mental retardation. And the percentage of L1 syndrome features like Hydrocephalus, Aphasia, Spasticity, Adducted thumb, with mental retardation, is varied.

Keywords: Hydrocephalus, Aphasia, Spastic Paraplegia, Mental retardation.

Introduction

The hereditary neurological disorders are a diverse group of syndromes that often share common features such as Mental retardation, Brain malformations, Sensory disturbances, and muscle weakness. L1 syndrome is an X-linked inherited disorder that primarily affects the nervous system. The mutations in L1CAM gene cause L1 syndrome, and responsible for a wide spectrum of neurological abnormalities, which include mental retardation [1-2].

Studies have provided evidence for the involvement of L1 CAM mutations in various X – linked mental retardation syndromes [3]. Mental retardation is a common clinical feature of most neurological diseases. In India, there are 1.5 crore people suffering from severe mental disorders [4].

The genetics of mental retardation turns to be remarkably complex since it can result from causes...
as different as chromosomal abnormalities, genomic imprinting mutations, polymorphic repeat expansions or point mutations. Up to 28-30% of all Mental retardation cases arise due to chromosomal abnormalities. Despite that identification of a number of genes, the biological basis of the condition remains unknown, the using of molecular genetics techniques help in understanding the pathogenesis of mental retardation.

Progress in delineating the genetic basis of inherited forms of mental retardation is at present largely restricted to cases of X-linked mental retardation (XLMR), because the only X-linked recessive disease is compatible with the occurrence of affected members in multiple generations. The L1CAM gene on X-chromosome involved in causing mental retardation and also development of a group of syndromes like X-linked hydrocephalus, Spastic paraplegia, MASA Syndrome.

There have been numerous reports of families with similar forms of sex-linked mental retardation and other developmental anomalies that affect the nervous system. While the spectrum of clinical features varies, certain characteristics are common. Affected males generally have a low IQ (20-50). They might also have enlarged or asymmetric heads, Spasticity, Aphasia, and Adducted thumbs. Many families have hydrocephalus as a regular occurrence, but not necessarily in all affected individuals. The objective of the present study was to identify and co-occurrence of the L1 syndrome features in Mental retardation. And to analyze the relationship between L1 syndrome features with mental retardation.

Material and Method

Study design

The present study was approved by an Institutional Ethical Committee of the University (KU/IEC/05-09/2014-15). The study samples primarily comprised of patients with Mental retardation. In this present study, we have covered seven Hospitals in four Districts of Karnataka.

Procedure:

We surveyed more than 146 mentally retarded patients and, under L1 syndrome diagnostic criteria 113 L1 syndrome patients have been identified. Among them, some of the patients were previously diagnosed by the Doctors and some of the patients were identified with the help of doctors and clinical diagnosis. In order to collect the clinical data, the standardized questionnaire was prepared and a detailed family history of the patients was collected and recorded. All subjects have given written informed consent. The medical records were reviewed carefully for the presence of L1 syndrome symptoms. And also each patient was examined for the presence of any L1 syndrome symptoms like Hydrocephalus, Adducted thumbs, Spasticity, Aphasia, Shuffling gait, Anteverted hips, and shoulders.

Statistical Analysis

Data were analyzed using SPSS 20.0. Segregated the collected data and analyzed the phenotypes by using frequency distribution. The mean value and standard deviation (SD) were calculated for each case and each L1 syndrome feature was statistically compared using Student’s t-test.

Results

Clinically the patients were subdivided into 2 categories: 1. Isolated Mental Retardation (Mental retardation without L1 syndrome features) (22.6%). 2. Mental retardation with L1 syndrome features (77.39%) (Fig. 1).

Over 77% of the Mental retardation patients displayed a combination of various L1 syndrome features. So, the rate of the predominance of the L1 syndrome in mentally retarded patients is high, suggesting that the mental retardation is one of the primary and common clinical clues to identify the L1 syndrome patients.

Isolated Mental Retardation (Mental retardation without L1 syndrome features):

Among 146 patients 33 patients suffered from isolated Mental retardation. The family history of the 13 patients (39%) were positive. The IQ was assessed and found to be mild (57.7%), moderate (33.3%) and severe (9%).

Mental retardation with L1 syndrome features:

The patient data was analyzed based on clinical features. Among 146 patients 113 patients have shared one or more clinical features of the L1 syndrome (Fig 1). 80 MR patients have aphasia, 59 MR patients have spastic paraplegia (Fig 1).
Fig. 1: L1 syndrome features in Mental retardation

Present data shows that the IQ range of L1 syndrome patients, 50.44% were moderately affected, 30% were mild, and 19.46% were severely affected. Here, the prevalence of moderately and severely affected patients in L1 syndrome condition was more (70%) compared to isolated MR condition (42.3%).

Table 1 depicted the mean carries prevalence according to the types and severity of the L1 syndrome features. The mean of MR patients and L1 syndrome patients were 0.97±0.16 and 3.18±1.78 respectively, and the patients who have MR+L1 syndrome feature had the highest score. There was a statistically significant difference among them (p<0.05). Based on the types of L1 syndrome features, there was a statistically significant difference for the mean of all feature. Patients with MR + Aphasia had the highest mean score 0.55±0.49. However overall mean score of MR+L1 syndrome features were high 3.18±1.78 and this score was statistically significant.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean±SD</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR</td>
<td>0.97±0.16</td>
<td>0.083</td>
</tr>
<tr>
<td>MR + L1 syndrome features</td>
<td>3.18±1.78</td>
<td>0.000*</td>
</tr>
<tr>
<td>Types of L1 syndrome features</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MR + Hydrocephalus</td>
<td>0.03±0.16</td>
<td>0.045*</td>
</tr>
<tr>
<td>MR + Spastic paraplegia</td>
<td>0.23±0.42</td>
<td>0.001*</td>
</tr>
<tr>
<td>MR + Aphasia</td>
<td>0.55±0.49</td>
<td>0.05*</td>
</tr>
<tr>
<td>MR + Adducted thumbs</td>
<td>0.14±0.35</td>
<td>0.09</td>
</tr>
<tr>
<td>MR + Anteverted hips/shoulders</td>
<td>0.15±0.35</td>
<td>0.09</td>
</tr>
<tr>
<td>MR + Constipation</td>
<td>0.03±0.18</td>
<td>0.025*</td>
</tr>
</tbody>
</table>

MR: Mental retardation; SD: Standard deviation; *p≤0.05 statistically significant.

Patients displayed a maximum number of L1 syndrome features:

The 23 patients displayed a maximum number of L1 syndrome features (Table 2). Main L1 syndrome features included Spastic paraplegia, Aphasia, Adducted thumb, Anteverted hips/shoulders. Patient M3 had Spastic paraplegia, walking on toes with semi-crouched legs and his family history reveals 2 babies born died before the birth of patient M3, the reason unknown for this. Patient SS6 had an Adducted thumb, progressive stiffness and contraction in lower limbs, bowed knees, irregularly shaped pupils, and inability to speak, and died at the age of 3 years. Patient SEC1 presented walking disability, shuffling gait, inability to speak. The older sister of the patient SEC46 had similar phenotypic features. The patient M5 display congenital Hydrocephalus with the Adducted thumb, Mental retardation, and Aphasia.
Table 2: Patients displayed the maximum number of L1 syndrome features

<table>
<thead>
<tr>
<th>Patient Number</th>
<th>Clinical Features</th>
<th>No. of L1 syndrome features</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3</td>
<td>+</td>
<td>5</td>
</tr>
<tr>
<td>SS6</td>
<td>+</td>
<td>5</td>
</tr>
<tr>
<td>SEC1</td>
<td>+</td>
<td>5</td>
</tr>
<tr>
<td>SEC46</td>
<td>+</td>
<td>5</td>
</tr>
<tr>
<td>SEC49</td>
<td>+</td>
<td>5</td>
</tr>
<tr>
<td>SEC61</td>
<td>+</td>
<td>5</td>
</tr>
<tr>
<td>M5</td>
<td>+</td>
<td>5</td>
</tr>
<tr>
<td>M7</td>
<td>+</td>
<td>4</td>
</tr>
<tr>
<td>VMH-C</td>
<td>+</td>
<td>4</td>
</tr>
<tr>
<td>A1</td>
<td>+</td>
<td>4</td>
</tr>
<tr>
<td>A5</td>
<td>+</td>
<td>4</td>
</tr>
<tr>
<td>A12</td>
<td>+</td>
<td>4</td>
</tr>
<tr>
<td>A20</td>
<td>+</td>
<td>4</td>
</tr>
<tr>
<td>SEC6</td>
<td>+</td>
<td>4</td>
</tr>
<tr>
<td>SEC7</td>
<td>+</td>
<td>4</td>
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<tr>
<td>SEC8</td>
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<td>SEC9</td>
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<td>4</td>
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<td>SEC16</td>
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<td>SEC34</td>
<td>+</td>
<td>4</td>
</tr>
<tr>
<td>SEC45</td>
<td>+</td>
<td>4</td>
</tr>
<tr>
<td>SEC60</td>
<td>+</td>
<td>4</td>
</tr>
</tbody>
</table>

Age at referral for diagnosis:

The age at referral for diagnosis of L1 syndrome patients was available (n=113/146) and the range was highly variable (2.0-32.0 years, mean = 14.5 years); 32 patients (28.31%) were referred at ≤ 10 years of age, 55 patients (48.67%) between > 10 and ≤ 20 years of age, 18 patients (15.9%) between > 20 and ≤ 30 years of age, and 08 patients (7.07%) were > 30 years of age (Fig. 2). In MR with L1 syndrome condition the patients aged >30 years were found to be 7%, while in isolated MR condition patients aged >30 years were found to be 27%.

Discussion

We report a cohort of patients with Mental retardation. Some types of human Mental retardation and brain malformations are found to be due to mutations
that affect the neural cell adhesion molecule L1 \[13\]. These mutations in the L1CAM gene lead to developing an L1 syndrome. Preliminarily we identify the L1 syndrome patients based on several phenotypes like, Mental retardation, Hydrocephalus, Aphasia, Spasticity, Epilepsy, Adducted thumb, etc., and the patients or MR children who had more than three symptoms, indicates the particular patient suffering from L1 syndrome \[14-15\]. Results showed that 77.39% of the MR patients had more than one L1 syndrome characteristic and the severity of the L1 syndrome is found to be high.

Affected males generally have a low IQ \[10\]. In the present study, it was observed that 50.44% of the L1 syndrome patients have an IQ range below 70, and 19.46% of patients have an IQ range below 35 (severe). Moderate IQ patients were more in L1 syndrome condition while mild ones are more (57.7%) in isolated MR condition.

In L1 syndrome, the spectrum of clinical features varies, that certain characteristics are common \[10\], and it is in congruent with the present study. MR was the most common disability among the patients examined followed by with spasticity in lower limbs (p<0.001), Aphasia and Adducted thumb (p<0.05). Many families have hydrocephalus as a regular occurrence, but not necessarily in all affected individual \[10\] (p=0.045). Followed by Anteverted hips/shoulders (p<0.004) highly significant with other L1 syndrome symptoms.

A combination of patients with positive family history and more than three L1 syndrome characteristics was considered as a severe L1 syndrome condition \[14\]. The present study revealed similar results 83% of the MR patients associated with more than three L1 syndrome features and 53% of the patients had more than four features with nearly 48% of the patients had a positive family history. 55% of the patients were found to have consanguineous parents or marriages.

In L1 syndrome patients, only 7.07% of the patients found to be above 30 years of age. It was much variable compared to isolated MR condition (27.2%). It suggests that the survival of the MR patients with L1 syndrome condition has shown to be decreased in contrast to isolated MR patients.

Finally, it should be noted that MR is the primary symptom in L1 syndrome condition but the severity of the L1 syndrome is significantly dependent on a number of associated characteristics. And more than four L1 syndrome characteristics in an individual MR patient strongly predict the severity of the L1 syndrome.

**Conclusion**

To the best of our knowledge, only two to three studies \[3,17,18\] reported from India. The present study is first of its kind from the southern region of India to identify the L1 syndrome patients based on clinical characteristics. Our findings support that L1 syndrome is associated with widely heterogeneous phenotypes \[16\]. This data revealed that the co-occurrence of L1 syndrome features in mental retardation is varied.

Identifying L1 syndrome symptoms and L1 CAM mutations in the L1CAM gene would enable us to offer prenatal diagnosis and genetic counseling for families at high risk and also create awareness and guidance among the parents and society.

**Future prospects of the study:**

Since there is no biochemical marker, molecular analysis of the L1 CAM gene is the only way to diagnose affected individuals \[19,20\]. Hence, the present study is the first step to identify the L1 syndrome features among MR individuals and diagnose the affected families. Therefore, all male patients with two or more clinical signs typical for the L1 disease should be screened for L1 CAM gene mutations.

**Conflict of Interest:** We declare that we have no competing interests.

**Source(s) of Funding:** University Grants Commission (F. No. 41-95/2012 SR), New Delhi, India.

**Ethical Clearance:** The present study was approved by an Institutional Ethical Committee of the University (Reference number KU/IEC/05-09/2014-15) and Shivamogga Institute of Medical Sciences (SIMS), Shivamogga.

**Acknowledgment:** We are thankful to the University Grants Commission (F. No. 41-95/2012 SR), New Delhi, for financial support.

**References**


Adoption of Telemedicine among Dental Healthcare Professionals

Preeti Y Shadangi, Manoranjan Dash, Prof. Ayasakanta Mohanty, Jyoti Ranjan Das, Sunil Kar, Bibhuti Bhusan Mishra

Abstract

Telemedicine system within the healthcare organization are gaining momentum growth as healthcare organizations need to cut their expenditure and improve efficiency in health care services to patients remotely. The purpose of this study is to provide insights into factors affecting the adoption of telemedicine in India among Dental health care professionals working in different dental colleges and hospitals. The study proposed a model to explain the adoption of telemedicine by taking 151 dentists from India and incorporating the variables of perceived usefulness, perceived ease of use, perceived risk, perceived cost, compatibility and trust. These construct explained adoption of telemedicine in delivering the dental services remotely to patients. Trust and risk were the most significant antecedents explaining the adoption of telemedicine.

Keywords: Telemedicine adoption, Trust, Perceived usefulness, Structural Equation model.

Introduction

Telemedicine being valued as a effective digital tool to provide health care services remotely to patients where patients will not be waiting in a queue for hour . As per survey conducted by Deloitte’s of US Physicians, 23% patient had visited video visit and 14% physicians as video visit capability. This indicates the technology has not reached the point of mass adoption and use. Telemedicine is the use of ICT provide healthcare when distance separates the patients. Telemedicine is defined as the use of “the use of electronic information and telecommunications technologies to support and promote long-distance clinical health care, patient and professional health-related education, public health and health administration”. There has been a tremendous increase in demand of telemedicine for healthcare services, both nationally and globally. This sector has been growing at a tremendous pace, with the industry to touch $280 billion by the end of 2020, according to Statista.com. In India, though the healthcare sector is seeing a giant leap in providing services to the consumers, it has still not been able to expand its market in rural areas. Around 75 percent of the rural population is struggling with insufficient infrastructure and technological awareness. In such a scenario, where penetration of healthcare services hardly lives up to the mark, the concept of telemedicine makes so much sense. India has large shortage of doctors where 12,000 ophthalmologists are present in India and practicing mostly in urban areas. Teleophthamology is a new branch of telemedicine which has been successfully implemented in Tamilnadu for providing health care services to rural people. Telemedicine is broad area, but there are limited data on its clinical effectiveness and cost effectiveness of the telemedicine applications. Many benefits of telemedicine are access to information, improved access to services, improved professional education and reduced health care costs. It has many drawbacks i.e. breakdown of
relationship between health professionals and patients. Access to qualified healthcare providers, specialized consultation, timely diagnosis, accurate prognosis, effective course of treatment, and lots more can benefit rural folk and bring down the disparity in healthcare offerings between the rural and urban areas. The current technology penetration, growing population, advancing economy, and accelerating healthcare industry are all responsible for the increased demand in digital healthcare. The objective of the study is to find out the factors affecting adoption of telemedicine by the dental health care professionals working in different dental colleges and hospitals.

**Literature Review**

Ray et al (2017) studied on family perspectives on telemedicine for pediatric subspecialty care, telemedicine programs provides many facility and the options for the choice of health care delivery by patients. It is very crucial to understand perceptions and preferences which is crucial to ensure good health care delivery to patients. Pedrosa et al (2017) integrate telemedicine program with other programs thus leading to improved outcomes of pediatric patients with cancer. Yen et al (2015) The study was to explore the factors influencing physician’s intention of adopting telemedicine and they had included the TPB(Theory of Planned behavior) model. Attitude, subjective norm, perceived behavioral control were positively related to behavioral intention. Different strategies has been formulated for experienced and non experience physician’s. Judy K. Qiang, Connie Marras (2015) study of telemedicine in Parkinson’s disease found patients preferred a combination of tele-health and in-person visits. Training of nurses is an important determinant of patient satisfaction. Clinicians should consider offering telehealth to all patients for whom it is medically appropriate, especially those who experience long travel times. Mi Jung Rho1, In young Choi1, Jaebeom Lee (2013) found perceived usefulness of telemedicine directly impacted the behavioral intention to use it, and the perceived ease of use directly impacted both the perceived usefulness and the behavioral intention to use it. Dayani Jayasinghe, Richard M. Crowder, Gary Wills (2016) focusing understanding culture as important factor when implementing a telemedicine system in the rural areas of the country.

E Souza Carlos Henrique Amaral, Morbeck Renata Albaladejo (2017) found the barriers of telemedicine services are Lack of experience in the use of technology or the quality of internet signals, Multiplicity of different telemedicine platforms, Quality of image sent to the HT hospital and Political & legal issue. Rajesh et al (2015) in their study identified barriers in optimal use of telemedicine technology in health care delivery System in India are policy resources and socio-cultural levels. Successful implementation can be entailed if different stakeholders are taken into consideration i.e. doctors, paramedical and non paramedical staff, policy makers and the target community for whom it is design. Menachemi N et al (2004) identified five attributes affecting inovation adoption rates for the four adopter groups i.e physicians, patients, hospital administrators an payers. Zanaboni Pet al (2014) Telemedicine has been widely adopted due to geographical reasons but the level of use is very low and it is an alternative to face to face outpatient visits. Dash Manoranjan, Shadangi Y Preeti and Kar Sunil (2019) study on adoption of telemedicine has included the Theory of Planned Behavior (TPB) model and other predictors were included in the Extended model for predicting adoption of telemedicine among physicians.

**Material and Method**

The respondents included in the study were dental health professionals working in different dental colleges and hospitals. Stratified random sampling was used for selecting the respondents. Total 345 respondents participated from which only 151 questionnaires were accepted and analyzed. The reliability and validity of questionnaire was tested. The Cronbach alpha reliability was found to be .895 Structural equation modeling was used to validated the model to ascertain both stability and reliability of instrument. The respondents were asked on a 5 point likert scale with values ranging from (1 Strongly agree to 5 Strongly Disagree).AMOS 20 Software was used analyze the model and path analysis was done. Multiple regression analysis was done to find out the predictors on adoption of telemedicine. All the predictors were significant on the adoption of telemedicine.
### Table-1 Multiple Regression Analysis Model

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
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<th>Sig.</th>
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<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>4.682</td>
<td>1.373</td>
<td>3.842</td>
<td>.001</td>
</tr>
<tr>
<td>Perceived useffulness</td>
<td>.548</td>
<td>.035</td>
<td>.564</td>
<td>3.654</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>.313</td>
<td>.099</td>
<td>.321</td>
<td>3.215</td>
</tr>
<tr>
<td>Risk</td>
<td>.120</td>
<td>.017</td>
<td>.123</td>
<td>2.058</td>
</tr>
<tr>
<td>Cost</td>
<td>-.100</td>
<td>.032</td>
<td>-.173</td>
<td>-1.729</td>
</tr>
<tr>
<td>Trust</td>
<td>.623</td>
<td>.019</td>
<td>.710</td>
<td>2.102</td>
</tr>
<tr>
<td>Compatibility</td>
<td>.757</td>
<td>.039</td>
<td>.844</td>
<td>4.587</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Adoption of Telemedicine

The $R^2$ value was .547 which explained the 54% of the predictors explained in the model.

### Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.740</td>
<td>.547</td>
<td>.094</td>
<td>1.029</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Perceived usefulness, Perceived Ease of Use, Risk, Cost, Trust, Compatibility.

![Fig-1 SEM Path Analysis Model](image-url)
Structural equation Model Variables

| Adoption | M_PU | .313 | .035 | .851 | .001 |
| Adoption | M_PEOU | .215 | .029 | .723 | .001 |
| Adoption | M_RISK | .237 | .040 | .866 | .001 |
| Adoption | M_COST | .247 | .030 | .817 | .001 |
| Adoption | M_TRUST | .132 | .013 | .970 | .001 |
| Adoption | M_COMPATIBILITY | .139 | .023 | .919 | .001 |

As it was expected, the hypotheses of perceived usefulness (H1), Perceived ease of use (H2), Perceived Risk (H3), Compatibility (H4), Trust (H5), Cost (H6) had significant effect on the concept of adoption of telemedicine by dental professionals. Based on the results obtained from the analysis of structural model, perceived risk (0.65) was identified as the most influential factor in comparison to trust (0.42), perceived usefulness (0.34), perceived ease of use (0.32), cost (0.22), and compatibility (0.10).

Table-2 Statistics of Model Fit

<table>
<thead>
<tr>
<th>Model</th>
<th>Df</th>
<th>P</th>
<th>χ2/df</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Model</td>
<td>694</td>
<td>0.000</td>
<td>2.72</td>
<td>.82</td>
<td>.10</td>
</tr>
<tr>
<td>Independence Model</td>
<td>782</td>
<td>0.000</td>
<td>4.62</td>
<td>.00</td>
<td>.20</td>
</tr>
</tbody>
</table>

The Model has χ2/df value of 2.72 with a p value less than .0001. This indicates a good fit of the model. THE CFI (Comparative fit Index) value falls within the range from 0 to 1. RMSEA has a value of 0.10. The calculated p value is 0.073, which is greater than 0.05 which indicates perfect fit. The GFI (Goodness of Fit Index) value and AGFI (Adjusted Goodness of Fit index) value is greater than .9 which represents it is a good fit. The calculated CFI (Comparative Fit Index) is 0.978. It indicates the model is a good fit.

Discussion

The different factors as identified for adoption telemedicine by health care professionals are perceived cost, perceived risk, perceived trust, perceived ease of use, perceived usefulness, and compatibility. All factors identified had significant effects on the adoption of Telemedicine of this technology. The factor compatibility with the process of delivery health care services was identified as a factor for affecting adoption of telemedicine. Since the requirement of services varies among professionals so it is advised to try to differentiate services and offer services as per the requirement of the dental professional. Trust was identified as the influential factor. Most dentists are concerned about trust on technology while adopting the new technology and trusting technology is important while doing their jobs. Technology has to be more trustworthy. Perceived usefulness has a strong influence on adoption of technology as they get more advantage from the use of the technology. Perceived ease of use is an important factor in adoption of new technology. Perceived risk was identified as the factor in adoption of telemedicine adoption. As a result, the extent to which a person believes that the use of telemedicine will carry no security or privacy threats may be more significant in determining telemedicine usage intentions. So it is recommended to prove security of services and employ guaranteeing and motivational policies to reduce professional’s perceived risk. Improving working processes, reducing potential errors, and accuracy of treatment would be beneficial for reducing the risk.
Conclusion

The study found the factors that affect the adoption of telemedicine by dental health care professionals; It is useful for understanding healthcare professionals willingness for adoption of telemedicine in order to deliver dental services through remotely to patients. The model accurately predicts the adoption of telemedicine. Trust and risk are the important factors that affect the adoption of telemedicine. Telemedicine are well accepted by dental health care professionals.

Ethical Clearance: Not Required (It does not involve any experimental data collected from human as well as Animals. The data is collected from Dental health Care Professionals working in different Hospitals which purely their personal view or opinion which does not violate the ethical standards.)

Source of Funding: Self

Conflict of Interest: Nil

References


An Empirical Study on Association of Operational Efficiency and Customer Satisfaction in Tertiary Hospitals in Punjab

Pritpal Singh¹, Mohd Farhan², Mohammad Asif³

¹Assistant Professor, Mittal School of Business, LPU, ²Assistant Professor, Mittal School of Business, LPU, ³Assistant Professor, College of Administration and Finance Saudi Electronic University, Dammam, Kingdom of Saudi Arabia (KSA)

Abstract

Through this paper framework is created for association between efficiency and customer satisfaction in tertiary hospitals of Punjab. Efficiency is calculated using data envelopment analysis and satisfaction is measured using a structured questionnaire for inpatients of 8 tertiary hospitals of Punjab (3 from each region of Majha, Malwa and 2 from Doaba). Data envelopment analysis (DEA) is a non-parametric method of measuring operational efficiency of decision making units. DEA is having strong link to production theory in economics. DEA uses technique of linear programming for calculating relative efficiencies of decision making units working individually with respect to specified inputs and outputs. This paper analyzes the relation between hospital efficiency and customer satisfaction for highly efficient and less efficient hospitals in comparative perspective. The findings of paper indicate hospital efficiency observes some changes the way relationship is between patient satisfaction and institutional factor like specialized doctors and specialized equipment.

Keywords: Data envelopment analysis, Operational Efficiency, customer satisfaction

Introduction

Rising healthcare cost and quickly expanding medicinal services request have constrained human services specialist co-ops to concentrate more on both efficiency and quality to give tertiary dimension health awareness administrations. Effective use of assets has moved toward becoming issue for emergency clinics. Health care specialist organizations are typically compelled to build up their activities both in term of value and amount of their results. Availability of healthcare services is problematic in developing countries like India where bed to patient ratio is 1:1000 which comparatively very high as US and Japan. It is important to concentrate on maximum utilization of available resources while taking care of quality of service provided to customers. Recent research also indicates that focus on quality as well as quantity are essential dynamics of administrators.

The other inspiration driving this study has been to see how to address a portion of the concern of benchmarking under changing situation in the healthcare part (¹). With the opening of private medical coverage part in the post-liberalization period, the ideas of effectiveness with which the assets are utilized would expect more prominent importance in future. The requirement for creating proficiency parameters and foundation, which helps in positioning of health centers, is prone to accept basic significance (²).

Shortage of assets for human services is a very much recognized issue. In this unique circumstance, effective usage of existing money related and human resources ends up essential for reinforcing the medicinal services conveyance. The evaluation of effectiveness of wellbeing offices can direct leaders in guaranteeing the ideal usage of accessible assets (³). Information envelopment examination (DEA) has risen as a viable and mainstream strategy for assessing the effectiveness of basic leadership units (DMUs) in various areas including the wellbeing segment. There have been various examinations on evaluating the proficiency of clinics,
wellbeing focuses and the general medicinal services framework by utilizing DEA in various settings\(^{(4)}\). These investigations have been led in industrialized nations just as in center and low-salary nations, including India. A few analysts have likewise attempted broad surveys of productivity thinks about utilizing DEA in the medicinal services division\(^{(13)}\). In any case, up to this point there is no examination accessible on the effectiveness appraisal of medical clinics in Punjab, India.

Along these lines, the essential research addresses managing this study are as per the following:

**Is there any immediate or indirect effect of hospital efficiency on patient satisfaction**

**What sort of a relationship exists between specialized doctors and equipment’s availability and hospital center efficiency on patient satisfaction**

**Research Framework**

The proposed research framework of our study is presented in Fig. 1.

Three primary hypotheses are as follows

**H1.** Specialized doctor and equipment’s availability has a positive effect on patient satisfaction.

**H2.** Hospital efficiency changes the form of the relationship between. Specialized doctor and equipment’s availability and patient satisfaction as a moderator variable.

**H3.** Hospital efficiency is in correlation with specialized doctor and equipment’s availability

In some studies by researchers that some infrastructural factors like such as hospital size, teaching activity, and location might affect the patient satisfaction but patient satisfaction and efficiency are primary areas of our study but we include one institutional factor of hospital size in our study thus following model is used to find relation\(^{(5)}\).

\[
\text{Patient satisfaction} = f (\text{Specialized Equipments, specialized doctors, hospital efficiency, hospital size})
\]

**Material and Method**

Data for patient satisfaction is obtained from patients and patients companion of 8 tertiary hospitals of Doaba Majha and Malwa area of Punjab using structured questionnaire consisting of 42 questions which has been been framed evaluating each dimension, overall satisfaction and efficiency on the Likert scale ranging from 5 (mostly liked) to 1 (not liked), a sample of 780 patients are taken survey covers both private and public tertiary hospitals of Punjab, respondents are mostly in patients with minimum 1 day of stay in hospitals and from 4 different departments\(^{(6)}\).

Data envelopment analysis is used for evaluating efficiency of hospitals with set of input and output values for calculating efficiency, To Find operational efficiency Hospitals DEA frontier Software is used DEA Frontier software is developed and coded by Dr. Joe Zhu. It consists of a series of DEA models and is an Add-In for Microsoft Excel. (Dr. Joe Zhu is Professor of Operations Analytics in the Foisie Business School, Worcester Polytechnic Institute.). Inputs selected in calculating efficiency are No. of beds, Specialized doctors and No. of nurses there are various modes used to evaluate efficiency using DEA but we used Constant return to scale efficiency model in this paper.

Emergency clinics are considered to have extremely less power over their yields like inpatient days or releases. However, it is bound to expect that medical clinics have more power over the usage of assets. In this way, an info situated DEA show is broadly utilized for assessing the efficiencies of clinics. Likewise, in this paper, an info arranged DEA demonstrate has been viewed as proper. Nitty gritty discourse of DEA can be found in the investigations of Cooper et al\(^{(12)}\).
Output of DEA based model

Table 1: Contains efficiency calculated using detail input and output of hospitals for year 2017.

<table>
<thead>
<tr>
<th>DMU Name</th>
<th>Efficiency</th>
<th>RTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital 1</td>
<td>0.16751</td>
<td>Decreasing</td>
</tr>
<tr>
<td>Hospital 2</td>
<td>0.10648</td>
<td>Increasing</td>
</tr>
<tr>
<td>Hospital 3</td>
<td>0.44856</td>
<td>Increasing</td>
</tr>
<tr>
<td>Hospital 4</td>
<td>0.34000</td>
<td>Constant</td>
</tr>
<tr>
<td>Hospital 5</td>
<td>0.19493</td>
<td>Increasing</td>
</tr>
<tr>
<td>Hospital 6</td>
<td>0.30700</td>
<td>Increasing</td>
</tr>
<tr>
<td>Hospital 7</td>
<td>0.70850</td>
<td>Increasing</td>
</tr>
<tr>
<td>Hospital 8</td>
<td>0.26547</td>
<td>Increasing</td>
</tr>
</tbody>
</table>

Table 2: Input oriented CRS model target which explains for each DMU how much efficient input target as compared to their original utilization of resources is

<table>
<thead>
<tr>
<th>DMU No.</th>
<th>DMU Name</th>
<th>No. of beds.</th>
<th>Doctors</th>
<th>Nurses</th>
<th>Inpatients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hospital 1</td>
<td>326.31908</td>
<td>43.50921</td>
<td>326.31908</td>
<td>99201.00000</td>
</tr>
<tr>
<td>2</td>
<td>Hospital 2</td>
<td>40.46053</td>
<td>5.39474</td>
<td>40.46053</td>
<td>12300.00000</td>
</tr>
<tr>
<td>3</td>
<td>Hospital 3</td>
<td>98.68421</td>
<td>13.15789</td>
<td>98.68421</td>
<td>30000.00000</td>
</tr>
<tr>
<td>4</td>
<td>Hospital 4</td>
<td>300.00000</td>
<td>40.00000</td>
<td>300.00000</td>
<td>91200.00000</td>
</tr>
<tr>
<td>5</td>
<td>Hospital 5</td>
<td>65.78947</td>
<td>8.77193</td>
<td>65.78947</td>
<td>20000.00000</td>
</tr>
<tr>
<td>6</td>
<td>Hospital 6</td>
<td>21.49013</td>
<td>2.86535</td>
<td>21.49013</td>
<td>6533.00000</td>
</tr>
<tr>
<td>7</td>
<td>Hospital 7</td>
<td>46.05263</td>
<td>6.14035</td>
<td>46.05263</td>
<td>14000.00000</td>
</tr>
<tr>
<td>8</td>
<td>Hospital 8</td>
<td>151.31579</td>
<td>20.17544</td>
<td>151.31579</td>
<td>46000.00000</td>
</tr>
</tbody>
</table>

Findings

In first stage efficiency is calculated by data envelopment analysis constant return to scale model using multiple inputs and .The return to scale refers to changes in output as all factors changes by all proportions in input there is increasing return to scale decreasing return to scale and constant return to scale. Increasing return to scale means in input is doubled production will a\'is more than doubled, decreasing return to scale means if input is doubled production will be less than doubled[7], and Constant return to scale means output changes in
same proportion as compare from efficiency scores hospitals are divided into two categories highly efficient and less efficient

In second stage to investigate effect of hospital efficiency, specialized doctors, equipment’s on patient satisfaction following regression model is used

\[ Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_1X_2 \]

One of our research questions is how to examine effect of efficiency on patient satisfaction for that we used above written model in which \( Y \) is Patient satisfaction, \( X_1 \) is efficiency, \( X_2 \) is specialized doctors and \( X_3 \) is institutional factor hospital size. Term \( b_4X_1X_2 \) represent the moderator effect of hospital efficiency on relationship between patient satisfaction and availability of specialized doctors Value of efficiency, specialized doctor availability and institutional factor hospital size is mentioned in below mentioned table.

**Table 3: Data of efficiency, satisfaction, Hospital size and specialized doctors of 8 hospitals**

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Satisfaction(Y)</th>
<th>Efficiency(X1)</th>
<th>Hospital size(X3)</th>
<th>Specialized Doctors(X2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital 1</td>
<td>2.10</td>
<td>.37</td>
<td>1948.00</td>
<td>230.00</td>
</tr>
<tr>
<td>Hospital 2</td>
<td>1.50</td>
<td>.49</td>
<td>824.00</td>
<td>90.00</td>
</tr>
<tr>
<td>Hospital 3</td>
<td>2.00</td>
<td>.07</td>
<td>1003.00</td>
<td>70.00</td>
</tr>
<tr>
<td>Hospital 4</td>
<td>3.00</td>
<td>.11</td>
<td>380.00</td>
<td>55.00</td>
</tr>
<tr>
<td>Hospital 5</td>
<td>4.20</td>
<td>.25</td>
<td>355.00</td>
<td>90.00</td>
</tr>
<tr>
<td>Hospital 6</td>
<td>3.00</td>
<td>.14</td>
<td>300.00</td>
<td>34.00</td>
</tr>
<tr>
<td>Hospital 7</td>
<td>3.30</td>
<td>.31</td>
<td>110.00</td>
<td>20.00</td>
</tr>
<tr>
<td>Hospital 8</td>
<td>3.90</td>
<td>.11</td>
<td>100.00</td>
<td>40.00</td>
</tr>
</tbody>
</table>

In above mention table overall statistics of eight hospitals are mentioned which include value of patient satisfaction which is collected from questionnaire from patients and companion of 8 hospitals. Data of efficiency which is calculated using data envelopment analysis technique of using excel solver, size of hospital which is counted from number of beds in hospital and number of specialized doctors and in below mwnition table hospitals are divided into three categories of large sized hospital small sized hospital and mediem sized hospital based upon number of beds in hospitals.

**Table 4 Descriptive statistics of hospital efficiency, satisfaction**

<table>
<thead>
<tr>
<th>Hospital</th>
<th>HOSPITAL</th>
<th>Satisfaction(Y)</th>
<th>Efficiency(X1)</th>
<th>Hospital size(X3)</th>
<th>Specialized Doctors(X2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large sized Hospitals(3)</td>
<td>Hospital 1</td>
<td>2.10</td>
<td>.37</td>
<td>1948.00</td>
<td>230.00</td>
</tr>
<tr>
<td>Hospital 2</td>
<td>1.50</td>
<td>.49</td>
<td>824.00</td>
<td>90.00</td>
<td></td>
</tr>
<tr>
<td>Hospital 3</td>
<td>2.00</td>
<td>.07</td>
<td>1003.00</td>
<td>70.00</td>
<td></td>
</tr>
</tbody>
</table>
From the above mentioned it can be easily analyzed that small and medium size hospitals are having high efficiency and patient satisfaction as compared to large sized hospitals and if talk about specialized doctors and availability of specialized equipment’s however average efficiency and patient satisfaction is higher for small and medium size hospitals.

To study impact of efficiency, hospital size and specialized doctors on patient satisfaction we used regression in second stage the following model is used to analyze

\[ Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 \]

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>3.553</td>
<td>.259</td>
<td>13.737</td>
</tr>
<tr>
<td>size</td>
<td>-.33</td>
<td>.001</td>
<td>-2.186</td>
<td>-5.675</td>
</tr>
<tr>
<td>doctors</td>
<td>.426</td>
<td>.006</td>
<td>1.802</td>
<td>4.476</td>
</tr>
<tr>
<td>Efficiency</td>
<td>-.061</td>
<td>1.051</td>
<td>-.420</td>
<td>-2.531</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Satisfaction

This model is significant at \( p<.05 \) level here number of specialized doctors increases patient satisfaction providing support to hypothesis H1 \( b_2=.226 \). However hospital size is having negative impact on patient satisfaction \( b_3=-.033 \). But efficiency is not having significant effect on patient satisfaction there might be the case indirect relation between hospital efficiency and patient satisfaction. One of our major research question is how efficiency the form of relationship between no of specialized doctors and patient satisfaction to evaluate this second stage regression analysis is done with moderator effect. The equation is as follows for second stage regression analysis

\[ Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_1X_2 \]

Interaction term \((bX1X2)\) represent the moderator effect of hospital efficiency on the relationship between specialized doctors and patient satisfaction.
The second model is also significant and regression analysis result explains that efficiency is considered to be negative moderator between relation of number of specialized doctors and patient satisfaction. Results in table suggested that higher level of efficiency level of hospitals lessen the positive effect of specialized doctors on patient satisfaction. In this way, medical clinic productivity variable applies a negative control between accessibility of specialists and patient fulfillment\(^{(10)}\), as we theorized. Moreover, discoveries give the proof that medical clinic size has critical negative impact on patient satisfaction\(^{(11)}\). As connection among effectiveness and specialist is characterized by two techniques basically customary methodology and TQM approach. In request to think about these a connection between proficiency of medical clinics and number of specialist accessibility was dissected. As emergency clinics dependably work with various economies of scale relationship is established in term of clinic estimate relationship coefficients are analyzed and found that there was negative relationship between’s two variable for little size clinic as contended by conventional methodology no huge for medium measured and huge positive for huge size medical clinics\(^{(11)}\). There is contrast between connection of huge size and little size hospitals it implies customary methodology is upheld for little size medical clinics of value trade off while extensive emergency clinics work with TQM approach.

### Table 6: Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>3.481</td>
<td>.288</td>
<td>12.099</td>
</tr>
<tr>
<td></td>
<td>size</td>
<td>-.003</td>
<td>.001</td>
<td>-2.196</td>
</tr>
<tr>
<td></td>
<td>doctors</td>
<td>.030</td>
<td>.008</td>
<td>2.089</td>
</tr>
<tr>
<td></td>
<td>Efficiency</td>
<td>-3.081</td>
<td>1.233</td>
<td>-.486</td>
</tr>
<tr>
<td></td>
<td>moderator</td>
<td>-.354</td>
<td>.456</td>
<td>-.281</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Satisfaction

As connection among effectiveness and specialist is characterized by two techniques basically customary methodology and TQM approach. In request to think about these a connection between proficiency of medical clinics and number of specialist accessibility was dissected. As emergency clinics dependably work with various economies of scale relationship is established in term of clinic estimate relationship coefficients are analyzed and found that there was negative relationship between’s two variable for little size clinic as contended by conventional methodology no huge for medium measured and huge positive for huge size medical clinics\(^{(11)}\). There is contrast between connection of huge size and little size hospitals it implies customary methodology is upheld for little size medical clinics of value trade off while extensive emergency clinics work with TQM approach.

### Conclusion

Curiously, large size hospitals are not executing just as little and medium size medical hospitals regarding scale effectiveness. In this way, these medical hospitals don’t work at ideal scale estimate. As recommended, expansive size medical hospitals may frame littler patient consideration units inside their own association. Along these lines, extensive size hospitals not just dispense with the negative impact of their non-ideal scale measure, yet in addition they shape explicit treatment units for patients\(^{(11)}\). Then again, low specialized productivity of large-estimate emergency hospitals could be halfway clarified by the imperfection of result estimation. In second stage investigation we analyzed that particular specialists has positive effect on patient fulfillment, anyway effectiveness contrarily directs the relationship this implies understanding fulfillment changes because of accessibility of specialists may be affected by dimension of medical clinic productivity. So hospital clinics can chip away at lessening their procedure cost and on the off chance that quiet thinks proficiency starts things out for clinic, at that point it will make negative effect as a primary concern of patient. Just concentrating on the powerful usage of assets without fundamentally thinking about quality. Presently emergency clinic directors have a decision. They can overlook efficiencies and simply center around accomplishing high-est nature of consideration, or the other way around. Now an ideal arrangement may be “ideal consideration.” as Rewar, D. Indi-cated, “ideal consideration” could be accomplished by considering a “balance” among proficiency and quality. Further utilization of Linear Programming, Simulation displaying and other numerical devices can be valuable for operational booking, asset allotment investigation for medicinal services managers

### Conflict of Interest:

None Declared.

### Source of Funding:

Self

### Ethical Clearance:

Ethical Clearance—has been obtained from required institute and committee.
References


Determinants of Food Choice in a School Environment

Rashmi Bhatt¹, Jagmeet Madan², Panchali Moitra³

¹MSc. Specialized Dietetics, ²Principal and Professor, ³Assistant Professor; Department of Food Nutrition and Dietetics, Sir Vithaldas Thackersey College of Home Science (Autonomous), SNDT Women’s University, Mumbai

Abstract

Aim: The purpose of this study is to assess the consumption patterns of school canteen food among children aged 10-12 years in Mumbai city.

Methodology: A cross-sectional study was conducted among 300 children in the age group of 10-12 years to assess their food preferences in school canteen and tiffin through a self-administered questionnaire. Anthropometric measurements were taken. 20 schools across Mumbai were randomly selected to assess the school food environment. The canteen food menu was recorded through observation and classified into HFSS and Healthy foods. Perceptions of canteen operators regarding healthy foods were assessed through interviews. Adherence to Government’s guidelines for addressing the consumption of HFSS foods in schools was examined.

Results: Higher percentage of students from private schools are overweight or obese, as compared to government school students (p<0.005). 65% children carried HFSS foods in tiffin. A significant association was found between the frequency of eating at canteen and the type of school that the children belong to (p<0.005). 41.2% children who ate from the canteen more than 3 times a week were overweight. HFSS foods brought more sales to 78% of all participating schools. It was found that none of the 20 schools completely followed all the 7 guidelines addressing the consumption of HFSS foods in school canteens.

Conclusion: Easy availability and affordability of HFSS foods, combined with less availability of healthier food choices are contributing factors to increasing obesity among children. There is an urgent need for the enforcement of proper school canteen policies and modifications in the canteen services.

Keywords: Unhealthy foods, HFSS, school canteen, adolescents, food choice, obesity, government.

Introduction

Adolescence is a phase of multi-level growth and development. Risk-taking behaviour begins to develop in this age and there is a strong desire for social-evaluation and social-acceptance.¹ As they begin to lead a more personalized lifestyle, food preferences begin to change and there can be various determinants for this.

The globalization of fast foods has opened the gates for many alternatives to choose from, for every consumer.² Unhealthy food choices are one of the most important precursors of overweight, obesity and development of Non-Communicable Diseases.³ The rise in intake of HFSS foods i.e. High fat, high salt and high sugar foods and fast foods have led to an evolution in dietary patterns.

Adolescents spend 6-7 hours in a learning environment, 5 days a week.⁴ School policies and practices targeting nutrition and physical activity, are capable of meaningfully impacting students’ health.⁵ Thus, the school environment can have a significant role to play in developing the right eating habits and spreading awareness about the ill effects of unhealthy foods and for the promotion of healthy eating behaviours.

Corresponding Author:
Ms. Rashmi Bhatt
MSc. Specialized Dietetics, Department of Food Nutrition and Dietetics, Sir Vithaldas Thackersey College of Home Science (Autonomous), SNDT Women’s University, Mumbai.
Email id- rashmibhatt198@gmail.com

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Materials and Method

20 schools in Mumbai that provided the consent for participation were included in this study. 300 children from 2 government and 2 private schools aged 10-12 years, were selected via randomized cluster sampling, and administered a Multiple Choice Questionnaire. This comprised of questions regarding the frequency of carrying a tiffin to school, the types of food carried in tiffin, frequency of eating from school canteen or food sellers in the campus, most preferred food items, most popular foods available, and factors affecting their food choice. Anthropometric parameters of the children including height, weight, waist and hip circumference were measured.

The food menu of the 20 schools was recorded in an Observational Inventory, made by categorizing foods under ‘High fat’, ‘High salt’, ‘High sugar’ and ‘Healthy’.

Food Standards and Safety Authority of India (FSSAI) 2015 specifications for identifying HFSS foods were considered for the cut off values of nutrients. The food menu of the 20 schools was recorded in an Observational Inventory, made by categorizing foods under ‘High fat’, ‘High salt’, ‘High sugar’ and ‘Healthy’.

Canteen operators were interviewed using a Structured Interview Schedule to get an insight about their perceptions of healthy foods, demographics and sales of canteen, presence of canteen policies and other aspects related to canteen management.

The 7 guidelines laid down by the FSSAI in collaboration with the Ministry of Women and Child development for the quality, quantity and type of foods available in school canteens have been made mandatory to be followed by all schools. The Adherence to these guidelines was examined through interview and observation.

Findings

Anthropometric results

This study concluded that children studying in private schools had a higher weight, BMI, waist circumference, and hip circumference children from government schools (p=0.001), which is shown in Table 1. This highlights the possibility that those belonging to high socio-economic status, preferably studying in private schools, had a higher prevalence of overweight and obesity. The availability of unhealthy food options in tiffin, and more importantly in school canteens have been known to affect the weight status of children. It was found that 41.1% children who had the frequency of eating from the canteen more than 3 times a week were overweight and 31% were obese.

Affordability of HFSS foods

Higher socio-economic status (SES) would provide better affordability, which is one of the determinants of making food choices. Most of the HFSS foods are priced between 5 to 20 rupees, which makes it quite affordable to students, thereby facilitating more consumption.

The present study indicates that a higher percentage of government school children ate from the canteen 3 times a week or every day of school compared to children from private schools. (p<0.005). Figure 1 illustrates the frequency of eating from the canteen with a comparison between children from both the type of schools.

Figure 1: Accessibility of HFSS foods

Easy accessibility of unhealthy food options interferes with the possibility of making a healthier food choice. Location of the canteen contributes to the accessibility. Findings show that the 80% of schools that had a canteen within the school campus had 46% of HFSS foods in the menu. The remaining 20% schools with food stalls or vendors outside the campus or at the school gate, had 73% HFSS foods available. This compels the children to buy more HFSS foods than healthy foods because of the easy access.

Availability of HFSS foods

Across all school canteens surveyed in the present study, the canteen menu consisted of 60% foods that were...
HFSS foods. As shown in Figure 2, a higher percentage of government schools had high salt foods (71.40%) and all of them (100%) had high sugar foods available in their canteens, as compared to private schools who had a higher percentage of high fat foods available (100%). It has been found in multiple Indian and western studies that canteen food services offer unhealthy foods.9-12

Figure 2:

Another physical aspect of the school food environment that impacts the dietary habits of adolescent school children, is the tiffin box. 80% of the participating children carried tiffins to school, out of which 65% carried HFSS foods in their tiffin. Even when children are carrying tiffins, 86.8% of them still prefer to eat from the canteen. Thus, regardless of carrying a tiffin, children liked to indulge in canteen foods.

Lack of healthy food options

High fat and high salt foods from the canteen appeared to be favourites among children. (Table 1) Students’ preference for unhealthy foods has been found to influence what is sold in the canteens.13

This supports another finding of this study that a higher percentage of both government and private schools (74.15%) stated student demands and cost effectiveness as the key factors for determining the menu of the canteen.

As Table 1 shows, HFSS foods contributed to majority of the total canteen sales wherein more high salt and high sugar foods were sold in private schools than government schools. 18.7% of the schools also depended on easy methods of preparation and faster services as another important aspect of deciding the menu. This is where the proclivity for fast foods comes into the picture. Children stated their preference for canteen foods mainly for their taste, followed by lower costs, availability and convenience. These findings form a potential link between the demand and supply of unhealthy food options in schools.

![Availability of HFSS Foods in school canteens](image)

Table 1: Weight status, preferred canteen foods and canteen sales

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>Private School</th>
<th>Government school</th>
<th>Total</th>
<th>( \chi^2 ) value</th>
<th>P value ( (p&lt;0.005) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (n)</td>
<td>160</td>
<td>140</td>
<td>300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHILDREN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High waist circumference*</td>
<td>33 (20.2%)</td>
<td>11 (7.9%)</td>
<td>44 (14.5%)</td>
<td>14.306</td>
<td>0.003*</td>
</tr>
<tr>
<td>Over weight</td>
<td>46 (28.6%)</td>
<td>24 (17.1%)</td>
<td>70 (23.3%)</td>
<td>37.977</td>
<td>0.003*</td>
</tr>
<tr>
<td>Obese</td>
<td>51 (31.7%)</td>
<td>15 (10.7%)</td>
<td>66 (21.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAVOURITE CANTEEN FOODS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Fat food*</td>
<td>150 (93.8%)</td>
<td>126 (90%)</td>
<td>276 (92%)</td>
<td>1.427</td>
<td>0.232</td>
</tr>
<tr>
<td>High Salt foods</td>
<td>99 (61.9%)</td>
<td>41 (29.3%)</td>
<td>140 (46.7%)</td>
<td>31.862</td>
<td>0.001**</td>
</tr>
<tr>
<td>High Sugar foods</td>
<td>39 (24.4%)</td>
<td>26 (18.6%)</td>
<td>65 (21.7%)</td>
<td>1.482</td>
<td>0.223</td>
</tr>
<tr>
<td>Healthy foods</td>
<td>31 (19.4%)</td>
<td>60 (42.9%)</td>
<td>91 (30.3%)</td>
<td>19.483</td>
<td>0.001**</td>
</tr>
</tbody>
</table>
Table 1: Weight status, preferred canteen foods and canteen sales

<table>
<thead>
<tr>
<th>Canteen Sales</th>
<th>Total (n)</th>
<th>13</th>
<th>7</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Fat food</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>91.3%</td>
<td>97.2%</td>
<td></td>
<td></td>
<td>94.2%</td>
</tr>
<tr>
<td>4.661</td>
<td>0.031</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Salt food</td>
<td>7</td>
<td></td>
<td>50.9%</td>
<td>25.5%</td>
</tr>
<tr>
<td>20.284</td>
<td>0.001**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Sugar food</td>
<td>21.4%</td>
<td>7.1%</td>
<td>14.2%</td>
<td>20.284</td>
</tr>
<tr>
<td>Healthy food</td>
<td>10.1%</td>
<td>32.6%</td>
<td>21.3%</td>
<td>23.200</td>
</tr>
<tr>
<td></td>
<td>0.001**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*IAP z scores*: High waist circumference = >0.525, above 70th percentile

**Overweight** = 0.55-1.34 (males), 0.67-1.64 (females); **Obese** = >1.34 (males), >1.64 (females)

*High fat foods* = Vada pav, samosa, Frankie, bread pakoda, bhajiya, French fries

*High salt foods* = Fried rice, schezwan rice, noodles, Chinese bhel, manchurian, chips, wafers

*High sugar foods* = Chocolate, pastry, icecream, lollipop, ice candy, toffies, doughnut

*Healthy foods* = Idli, dosa, Veg paratha, Dal rice, Veg pulav, Roti sabji, upma, poha, khichdi, Veg sandwich, milkshake, fruits, egg.

Perceptions of canteen operators and barriers to change

Most of them believed that it was not feasible to offer healthy foods in a canteen. The cost effectiveness for each food item on the menu is a top priority. Apart from this, several barriers are faced by the canteen operators, the major one being the singular role of school principal in the final decisions of canteen services which deprived them of flexibility of frequent experimentations. Lack of response on the side of children to buy new, healthier substitutes on the menu was another issue. The logistics involved for introducing new, healthy options put a speed breaker in making even the slightest change.

Adherence to government guidelines

The present study is one of the first Indian studies to evaluate the adherence to these 7 specific guidelines by the schools. It was found that none of the 20 schools completely followed all the 7 guidelines. Figure 3 clearly indicates that Guideline 1, which bans the sale of HFSS foods in school canteens was clearly not followed by 90% of schools. Evidently, there is a lack of enforcement of these guidelines and recommendations.

Figure 3:

Role of school authorities

In the present study, in spite of the presence of a school canteen policy and a school canteen committee in 60% of schools, out of which 92% are private schools, more than half of the menu (52%) contains of foods high in fat. The proportion of healthy food choices available in school canteens is scanty.

Also, there is no involvement of parents, student representatives and nutritionists in the school canteen committee of any school.

Conclusion

A significant population of this age group is already on the borderline for obesity and continued exposure to unhealthy food and faulty dietary behaviours will accelerate the issue. Along with the affordability of HFSS foods, the easy availability is a major setback. Schools being an impactful centre for learning, do not have efficient strategies to ensure development of healthy food habits in children.

Interactive promotional activities for encouraging healthy food habits among children can model healthy food environments in schools as well as homes. Nutrition
education and awareness can prove to be influential.

Presence of HFSS foods in tiffin highlights the fact that parental education and willingness of implementing nutrition based practices at the home front is equally important to target.

These findings point to the need to create effective school food policies in Indian schools to provide a healthy school food environment. Future research is required to test the feasibility of the implementation of school food policies and to address the issues in implementation of the same.

**Ethical Clearance:** Approval taken from Inter System Biomedica Ethics Committee (ISBEC), Mumbai.

**Conflict of Interest:** Nil

**Source of Funding:** Self

MSc. Specialized Dietetics, Department of Food Nutrition and Dietetics, Sir Vithaldas Thackersey College of Home Science (Autonomous), SNDT Women’s University, Mumbai. Address for correspondence-D/702, Surbhi Apartments, Aadarsh Lane, Goraswadi, Behind PVR Milap, Malad (west), Mumbai-4000064.

**References**


Assessing the Future Assessors: A Health Literacy Assessment Using the Newest Vital Sign

Rathnakar P Urval¹, Priyanka Kamath², Medha Urval³, Kashvi Gupta⁴, Ashwin Kamath⁵

¹Professor & Head, Department of Pharmacology, Kanachur Institute of Medical Sciences, Deralakatte, Mangalore, Karnataka, India, ²Assistant Professor, Department of Pharmacology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, India, ³Junior Resident, Department of General Surgery, SDM College of Medical Sciences, Dharwad, Karnataka, India, ⁴MPH Student, School of Public Health, University of Michigan, Ann Arbor, MI 48109, USA, ⁵Associate Professor, Department of Pharmacology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, India

Abstract

Background & Aim: Health literacy (HL) has been defined as the ability to obtain, process, and understand basic information and services needed to make appropriate health decisions. This study aimed to determine the HL of undergraduate medical students using the Newest Vital Sign (NVS), a nutrition label-based HL tool.

Method: This was a cross-sectional study conducted among newly admitted first year medical students using the Newest Vital Sign. Following informed consent, under supervision, the participants were handed over the nutrition label with six questions. Questions were asked in sequence, and continued even if the participant did not get the first or the second question right. If a participant got the first four questions right, it was considered a sign of adequate literacy.

Results: The study involved 110 participants out of which 72 were females. Overall, 87% of the participants had adequate health literacy, 11% had a possibility of limited health literacy, and less than 2% had a likelihood of limited health literacy. The mean of the total time taken to answer the questionnaire was 9.89 ± 2.25 minutes. More than 50% of the participants answered the questionnaire in the time range of nine to eleven minutes. Only <25% participants took longer than ten minutes to solve the questionnaire.

Conclusion: It was observed that more than 85% of the participants had an adequate level of health literacy. NVS, which is based on a nutrition label, is a very simple tool, and the test can be easily administered in ten minutes.

Keywords: Newest Vital Sign, Health Literacy, Students, Education, Time

Introduction

Health literacy [HL] is defined as the ability to obtain, process, and understand basic information and services needed to make appropriate health decisions.¹ Many aspects of health like health knowledge, health status, use of health facilities and cost have been found to be closely related to HL levels by many studies.² Health literacy is itself dependent upon more general levels of literacy. Even people with adequate literacy skills may not understand medical vocabulary and the basic concepts in health and medicine.³

Adequate health literacy is important as one has to frequently fill various registration forms in the hospital, sign consent forms, read food and medicine labels and inserts, understand physician’s instructions and various
healthcare messages which often are text based. People with limited health literacy are more likely to make medication errors, and they have less health knowledge, worse health status, more hospitalizations, and higher healthcare costs than people with adequate literacy.4

Many tools are available to test health literacy, but many a times the application of these tools may not be practical in a busy outpatient department (OPD) setting due to time constraints.5 In 2005, Weiss (Pfizer Inc.) developed a new screening instrument based on a nutrition label usually present on an ice cream container, the Newest Vital Sign (NVS), to assess level of health literacy.4 The Newest Vital Sign is a simple and fast way to identify those with limitations in health literacy skills. The tool, which tests literacy skills for both numbers and words, has been validated against a previously validated measure of health literacy, Test of Functional Health Literacy in Adults (TOFHLA), and has been shown to take approximately three minutes to administer.6

The objective of our study was to determine the health literacy of newly enrolled undergraduate medical students using NVS. This student population represents well-educated individuals with limited exposure to the complex medical terminologies; it is expected that they would be able to easily understand the information presented in the nutrition label. Since an earlier study had shown the health literacy may not be adequate even in highly educated individuals and no study has been done in the Indian population using NVS, the data from the current study would provide a rough, although limited, measure of health literacy in well-educated individuals as assessed using NVS.

Materials & Method

This was a cross-sectional study conducted among newly admitted first year (first semester) medical students, using the Newest Vital Sign (Copyright Pfizer Inc.; used with permission). It consists of an ice cream nutrition label which is provided to the participant, and six questions are asked to determine their understanding of the nutrition label. After seeking approval from the Institutional Ethics Committee, volunteers who consented to participate were recruited into the study. The test was administered by the study investigators. After obtaining the informed consent, the demographic data of the participant was recorded and NVS was administered.

The participant was handed over the ice cream nutrition label, which was retained with the participant for the entire duration of the test. The test contained six questions; the participant was allowed to refer the label as often as desired, during the course of the test. No upper time limit was set in which the test had to be completed. However, if the participant was still trying to solve the first or second question at the fifth minute, the likelihood of the participant having limited literacy was considered high. Questions were asked in sequence, and continued even if the participant did not get the first or the second question right. If the participant got the first four questions right, it was considered a sign of adequate literacy.

No prompts were given if a participant found it difficult to answer a question. The participants were not told if they’ve answered a question correctly or not at the end of each question. The score was not revealed to the participants until the entire test was completed. The maximum possible score was six (one mark per question). A score of 0–1 suggests high likelihood of limited health literacy; 2–3, possibility of limited health literacy; and score of 4–6, sign of adequate health literacy. The data was analysed using SPSS version 11.5 (Chicago, IL, USA). Descriptive statistics were used to present the results. The comparison of the scores between the gender groups was done using Student’s t-test. A p-value <0.05 was considered statistically significant.

Results

The study involved 110 participants out of which 72 (65.45%) were female. Eleven out of the 110 participants were Malaysians. Barring two participants, the medium of instruction of all the other participants was English.

Table 1 shows the number of participants who correctly answered each of the questions. Overall, 87% of the participants had adequate health literacy, 11% had a possibility of limited health literacy, and less than 2% had a likelihood of limited health literacy. The mean score was 5.00 ± 1.38 in males and 5.07 ± 1.23 in females (p = 0.787).

The mean time taken to answer the questionnaire was 9.89 ± 2.25 minutes. There was no significant difference in time required for completion of the questionnaire between males and females (p = 0.715). More than 50% of the participants answered the questionnaire in the time range of 9–11 minutes. Only about 25% of the
participants took longer than 10 minutes to answer the questionnaire.

**Table 1. Number (%) of correct responses provided by first year undergraduate medical students to the Newest Vital Sign questionnaire**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Correct Answer</th>
<th>Number of correct responses (%) [n=110]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. If you eat the entire container, how many calories will you eat?</td>
<td>1,000</td>
<td>101 (91.81)</td>
</tr>
<tr>
<td>2. If you are allowed to eat 60 g of carbohydrates as a snack, how much ice cream could you have?</td>
<td>Any of the following is correct:</td>
<td>90 (81.8)</td>
</tr>
<tr>
<td>- 1 cup (or any amount up to 1 cup)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Half the container</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42 g of saturated fat each day, which includes 1 serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day?</td>
<td>33</td>
<td>97 (88.18)</td>
</tr>
<tr>
<td>4. If you usually eat 2500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving?</td>
<td>10%</td>
<td>84 (76.36)</td>
</tr>
<tr>
<td>Pretend that you are allergic to the following substances: Penicillin, peanuts, latex gloves, and bee stings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Is it safe for you to eat this ice cream?</td>
<td>No</td>
<td>95 (86.36)</td>
</tr>
<tr>
<td>6. Why not?</td>
<td>Because it has peanut oil.</td>
<td>88 (80)</td>
</tr>
</tbody>
</table>

**Discussion**

Health literacy has emerged as a concept that could play a vital role in improving health care system delivery and health status of the public in general. Lower levels of health literacy has been seen to be associated with worse outcomes, increase in emergencies, along with lesser use of preventive services. Instruments such as the Rapid Estimate of Adult Literacy in Medicine (REALM), Short-TOHFLA (S-TOHFLA) have been developed to test health literacy. However, there is no gold standard tool to determine the same.

NVS has not yet been widely tested in our country. In a study conducted in a tertiary care hospital, using the REALM questionnaire it was observed that more than 50% patients had a below average health literacy, though it was better in the younger age group (<25 years), compared to older adults. A striking fact was similar observation to earlier studies, where in general education of the patient did not exactly reflect the health literacy levels; even an individual with a post graduate qualification had a low health literacy.

NVS is a relatively simple tool to study health literacy which has the advantage of not being time consuming to administer and tests prose literacy, numeracy, and document literacy skills. In our study, first year medical students who had recently joined the course were chosen to participate as this group of young adults would not have received more than three months of medical education at the time of the conduct of the study. Hence, they could be considered to represent any well-educated young adult. This study showed no difference between male and female participants in health literacy similar to an earlier study which had reported no difference in HL among male and female participants. Overall, 87% of the participants had adequate health literacy, 11% had
a possibility of limited health literacy, and less than 2% had a likelihood of limited health literacy. In an earlier study the average time taken to complete NVS was observed to be 2.63 minutes. However, in our study the average time taken was 9.89 minutes.

The use of an ice cream label is especially relevant as prior research has shown that a lower level of comprehension of food labels correlated highly with low-level literacy and numeracy skills. It was observed that 89% of the study population used food labels, which makes the NVS a tool that patients can easily relate to. The study also found that even persons with good reading skills could have difficulties interpreting food labels.

Our study has certain limitations. The results of our study do not represent the health literacy status in the general population or the patient population. Moreover, the young medical students may have been able to relate better to the food label used to assess the health literacy but the same many not be suitable in the general population where reading food label is not a routine practice. The results are also not generalizable to students from other disciplines. However, considering that there are hardly any health literacy studies conducted in India using NVS, our study provides a rough estimate of the health literacy status in a well-educated medical student population. Our study also showed that NVS is a simple and rapid test to administer.

An earlier study conducted to study the difference in the Short Test of Functional Health Literacy in Adults (S-TOFHLA) and NVS, among and between a sample of English and Spanish-speaking patients showed that the results pertaining to levels of health literacy were likely to vary depending on the instrument used. A similar observation was made in another study which compared S-TOFHLA and NVS among children caregivers. The NVS was found to be more sensitive in picking up limited health literacy levels in younger population. This is another factor that needs to be kept in mind when a tool to assess health literacy is administered. A study conducted in Japan with a Japanese version of NVS demonstrated good validity and reliability. This test has also been found to be a valid measure of health literacy in the UK, along with being easy to administer and rapid. However, this is yet to be validated in India, for which further studies with larger sample size that is representative of different population and groups, are needed.

**Conclusion**

This study was carried out to study the health literacy level among first year medical students using the nutrition label-based NVS tool. It was observed that more than 85% of the participants had an adequate level of health literacy. NVS is a very simple tool, and the test can be easily administered in ten minutes. However, this needs to be studied further among patient population, which will enable us to determine whether this tool can be widely used to study health literacy.

**Conflict of Interest:** The authors have no conflicts of interest to declare.

**Funding:** The study was not supported by any funding.

**Ethical Clearance:** Study was conducted after approval from the Institutional Ethics Committee was obtained.

**Acknowledgment:** None.

**References**


The Cost of Falls among the Elderly in Kattankulathur Block, Tamil Nadu

Roshni Mary Peter, Alex Joseph, K R. John

1Assistant Professor, Department of Community Medicine, 2Assistant Professor, Division of Epidemiology, School of Public Health, 3Former Professor and Head, Department of Community Medicine, SRM MCH &RC, SRM IST, Kattankulathur

Abstract

Background: Fall injuries are a major public health concern in elderly. About 28-35% of the elderly people aged 65 years are experiencing fall each year and the prevalence of fall increases to 32-42% in elderly aged 70 years. Falls are one of the major problems in the elderly and are considered as one of the geriatric giants. As the frequency of fall increases with increasing age and frailty level the costs to treat fall injuries are also likely to rise.

Materials and Method: A community based cross-sectional study was conducted to estimate the costs of fall-related injury in the elderly in the rural Kattankulathur Block. The survey carried out among elderly contacted from 11 villages selected randomly. Semi structured questionnaire was used to collect data regarding cost of fall.

Results: 140 elderly were reported to have fallen at least once in the past one year among 747 elders contacted. The mean costs per fall victim, was found to be 4563 Rs, the mean costs among males were 5636 Rs and among Females were 3656 Rs. In the Linear Regression analysis, Age, Kind of Facility, Time taken to take decision for seeking treatment was found to be significant with the cost associated with fall.

Conclusion: Fall prevention must be emphasized in public health polices and health programs for elderly people. Falls are an emerging public health problem and a barrier to an active ageing in India. The increasing number of falls in elderly aged 70 and above has a considerable effect on the cost of treatment. There is a need for collective efforts of health professionals, researcher, policy makers and health care delivery system to promote active ageing and prevent fall injuries.

Key words: Fall, Elderly, Cost estimation, Linear Regression and Community.

Introduction

The global share of older people (aged 60 years and above) increased from 9.2 percent in 1990 to 11.7 percent in 2013 and will continue to grow reaching 21.1 percent by 2050.1 Injuries resulting from falls in elderly people are a major public health concern, representing one of the main causes of longstanding pain, functional impairment, disability and death in this population. The problem is going to worsen since the rates of such injuries seem to be raising in many areas, as is the number of elderly people in both the developed and developing world. Although not all falls lead to injury, about 20% need medical attention, 5% results in fracture and other serious injuries such as severe head injuries, joint distortions, soft-tissue bruises, contusions and lacerations results in 5–10% of falls. 2,3 The problem

Corresponding author:
Dr. Alex Joseph,
Assistant Professor, Division of Epidemiology, School of Public Health, SRM IST, Kattankulathur – 603203,
Email: alexjosephdr@gmail.com.
of falls in the elderly population is clearly more than simply a high incidence, but also it impose a significant financial burden on the healthcare system.

**Magnitude of the Problem:**

About 28-35% of the elderly people aged 65 years are experiencing fall each year \(^4,^5,^6\) and the prevalence of fall is increasing to 32-42% of the elderly aged 70 years.\(^7,^8\) The incidence of falls appears to vary among countries as well. For instance, a study in the South-East Asia Region found that the prevalence of fall ranges from 6-31%\(^9,^{10}\) while another study conducted in Japan found that 20% of older adults fell each year.\(^11\) A study in the Latin/Caribbean region found that the proportion of older adults who fell each year ranging from 21.6% in Barbados to 34% in Chile.\(^12\) A significant number of Falls which results in injuries can result in the long term use of healthcare services leading to high healthcare costs.\(^13\) Falls among elderly have a huge impact on government funded programs, eight percent of Medicaid expenses in US for older adults were spent on falls.\(^14\) In USA and Australia with respect to lifetime costs, falls rank the second largest contribution of the economic burden of injuries.\(^15\)

A Community based Multi-centric Study conducted for the purpose of evaluating Health Problems among the Elderly during the year of 2003, in 10 states across India, shows the incidence of fall (History of a single fall in the last 6 months) was 14% and it is estimated that in India nearly 1.5 to 2 million persons are injured every year.\(^1\) The current demographic transition in India shows that southern India has an increased number of older adults over 60 years of age and it is expected to maintain the trend in the future as well.\(^16\) In India there are not much studies published available which had tried to estimate the cost of fall injuries among the elderly adults.

There are multiple perspectives by which economic consequences can be measured which includes societal, payer and provider based depending on the decision making process. The societal perspective takes the view of all costs of an injury relevant to society, this includes both the direct (medical and non-medical) and indirect costs which includes loss of productivity.

**Materials and Method**

The study was conducted in the Kattankulathur block, a revenue block in the Kanchipuram district situated on the northern East Coast of Tamil Nadu, India. As per 2011 census, the population of the Kattankulathur block comprises of 39 villages with a total population of 2, 18,000.

The present study is a community based cross-sectional design to estimate the costs of fall-related injury in the elderly in the rural Kattankulathur Block. The sample was selected from the 11 villages randomly selected by probability proportional to size sampling technique followed systematic random selection of 747 elderly people above 60 years of age. History of fall during the past one year was used to identify fall events by door to door survey.

Considering the prevalence of 14% as reference value, absolute precision as 5%, and 99.99% confidence interval the sample size was calculated as 724. However 747 elderly were enrolled for our study.

Inclusion criteria include Individuals who are aged 60 years and above experienced fall, who are permanent residents in the study area. Exclusion criteria include Individuals who are below 60 years, participants those who did not give informed consent and those with the permanent disability or those who were bed-ridden for a very long time. Individuals with a known history of serious illness and people with mental illness were excluded.

**Findings**

In the survey carried out, 747 elderly were contacted from 11 villages selected randomly. 140 elderly were reported to have fallen at least once in the past one year. About 54% were females and 46% were males.

Among the total 138 participants injured, 112 (82%) had totally recovered after the fall and 26 (18%) had not fully recovered from the consequences of fall at the time of interview. Among the 140 participants, 57 participants (41%) daily activities were not affected, they were able to move around freely, 57 participants (41%) had restricted activity and 25 participants (18%) were bedridden after the fall.
Among the 140 participants, 92% of the elderly were having the economic dependence on others while 54% were fully dependent, 38% were partially dependent and only 8% of the elderly were independent. Among all the 140 participants, 126 participants (90%) availed medical attention. 125 participants (90%) seek medical attention on the same day itself, 15 participants (10%) sought after 2-3 days. Visiting to an allopathic doctor was the most common practice 65 (51 %), followed by 35 participants (27%) that required hospitalization, and 26 participants (20%) visited traditional healers.

Table 1: Summary of Cost associated with fall

<table>
<thead>
<tr>
<th>Cost</th>
<th>Direct medical</th>
<th>Direct Non- medical</th>
<th>Indirect</th>
<th>Total expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 1000</td>
<td>70(%)</td>
<td>104 (80.6%)</td>
<td>62(97%)</td>
<td>56 (43%)</td>
</tr>
<tr>
<td>1001-5000</td>
<td>29(22%)</td>
<td>24(18.6%)</td>
<td>2(3%)</td>
<td>38 (29%)</td>
</tr>
<tr>
<td>5001-10000</td>
<td>27(21%)</td>
<td>1(8%)</td>
<td>0</td>
<td>29 (22%)</td>
</tr>
<tr>
<td>More than 10000</td>
<td>4(3%)</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>7 (5%)</td>
</tr>
<tr>
<td>Total</td>
<td>130(100%)</td>
<td>129(100%)</td>
<td>64(100%)</td>
<td>130 (100%)</td>
</tr>
</tbody>
</table>

Among the 130 participants who had incurred any expenses associated with the fall, 56 participants (43%) had their total expenses less than 1000 Rs, 38 participants (29%) had expenses between 1001-5000 Rs, 29 participants (22%) had expenses between 5001-10000 Rs and 7 participants (5%) had expenses more than 10000 Rs.

The mean costs per fall victim, was found to be 4563 Rs, the minimum cost reported was 150 Rs and maximum was reported to be 1 lakh rupees. The mean costs among males were found to be 5636 Rs the minimum cost was 150 Rs and maximum 1 lakh rupees. Females were found to be 3656 Rs with a the minimum cost reported as 300 Rs and maximum of 20000Rs.

Table 2: Distribution of Cost According to the Type of Medical Care

<table>
<thead>
<tr>
<th>Cost</th>
<th>Visit to Hospital</th>
<th>Hospitalization</th>
<th>Traditional Healer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 1000</td>
<td>36 (49.2%)</td>
<td>0 (.0%)</td>
<td>20 (76.9%)</td>
<td>56 (43.1%)</td>
</tr>
<tr>
<td>1001-5000</td>
<td>29 (44.6%)</td>
<td>4 (11.4%)</td>
<td>5 (19.2%)</td>
<td>38 (29.2%)</td>
</tr>
<tr>
<td>5001-10000</td>
<td>4 (6.2%)</td>
<td>25 (71.4%)</td>
<td>0 (.0%)</td>
<td>29 (22.3%)</td>
</tr>
<tr>
<td>More than 10000</td>
<td>0 (.0%)</td>
<td>6 (17.1%)</td>
<td>1 (3.8%)</td>
<td>7 (5.4%)</td>
</tr>
<tr>
<td>Total</td>
<td>69 (100.0%)</td>
<td>35 (100.0%)</td>
<td>26 (100.0%)</td>
<td>130 (100%)</td>
</tr>
</tbody>
</table>
Among the 69 participants who were treated as outpatients, 36 participants (49.2%) had to spend about less than 1000 Rs, 29 (44.6%) about 1001-5000 Rs and 4 (6.2%) in a range of 5001-10000. In those 35 participants who were Hospitalized and treated as inpatients, 4 (11.4%) had an expense of 1001-5000 Rs, 25 (71.4%) had an expense of 5001-10000 Rs and 6 (17.1%) more than 10000 Rs. Among the 26 participants who got medical care from traditional healers, 20 (76.9) % had to spend less than 1000 Rs, 5 (19.2%) had an expense of 1001-5000 Rs and 1 (3.8%) had an expense of More than 10000 Rs. There was a significant difference between the cost and type of treatment.

Direct medical cost includes clinician visit, hospitalization, diagnostic testing, drug treatments and therapeutic procedure. Rs. 2894 was the mean cost with 95% CI (2251 -4818) for direct medical expenses, with a minimum of Rs 0 to a maximum of Rs 35000 spent towards meeting the direct medical expenses. Direct nonmedical expenses associated with receiving medical treatment, such as the cost of transportation to and from medical services Rs 685 with 95% CI (503 -844) was the mean cost for direct non-medical expenses, with a minimum of Rs 0 and maximum of Rs 6,000 spent towards meeting the direct non-medical expenses. Indirect cost involves loss of wages for the patient as well as the bystander; Rs 352 with 95% CI (260 – 491) was the mean cost for indirect expenses, with a minimum of Rs 0 and maximum of Rs 3,000 spent towards meeting the indirect expenses.

**Table 3: Linear Regression of Total Cost Associated with Risk Factors**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
<th>95.0% CI</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.82</td>
<td>-3.13</td>
<td>0</td>
<td>-1.33</td>
<td>-0.299</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.275</td>
<td>0.776</td>
<td>0.44</td>
<td>-0.427</td>
<td>0.978</td>
<td></td>
</tr>
<tr>
<td>Type of Family</td>
<td>0.165</td>
<td>0.91</td>
<td>0.37</td>
<td>-0.51</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>-0.38</td>
<td>-1.93</td>
<td>0.07</td>
<td>-1.77</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Employment status</td>
<td>0.474</td>
<td>1.47</td>
<td>0.16</td>
<td>-0.437</td>
<td>2.56</td>
<td></td>
</tr>
<tr>
<td>Type of Housing</td>
<td>-0.08</td>
<td>-0.55</td>
<td>0.59</td>
<td>-0.671</td>
<td>0.391</td>
<td></td>
</tr>
<tr>
<td>Economic dependence</td>
<td>-0.12</td>
<td>-0.37</td>
<td>0.71</td>
<td>-1.28</td>
<td>0.897</td>
<td></td>
</tr>
<tr>
<td>Diet</td>
<td>-0.11</td>
<td>-0.71</td>
<td>0.49</td>
<td>-2.35</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td>Heart Diseases</td>
<td>0.166</td>
<td>0.849</td>
<td>0.41</td>
<td>-1.06</td>
<td>2.54</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>0.014</td>
<td>0.071</td>
<td>0.94</td>
<td>-2.97</td>
<td>3.19</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>-0.11</td>
<td>-0.45</td>
<td>0.65</td>
<td>-0.584</td>
<td>0.367</td>
<td></td>
</tr>
<tr>
<td>Dizziness</td>
<td>0.116</td>
<td>0.446</td>
<td>0.66</td>
<td>-0.4</td>
<td>0.632</td>
<td></td>
</tr>
<tr>
<td>Dimness of Vision</td>
<td>-0.1</td>
<td>-0.3</td>
<td>0.77</td>
<td>-0.759</td>
<td>0.561</td>
<td></td>
</tr>
<tr>
<td>Spectacles Use</td>
<td>-0.03</td>
<td>-0.17</td>
<td>0.87</td>
<td>-1.05</td>
<td>0.893</td>
<td></td>
</tr>
<tr>
<td>Loss of sensation of feet</td>
<td>0.072</td>
<td>0.238</td>
<td>0.81</td>
<td>-0.529</td>
<td>0.673</td>
<td></td>
</tr>
<tr>
<td>Walking Difficulty</td>
<td>0.196</td>
<td>1.06</td>
<td>0.3</td>
<td>-0.658</td>
<td>2.03</td>
<td></td>
</tr>
<tr>
<td>Slippery Bathroom floor</td>
<td>-0.14</td>
<td>-0.56</td>
<td>0.58</td>
<td>-2.06</td>
<td>1.18</td>
<td></td>
</tr>
<tr>
<td>No of events of fall</td>
<td>0.225</td>
<td>1.4</td>
<td>0.17</td>
<td>-0.254</td>
<td>1.31</td>
<td></td>
</tr>
<tr>
<td>Place of Fall</td>
<td>-0.12</td>
<td>-0.79</td>
<td>0.44</td>
<td>-0.953</td>
<td>0.429</td>
<td></td>
</tr>
<tr>
<td>Type of injuries</td>
<td>-0.21</td>
<td>-0.9</td>
<td>0.38</td>
<td>-0.789</td>
<td>0.312</td>
<td></td>
</tr>
<tr>
<td>Kind of Facility</td>
<td>0.396</td>
<td>2.66</td>
<td>0.01</td>
<td>0.145</td>
<td>1.17</td>
<td></td>
</tr>
<tr>
<td>Time for seeking treatment</td>
<td>-0.63</td>
<td>-2.77</td>
<td>0.01</td>
<td>-2.02</td>
<td>-0.293</td>
<td></td>
</tr>
<tr>
<td>Physical activity</td>
<td>-0.1</td>
<td>-0.39</td>
<td>0.7</td>
<td>-0.586</td>
<td>0.393</td>
<td></td>
</tr>
<tr>
<td>Fear of falling</td>
<td>-0.4</td>
<td>-1.37</td>
<td>0.17</td>
<td>-0.986</td>
<td>0.178</td>
<td></td>
</tr>
<tr>
<td>Nutritional supplements</td>
<td>-0.3</td>
<td>-1.54</td>
<td>0.14</td>
<td>-1.84</td>
<td>0.272</td>
<td></td>
</tr>
<tr>
<td>Multiple medications</td>
<td>-0.09</td>
<td>-0.48</td>
<td>0.63</td>
<td>-0.449</td>
<td>0.273</td>
<td></td>
</tr>
<tr>
<td>Alcohol Use</td>
<td>0.37</td>
<td>1.41</td>
<td>0.16</td>
<td>-0.148</td>
<td>0.888</td>
<td></td>
</tr>
</tbody>
</table>
Linear Regression of the cost associated with fall and risk factors was performed after doing log transformation of the total cost to transform a normal distribution. In the analysis, Age, Kind of Facility, Time taken to take decision for seeking treatment was only found to be significant with the cost associated with fall.

**Discussion**

The current study is a community-based cross-sectional study that aims to estimate the costs of falls among the rural community elderly in southern Indian population. Among the 140 participants, there were 130 participants who had expenses for seeking the medical care, a critical assessment done by PHFI (public health foundation of India) states that, In India, only 25% of people have health insurance coverage, and medical expenses are predominantly borne out-of-pocket.\(^\text{17}\) The average costs of fall among elderly in our study was found to be 4563 Rs, males were reported to have higher average cost compared to females. The 2017 National Health Policy report quotes according to Central Bureau of Health Intelligence statistics that 35 crore individuals, 27\% of the total population of India were covered under any insurance in 2015-16. The medical expenses are mostly borne out of pocket and elderly is more vulnerable to such financial burden.

Community-based falls-prevention programs is an attractive proposition for cost-effectiveness. A study conducted by **Vidmantas Alekna** et al shows that the mean estimated healthcare cost was 254 EUR (Rs.21,262 Indian Rupee) per patient receiving fall-related medical care.\(^\text{18}\) Mostly economic analyses are dependent upon the assumptions they make, this can lead to inaccurate cost estimations. The current study showed that falls have relevant economic burden.

**Conclusion**

Falls are one of the major problems in the elderly and are considered as one of the geriatric giants. The frequency of fall increases with age and frailty level. Falls often signal the “beginning of the end” of an older person’s life. Fearful of such an outcome, older adults often restrict their activity to avoid the risk of falling. Unfortunately, this very behavior actually increases the risk of falling by causing loss of muscle and strength. In India one third of older adults aged 60 years and older live below poverty line up to 65\% of older adult are economically dependent, especially windowed women. Non affordability is a case of not seeking treatment among older adults. Fall prevention must be emphasized in public health polices and health programs for elderly people. Falls are an emerging public health problem and a barrier to an active ageing in India. There is an urgent need for coordinator and collaborative. Efforts of health professionals, researcher, policy makers and health care delivery system to prevent for promote active ageing. In India only 25\% of people have health insurance coverage and medical expenses are predominantly born out of package. Fall related injuries may affect a person’s savings, increase the economic burden of care giver and contribute to neglect of older adult.

**Limitation**

The cost associated with fall was based on self reported data, the recall was poor and the subjects were not fully aware of the actual cost, often relatives paid towards the expenses. The reported cost is only an estimate of actual cost which has incurred within a year from the date of survey.

**Ethical Considerations:** This study was approved by the Institutional ethical committee of SRM Medical College Hospital and Research Centre, Kattankulathur, Tamilnadu.

**Funding:** Not Applicable.

**Competing Interest:** There is no competing interest.

**References**


Variation in Lip Thickness in Individuals with Angle’s Class I, Class II and Class III Malocclusion - A Cephalometric Study

S.Subashree Rathi¹, Arvind Sivakumar²

¹Post graduate student, Department of Orthodontics and Dentofacial Orthopaedics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical And Technical Sciences(SIMATS), Saveetha University; ²Craniofacial orthodontic consultant, Cleft and craniofacial institute, Senior Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical And Technical Sciences(SIMATS) Saveetha University

Abstract

Introduction: Facial harmony is achieved by both hard tissue and soft tissue of an individual. The aim of this study is to determine the lip thickness individuals with Angle’s class I, Class II and Class III Malocclusion. To evaluate the variation in lip thickness among these three groups. MATERIALS AND METHOD: The material includes the lateral cephalometric radiographs of thirty individuals with ten in each group. Each group is further divided into five male and five female subjects with vertical growth pattern. The basic upper lip thickness was then measured according to the definition of Holdaway. The measured values were then subjected to statistical evaluation. RESULTS: The mean of groups 1, 2 and 3 were 14.2, 12.6 and 14.4 respectively. One way ANOVA shows a statistically significant correlation between the three groups with a significance value of 0.013 (P<0.05). According to post hoc Tukey’s HSD test, lip thickness in class 2 individuals is significantly lower than the lip thickness in class 1 and class 3 individuals. CONCLUSION: Within the limitations of the study, it could be concluded that the basic upper lip thickness of class II individuals is lower compared to class I and class III individuals.

Keywords: lip thickness, malocclusion, skeletal class I, Holdaway

Introduction

The orthodontic diagnosis, early in the 1900’s, even before Angle classified malocclusion, was the clinical evidence of the anteroposterior relationship of mandible to the maxilla. With the development of cephalometric x-ray by Broadbent in 1931¹, there were more reliable methods of orthodontic diagnosis. Since the time, hard tissue values were only considered for the diagnosis and treatment planning. Holdaway⁵ Bradely⁶ Park and Burstone⁷ are one among the few who emphasized the use of soft tissue measurements along with hard tissue measurements.

Holdaway⁵ stated that “Usually as we correct malocclusions, we bring about changes in appearance that are pleasing to all concerned. However, most orthodontists who have practiced for even a few years have had the unpleasant experience of finding that some patients’ faces looked better before the orthodontic corrections were made.” Holdaway⁵ also stated that “Better treatment goals can be set if we quantitate the soft-tissue features which contribute to or detract from that ‘physical attractiveness stereotype’ which has been ingrained into our culture.”
The soft tissue changes that occur during orthodontic treatment plays an important role in the diagnosis and treatment planning. According to the studies conducted by Oliver and Wisth, there seems to be an influence of lip structure on the lip response. In a study conducted by Oliver, it was found that there was a correlation between thin lips/high lip strain and incisor retraction, there was no significant correlation found in case of thick lips or low lip strain. Also, Wisth found that lip response, as a proportion of incisor retraction, decreased as the amount of incisor retraction increased. This seems to indicate that the lips have some inherent support.

Facial harmony is achieved by both hard tissue and soft tissue of an individual. Knowledge of facial tissue depth is very important pertaining to dentistry and forensics. In order to perform reconstructive surgeries like placement of graft, the depth of soft tissues should be known prior to the surgery, which are different for each individual, to achieve a good result. The first person to publish about the soft tissue depth for any application was Welcker in 1833. Later, various authors have studied the facial soft tissue thickness of Africans, American, European, Japanese, Caucasian adults etc.

Goëyenc et al examined the differentiations of soft tissues in skeletal Class I, dental Class I, Class II, and Class III patients in Anatolian Turkish population. With all these points in mind, we intend to analyse the variations in the average lip thickness of individuals with skeletal class I, class II and class III.

Materials and Method

This retrospective study was designed to analyse the variations in lip thickness which comprised of a total sample size of 90 subjects which was divided into three groups with thirty subjects in each group. The pre-treatment cephalograms were obtained to do the analysis. The criteria for patient selection was as follows:

Class I, class II, class III skeletal pattern in the respective groups 1, 2 and 3. Class I skeletal pattern represents a balanced profile, class II pattern represents a retrognathic profile and class III pattern represents a prognathic profile.

Normal growth and development

No history of previous orthodontic treatment.

All subjects were positioned in the cephalostat with the sagittal plane at a right angle to the path of the x-rays, the Frankfort plane parallel to the horizontal, the teeth in centric occlusion, and the lips slightly closed. The landmarks were marked based on the definitions provided by Holdaway. The radiographs were traced and corresponding points marked using Facad software for cephalometric tracing. All the measurements were done by the same investigator to prevent bias.

According to the literature, the basic upper lip thickness is measured from approximately 3 mm below point A and the drape of the upper lip. The pictorial representation of the landmarks used to measure lip thickness is given in figure 1 and figure 2.

Figure 1: Pictorial representation of the landmarks used for measurement of upper lip thickness
A - Deepest point on maxilla
a - 3mm below point A along anterior curvature of maxilla
a’ - Point on external border of upper lip parallel to FH plane.
All statistical analyses were performed with the SPSS software package. For each variable, the arithmetic mean and SD were calculated. One-way ANOVA and post hoc Tukey’s HSD analysis was performed to check for statistical significance.

**Results**

Table 1 shows the descriptive statistics of basic upper lip thickness for each type if malocclusion. The mean of groups 1, 2 and 3 were 14.2, 12.6 and 14.4 respectively. The distribution of the basic upper lip thickness values under each type of malocclusion is

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skeletal Class I</td>
<td>14.215</td>
<td>1.891052</td>
</tr>
<tr>
<td>Skeletal Class II</td>
<td>12.69</td>
<td>2.48255</td>
</tr>
<tr>
<td>Skeletal Class III</td>
<td>14.47368</td>
<td>1.342403</td>
</tr>
</tbody>
</table>

Oneway ANOVA shows a statistically significant correlation between the three groups with a signifiance value of 0.013 (P<0.05). According to post hoc Tukey’s HSD test, lip thickness in class2 individuals is significantly lower than the lip thickness in class 1 and class 3 individuals. (Table 2)

**Discussion**

Facial attractiveness or harmony does not solely depend on the hard tissues. The soft tissue dimensions also vary depending on the length of the tissue, thickness of the tissue and its postural tone.\textsuperscript{19,20} Facial soft tissue measurements are of importance to maintain an optimum facial attractiveness. Many human body parts including the face undergo development with bilateral symmetry.\textsuperscript{24} The soft tissue should be assessed in its own merit by the orthodontist in order to obtain a positive treatment goal.\textsuperscript{21}

In the current study, the distribution of the upper lip thickness over a plot area shows even distribution with mild variations. Lip thickness in class II falls well below the line from class I and class II. It is depicted in the pictures below. (figure 3 – 6)
The reason for reduced lip thickness in skeletal class II individual could be owing to one of the following many reasons. Short hypotonic upper lip and inability to close the mouth, that is incompetent lips, could be one of the reasons for this. In case of prognathic maxilla in skeletal class II individuals, the soft tissues compensates and tries to camouflage the prognathism and hence the lip thickness is reduced.

Evaluating the upper lip thickness as an integral part of treatment plan is important because, changes in position of upper incisors will alter the position of upper lip. The soft tissue contour plays a major role in the final outcome of the treatment. Soft tissue analysis enhances the maintenance of normal facial forms and any abnormalities detected are corrected orthodontically or surgically. Soft tissue analysis, should not therefore replace the comprehensive clinical examination, it is used as an adjunct which results in optimal facial esthetics.

Earlier studies by Grosaores et al showed that males have thicker upper lips than the females and in addition they said that there is difference in lower lip thickness between males and females.22

Ayla et al studied the variations in soft tissue thickness in individuals with different occlusion patterns. It was found out that the upper lip thickness was significantly lower in the Class I group when compared with the other two classes and it was more prominent in males compared to females.23

**Conclusion**

Within the limitations of the study, it could be concluded that the basic upper lip thickness of class II individuals is lower compared to class I and class III individuals.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**Ethical Clearance:** Ethical clearance taken from Ethical Committee of Saveetha Institute of Medical And Technical Sciences.

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A Cross Sectional Study on Factors Influencing the Delay in Clinical Diagnosis in a Super Specialty Eye Hospital

Sachin Suresh Shinde¹, Kishore Babu Marivina², Madhavi Latha³, Sukesh Krishna Chaitanya Loka⁴

¹Research Scholar, KL University, Vijayawada, ²Professor& Principal-College of Management, KLEF, Vijayawada (AP), ³Retina Consultant-Super specialty hospital Eye Care, ⁴Clinical Pharmacologist, Krishna Institute of Medical Sciences Hyderabad

Abstract

The present dissertation addresses the service gaps and the causes behind it, specifically in super-speciality eye hospital with a wide range of multi-specialists. It includes the hierarchical process flow at a typical modern-day care Eye hospital.

A Survey has been conducted in which the patients are posed a questionnaire during their first visit to the OPD, to provide constructive feedback and grievances. A qualitative feedback of this is done by using MS Excel and other service tools. The results have pointed out the locations and causes of delay

By performing a Fish-bone analysis (cause-effect), the causes for delays in clinical diagnosis (done in various phases) are identified and plausible solutions are furnished to upgrade which would be a part of the continuous quality program.

This research helps the reader understand the process of service, its results and implications that are proposed as a solution to overcome the above issue.

Key words: Diagnosis, Delay, Factors, Ophthalmology, Super specialty hospital

Introduction

There is an increased demand in Consultations for Eye hospitals. This demand comes mostly from patients with chronic eye diseases, such as macular degeneration, glaucoma, and diabetic eye disease. These patients are at a greater risk of developing irreversible loss of vision. These conditions require long-term follow-up with up to date treatment procedures. But these follow-ups are more likely to be postponed or discontinued due to various reasons like negligence and socio economic hurdles. Sustained maintenance of patients’ revisits is as important as getting new patients. Nothing works best than person to person publicity.

In present scenario, an Ophthalmology hospital¹ is exclusive setups and is a group practice. The services are subdivided based on specialties like Cornea, Glaucoma, Retina, Refractive surgery, Cataract surgery, Orbit- Oculoplasty and Uvea clinics. Hence most of the patients require inter departmental referrals. Ophthalmology hospitals most of the times fail to routinely meet the expectations and consequently may not respond adequately to the patients’ queries.

In recent years, a growing emphasis on patient-centered care² consumerism in medicine has further exemplified the importance of effective doctor-patient communication

Types of delays encountered³ in day to day practice:

Detection delay
Service delay
Diagnostic delay

Corresponding Author:
Dr. Sachin Suresh Shinde
21-7-404, Shakkar Kota
Charminar, Hyderabad-500002
Phone Number-9885291487
Email id: dr.sshinde85@gmail.com
**Statement of the Problem:**

In a typical hospital setup a diagnosis is meant to provide a reliable description of the clinical condition. Provisional diagnosis (PD) is the first considered diagnosis which initiates the first phase of management, whereas confirmatory or Final diagnosis (FD) is only obtained when we go through the chronological organization and critical evaluation of information obtained from the history, physical examination, and investigations. Until we get the final diagnosis we cannot start the treatment. During the process of attaining final diagnosis a patient should go through multiple steps which involve medical and non-medical personnel which is a long process which ends in parents dissatisfaction.

This thesis data may be an eye opener to both medical and non-medical personnel for understanding and revising the process of service planning and service delivery. Necessary intervention measures may be undertaken toward improvisation of diagnostic skill of the supporting staff and doctors for quality hospital services.

**Literature Review**

Feigenbaum[^4] said that quality is a patient determination, not an engineer’s determination. It is based on the patient’s actual experience with the service measured against his or her requirement stated or unstated, conscious or merely sensed, technically operational or entirely subjective & always representing a moving target in a competitive market.

Garud[^5] pointed out that quality is different things to different people According to Crosby, quality is ‘conformance to requirements.’ (zero defects). With reference to healthcare, quality is defined as a ‘level of excellence’ in achieving the desired result. There are several components of quality in the field of health care: access to services, relevance to the need, effectiveness and safety, equity, social acceptability & efficiency and economy.

According to Sakharkar[^6] Quality is defined as adherence to standards & criteria that are based on current knowledge & sound experience. Quality is achievable through ongoing evaluation of patient care, which would assure the hospital that all was done to justify the diagnosis, treatment & outcome & to pinpoint inadequacies in medical care for rectification for the future cases.

Gronroos[^7] postulated the two components, technical quality, which involves what; the patient is actually receiving from the service, and functional quality, which involves the manner in which the service is delivered.

Nadkarni[^8] has reported that the rapidly expanding scope of the healthcare has lead to increasing complexity in its delivery. Patient satisfaction is increasingly taken as an important measure of quality.

According to Woodrufe[^9] service quality is of crucial importance to both patients and service providers. Organizations are becoming increasingly aware of the importance of quality in maintaining competitive advantage. Quality should be functional, not restrictive and should reflect the overall business or business like activities of the organization.

Donabedian[^10] developed seven attributes of healthcare quality

- Efficacy
- Effectiveness
- Efficiency
- Optimality
- Acceptability
- Legitimacy
- Equity

Lytle and Mokwa[^11] reported that maintaining that service quality depends on 2 variables, expected service and perceived service. They further said that a healthcare service product is a bundle of tangible and intangible benefits that satisfy patient’s needs and wants. Two research group’s linked perceived quality on the part of the consumers to the level of employee satisfaction with work roles. Both groups maintained that such factors as job design, role clarity and autonomy affect employee attitudes, which in turn affect patient experience in institution.

Mittal and Baldasare[^12] measured the effect of certain quality factors in the physicians’ practice and found that physician competence, communication, respect, caring, taking time to learn history and follow up treatment were weighted more heavily if the patients were not satisfied.
Patient Satisfaction

Pollock & Evans \(^{13}\) wrote about audit of patient satisfaction. They said “managers want cost effectiveness, doctors want to cure patients and keep their morbidity and mortality down, but what do patients want?” This question often gets pushed to the bottom of the list, if it gets asked at all and it is really the most important. In general, patients want competence, courtesy, kindness, consideration and information, they want continuity of care, they want the opportunity to decide for themselves having discussed matters with their doctors and be a partner in the decision about how to treat their disease.

According to Delbanco\(^{14}\) techniques to measure the quality of the healthcare proliferate and improve, health professionals are beginning to accept that patient and their families hold unique vantage points as experts witnesses of care and that they should plan their services to reflect the needs of patients. Patients satisfaction is now a critical variable in any calculation of quality or value and therefore in the assessment of corporate accountability. It is a legitimate and important measure of quality of care.

The increasing cost of health services and the need for better use of available resources is a concern for healthcare providers. Consequently, it is evident that there is a need to measure the efficiency of health care to determine if proper use of available resources is made. According to Fitzpatrick \(^{15}\), patient satisfaction is an important and widely accepted measure of care efficiency.

Objectives of the study

1. To assess the service gap in Eye-hospitals from entry to exit.
2. To identify patient expectations in Eye-hospitals.
3. To evaluate cause of delay.
4. Analyzing the gaps in service.
5. Preparing steps in service delivery improvement.

Methodology

Introduction:

The study was conducted from January 15 to March 15 at Super specialty hospital Eye Hospital which is a super specialty eye care centre with multiple departments i.e. cornea clinic, Glaucoma clinic, Cataract clinic, Refractive surgery clinic and retina clinic.

Research Design

The present study is cross-sectional study conducted for a period of 60 days to the OPD initial visit patients at Super specialty hospital eye hospital.

Ethical Consideration

Formal consent letter and permission is approved from the medical director at head office. Patients are informed about the purpose of the study and the research design and said them their data will be confidential. They should not bias and patient participation is purely volunteer job.

Instrument and Component

Questionnaire was designed for assessing the cause for service gap and health object of hospital

Sample Size

A total of 200 OPD patients were interviewed and requested to fill the questionnaires who are voluntarily involved in a period of one month.

Inclusion Criteria

New OPD patients who are interested to fill the questionnaire before exit of hospital.

Exclusion Criteria

Old OPD patients or follow up cases
Not interested to fill the questionnaire

Sampling Procedure

Sampling technique is simple random technique with sampling size of 200 to the new OPD patient.

Data Analysis

The collected data is analyzed by using descriptive statistical tool M.S excel and service quality tool and analyze by “Cause-Effect Analysis”(fish bone technique)
Data Analysis And Interpretation

All the survey data was collected and analyzed by using MS Excel and service quality tool. Survey questionnaire has been incorporated into excel sheet for data analysis.

Data sample analysis

For Registration

Table 1. Time taken for registration

<table>
<thead>
<tr>
<th>S.No</th>
<th>Particulars</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>02-04 min</td>
<td>77</td>
<td>38.5%</td>
</tr>
<tr>
<td>2</td>
<td>04-05 Min</td>
<td>82</td>
<td>41.0%</td>
</tr>
<tr>
<td>3</td>
<td>&gt; 05 Min</td>
<td>41</td>
<td>20.5%</td>
</tr>
<tr>
<td>4</td>
<td>Grand Total</td>
<td>200</td>
<td>100%</td>
</tr>
</tbody>
</table>

Interpretation:

Around 39% of patients were 02-04 min of waiting time at reception.

Patients who are illiterate has taken more waiting time for registration and those 41 patients has taken staff or attendant support to fill the registration form.

Few patients i.e. Uneducated / patients are having some queries about doctor availability or would like to have specialized consultation requirements. Has taken some to get register themselves.

Average Time Taken at Refraction

Table 2. Average time taken at refraction

Time taken refraction

<table>
<thead>
<tr>
<th>S.No</th>
<th>Particulars</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>01-05 Min</td>
<td>33</td>
<td>16.5%</td>
</tr>
<tr>
<td>2</td>
<td>05-10 min</td>
<td>58</td>
<td>29.0%</td>
</tr>
<tr>
<td>3</td>
<td>&gt;10 Min</td>
<td>109</td>
<td>54.5%</td>
</tr>
<tr>
<td>4</td>
<td>Grand Total</td>
<td>200</td>
<td>100%</td>
</tr>
</tbody>
</table>

Interpretation:

Around 16.5% of patients take 01-05 min for completing the Refraction process. These patients are cooperative who come for normal sight check up and Emergency patients only patient’s history and problem will be mentioned in Case sheet takes less time.

Nearly 29% of patients take 05 – 10min of time for refraction process. They are Cooperative patients, and they come with complaint of Blurry vision, sight check up etc.

Around 54.5% of patients are taking more than 10min for refraction process; this could be due to non-cooperative patients, illiterates ,more no. of patients at peak hours, non-availability of Optometrists.

TIME TAKEN AT PRIMARY CONSULTATION

Table 3. Time taken at primary consultation

Primary Consultation

<table>
<thead>
<tr>
<th>S.No</th>
<th>Particulars</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>01-05 Min</td>
<td>50</td>
<td>25%</td>
</tr>
<tr>
<td>2</td>
<td>05-10 min</td>
<td>21</td>
<td>11%</td>
</tr>
<tr>
<td>3</td>
<td>10-15 Min</td>
<td>18</td>
<td>9%</td>
</tr>
<tr>
<td>4</td>
<td>&gt; 15 Min</td>
<td>111</td>
<td>55%</td>
</tr>
<tr>
<td></td>
<td>Grand Total</td>
<td>200</td>
<td>100%</td>
</tr>
</tbody>
</table>

Interpretation:

Around 25% of patients take 01-05 min for completing the Primary consultation. The patients, who come for normal check up at lean hours.

Nearly 11% of patients take 05 – 10min of time for Primary consultation. They are Cooperative patients, and they come with complaint of Blurry vision, sight check up etc.

Around 9% of the patients may take 10 -15min of time for Primary consultation.
Table 4. Total time spent by patient

<table>
<thead>
<tr>
<th>S.No</th>
<th>Particulars</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30-60 min</td>
<td>123</td>
<td>62%</td>
</tr>
<tr>
<td>2</td>
<td>1-2 hrs</td>
<td>48</td>
<td>24%</td>
</tr>
<tr>
<td>3</td>
<td>02-03 hrs</td>
<td>21</td>
<td>10%</td>
</tr>
<tr>
<td>4</td>
<td>&gt;3hrs</td>
<td>8</td>
<td>4%</td>
</tr>
<tr>
<td>5</td>
<td>Grand Total</td>
<td>200</td>
<td>100%</td>
</tr>
</tbody>
</table>

Interpretation:
Nearly 62% of the patients will be spending 30-60 min in hospital. These patients could have come for General Eye check up, and some patients may come again after few days for further procedures like dilatation.

Nearly 24% of the patient will be in hospital for 1 – 2 hours; this is due to dilatation process.

Around 10% of patients will be in hospital for 2-3 hours, here they will be advised to undergo for scans, investigations etc.

Few patients constituting of 4% will come to the hospital in the same day with various reasons (less money, urgent work etc).

Table 5. Average Time Taken For Investigations

<table>
<thead>
<tr>
<th>Investigations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>21</td>
</tr>
<tr>
<td>No</td>
<td>179</td>
</tr>
<tr>
<td>Grand Total</td>
<td>200</td>
</tr>
</tbody>
</table>

Interpretation:
Only 21 of the patients are advised for investigations. It can be advised at Primary or Cross consultation level.

Most delays are seen in cases advised after cross consultation or lack of availability of optometrist.

Table 6. Overall delay at location wise

<table>
<thead>
<tr>
<th>S.No</th>
<th>Particulars</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Registration</td>
<td>6</td>
<td>3%</td>
</tr>
<tr>
<td>2</td>
<td>Doctor Consultation</td>
<td>17</td>
<td>8.5%</td>
</tr>
<tr>
<td>3</td>
<td>Refraction</td>
<td>38</td>
<td>19%</td>
</tr>
<tr>
<td>4</td>
<td>Investigations</td>
<td>14</td>
<td>7%</td>
</tr>
<tr>
<td>5</td>
<td>Advised for next visit</td>
<td>125</td>
<td>62.5%</td>
</tr>
<tr>
<td>6</td>
<td>Grand Total</td>
<td>200</td>
<td>100%</td>
</tr>
</tbody>
</table>

Interpretation:
On overall analysis the delay at Registration process is at 3%. At doctor consultation level it is up to 8%. And more delay is at Refraction process, which is at 19%. And at Investigations it is 7%. The patients advised for next visit are of 63%.

Findings & Suggestions

LOCALITY:
Findings: Rural patients who visit hospital through reference come at peak hours and hence a delay expected in every stage.

Suggestions: Phone call appointments can be taken where by basic details like Name, Age, and Phone number. Referral type can be mentioned in Registration forms. By the time the patient enters the hospital, a personalized case sheet can be created before hand to save time.

Online appointments/ Aadhar card number linkage to hospital server.

PURPOSE OF VISIT

Findings: Delay in consultation due to allotment process of the right patient to the appropriate concerned specialty doctor who can justify the problem.

Suggestions: Patients who have been referred from other hospitals or diabetic patients can be sent to concerned (Retina) specialty department directly.
instead of waiting at primary doctor and then referring to specialist.

**Average time taken for registration**

**Findings:** Patients from Rural areas finds difficulty in giving their details and understanding the process etc.

**Suggestions:** Basic details can be taken in peak hours, a diagrammatic chart can be prepared, which shows the patient movement in stages. A Staff member should accompany the patient.

**Average time taken at refraction**

**Findings:** Refraction process usually gets delayed at Peak hours 11am-1pm.

**Suggestions:** Availability of Optometrists at peak hours should be maintained. They should be trained in such a way that the job is done promptly and in perfection. All optometrists should be trained for all investigation procedure and roster of the optometrist should be scheduled.

**Time taken at primary consultation**

**Interpretation:**

**Findings:** Delay at primary consultation

**Suggestions:** This occurs in peak hours and lunch time so known and appointment patients can be suggested to come at lean hours.

**Time Taken at Cross Consultation**

**Findings:** Delay at Cross consultation

**Suggestions:** Timings of Specialized doctors should be mentioned in Panel board and working days/timings should be maintained and updated daily.

Receptionist should be intimated about doctor’s schedule priorly.

**Total Time Spent By Patient**

**Findings:** Patient waiting time is more than expected.

**Suggestions:** Maximum time for a normal patient to be spent at hospital should be under 35mins.

Patient who has to undergo surgery, initially have to complete their battery of investigations for whom the time should be from 60-90mins. Fast track services can be planned

**Conclusion**

Service gaps exists in our hospital setup. As a part of continuous qualitative improvement program, service gaps should be analyzed and rectified to sustain in the market and implementation of other service sector models is suggested. Fast track services can be planned

**Conflict of Interest:** NIL

**Source of Funding:** Self

**Ethical Clearance:** Ethical clearance had been obtained from eye care hospital, Vijayawada

**References**

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Impact of Power and Politics on Employee’s Health and Performance in Private Nursing Homes of West Bengal, India: An Empirical Study Using Structural Equation Modelling (SEM)

Satakshi Chatterjee¹, Arunangshu Giri², Pradip Paul³

¹Assistant Professor, Department of Pharmaceutical Management, ²Associate Professor, School of Management & Social Science, Haldia Institute of Technology, Haldia, West Bengal, India, ³Senior Manager (Retail Sales), Haldia Divisional Office, Indian Oil Corporation Ltd., Haldia, West Bengal, India

Abstract

Organisational power and politics are embedded in each and every organisation and healthcare industry is not the exception. Healthcare is considered to be very important for any nation as this industry deals with providing quality services for one of the basic amenities which is required to survive and that is health. The employees of these institutions are the cardinal links who are responsible for dealing with the lives of the patients who seek their services at the times of their need. As such, the employees would give the best output when they are provided with an environment which would help in their individual growth without any kind of hindrances of any manner. In this study, secondary data was used to develop a hypothesized model and primary data was used to support the research model. This study focuses power and politics having impact on Employee Health and Performance. Structural Equation Modelling (SEM) using SPSS and AMOS Software was used as analytical tool. Thus, this study reveals that organisational power and politics has a deep impact on the health of the employees which in turn affects the performance of the employees and their productivity levels as well.

Keywords: Power; Politics; Employee Health; Employee Performance; Healthcare industry; Structural Equation Modelling (SEM).

Introduction

The healthcare system of India is in a state of disrepair. Because of this, the quality of services offered by the medical professionals is declining rapidly. Health has become a necessary amenity of the common people. This demand drives the growth of the healthcare industry very promptly. Power and Politics are present across all the organisations. Power is the empowerment of the working professionals which aids them in decision making. It often leads to organisational politics. Politics may be defined as the irrational behaviour of the employees to gain a certain number of advantages which, under normal circumstances, would be beyond their reach. Power and politics, if not properly handled, can lead to a creation of a negative ambience which will be hampering the health of the organisation in the long run. Some of the other negative effects of power and politics are: decreasing concentration of the employees, worsening of the attitude of the employees over time, de-motivating the employees, creating job stress and it also helps in the propagation of wrong information through the informal communication system of the organisation. All of these factors collectively lead to the plunging work performance of the individuals. This is because their attention is diverted to the wrong areas which restricts them to focus on their work and deliver their hundred per cent. Satisfaction of the employees

Corresponding Author:
Arunangshu Giri
Associate Professor, School of Management & Social Science, Haldia Institute of Technology, Haldia, West Bengal, India. E-Mail: arunangshugiri@gmail.com, Mobile No. – 09475433195.
in the healthcare industry is of paramount importance. It is seen that power and politics has a negative impact on them by causing havoc in their personal as well as domestic life by causing unnecessary stress. Hence, the factors influencing the organisational power and politics must be delved deeper.

**Literature Review**

There are two kinds of power: positive and negative (Somoye, 2016)⁠¹. Power is often depicted negatively in the organisational context. Negative use of power can lead to the obstruction of various efforts of empowerment of the employees. This can lead to the complications in the relationship between the employees in the various job roles (Tjosvold, et al., 2006)². Negative use of power is responsible for the creation of job stress in the employees which has a negative impact on their health as such (Lo, et al., 2014)³. Power is also responsible for influencing politics of an organisation. A research study suggests that the employees of the various organisations have a set perception of organisational politics in their minds. Negative perception of the organisational politics need to be controlled (Jain, et al., 2018)⁴. It can also be held responsible for messing up the commitment level of the employees (Rahman, et al., 2013)⁵. As a result, the employees lose their drive to succeed and they become de-motivated which automatically lowers their degree of work engagement (Ahmad, et al., 2016)⁶. Power and Politics are very much real in the nursing homes as well, which are the crucial points of contact of the healthcare industry. They have an adverse impact on the mental health as well as physical health of the employees by increasing their job stress (Cropanzano, et al., 1997)⁷. The mental health is affected by the power and politics of the organisations which results in growing work frustration, increased level of anxiety amongst the workers, decreased level of work enthusiasm for their respective work, increased aggressiveness and many more. The physical health of the employees are also affected which results in fatigue (Fan & Smith, 2017)⁸. In nursing work which is relevant in the nursing homes, fatigued employees have lower work performance (Barker & Nussbaum, 2011)⁹. Also, often times, the workers in the healthcare industry has to work crazy hours as a result of which they are at risk of developing chronic diseases like spondalitis, misbalanced posture, problems related to movement and many more. Work life balance is also hampered in this scenario. The employee’s tendency to commit errors increases significantly and their work performance goes down drastically. Thus, increasing the performance of the employees is a critical issue which is being focused upon across various organisations. It has been seen that both power and politics are influential to the employee’s health and work performance (Muda, et al., 2014)¹⁰. Thus, the productivity of the employees plummets as well (Pradhan, et al., 2016)¹¹.

**Hypotheses Development**

H1: ‘Politics’ negatively influences ‘Employee Health’ in Private Nursing Homes.


H4: ‘Power’ negatively influences ‘Employee Performance’ in Private Nursing Homes.

H5: ‘Employee Health’ positively influences ‘Employee Performance’ in Private Nursing Homes.

**Research Methodology**

In this study, primary as well as secondary data has been used for establishing research model (Figure 1). For survey purpose, a structured questionnaire was prepared with related variables collected from literature review. All factors and the variables have been directly taken from previous studies. 5 point Likert type scale (from strongly agree: 5; agree, 4; neutral, 3; disagree, 2; strongly disagree, 1) was used for evaluating the responses of the employees of Private Nursing Homes of West Bengal. Sample element was collected in different stages. In the first stage, a district was selected randomly in West Bengal. After that Private Nursing Homes were chosen from selected district through convenience sampling in the second stage. In the 3rd stage, employees were chosen for giving feedback from selected Private Nursing Homes through random sampling. 197 responses out of distributed questionnaires to 200 employees were finally collected for this study. The survey period was
from 10th January, 2019 to 5th March, 2019.

**Analysis and Findings**

For developing the research model and establishing the hypothesis, Structure equation modeling (SEM) by AMOS has been used in this study. Through structural model, model fitness indexes have been checked. The overall Cronbach alpha which is 0.821 (more than 0.70) shows the acceptable range of reliability of data set. The fitness indices were checked and all hypotheses were tested here (Table 1 and 2). Path analysis was executed for checking the impact of Power and Politics on Employee Health and Performance in Private Nursing Homes of West Bengal.

### Table 1: Fit indices of Confirmatory Factor Analysis for Structural Model

<table>
<thead>
<tr>
<th>Fit Index</th>
<th>Acceptable Threshold Levels</th>
<th>Structural Model Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\chi^2$/df (Chi-square / degree of freedom)</td>
<td>Values less than 3</td>
<td>1.078</td>
</tr>
<tr>
<td>RMSEA (Root mean-square error of approximation)</td>
<td>Values less than 0.06</td>
<td>0.029</td>
</tr>
<tr>
<td>GFI (Goodness of fit index)</td>
<td>Values greater than 0.90</td>
<td>0.971</td>
</tr>
<tr>
<td>AGFI (Adjusted goodness of fit index)</td>
<td>Values greater than 0.90</td>
<td>0.959</td>
</tr>
<tr>
<td>NFI (Normed fit index)</td>
<td>Values greater than 0.90</td>
<td>0.946</td>
</tr>
<tr>
<td>CFI (Comparative fit index)</td>
<td>Values greater than 0.90</td>
<td>0.975</td>
</tr>
</tbody>
</table>

Here all fit (Table 4) indices of Structural model indicate the acceptable range of good model fits.

![Figure 2: Outcome of hypothesized structural model](image)

### Table 2: Path analysis of Structural Model

<table>
<thead>
<tr>
<th>Measurement Path</th>
<th>Hypothesis</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P-Value</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee Health ←</td>
<td>Politics</td>
<td>H1</td>
<td>-0.483</td>
<td>0.079</td>
<td>-6.091</td>
<td>.001*</td>
</tr>
<tr>
<td>Employee Health ←</td>
<td>Power</td>
<td>H2</td>
<td>-0.182</td>
<td>0.064</td>
<td>-2.857</td>
<td>.004*</td>
</tr>
<tr>
<td>Employee Performance ←</td>
<td>Employee Health</td>
<td>H5</td>
<td>.172</td>
<td>0.115</td>
<td>1.497</td>
<td>.034**</td>
</tr>
<tr>
<td>Employee Performance ←</td>
<td>Politics</td>
<td>H3</td>
<td>-0.186</td>
<td>0.139</td>
<td>-1.339</td>
<td>.011**</td>
</tr>
</tbody>
</table>
Path Analysis for Hypothesis Testing

H1: ‘Politics’ negatively influences ‘Employee Health’ in Private Nursing Homes of West Bengal.

Structural model supports this hypothesis. Organisational politics creates distractions for the employees as a result of which they are unable to focus on their work. Their efficiency decreases drastically and it ultimately results in job stress. Thus, the employees’ health starts to deteriorate which in itself becomes a barrier to the employee’s increase in productivity (Schneider, 2016)\textsuperscript{12}.

H2: ‘Power’ negatively influences ‘Employee Health’ in Private Nursing Homes of West Bengal.

Structural model supports this hypothesis. Power resides in a limited number of employees within the nursing homes. It is imperative that these individuals would be inclined to misuse their power under dire circumstances. This de-motivates the other employees present in the organization as they feel their contributions are not being recognized by the organization as the top leaders do not hold their work accountable for the success of the nursing homes. This de-motivated state of mind of the employees lead to the deterioration of their physical as well as their mental health.

H3: ‘Politics’ negatively influences ‘Employee Performance’ in Private Nursing Homes of West Bengal.

Structural model supports this hypothesis. This study reveals that organizational politics is responsible for negatively influencing the work performance of the employees because of lower commitment levels on their part (Abbas & Awan, 2017)\textsuperscript{13}. This can be prevented by understanding the perception of the employees regarding the organizational politics transpiring in a workplace. A thorough understanding of the employee’s perception regarding organizational politics will help in adoption of various strategies which will help in the minimization of the affect of the organizational politics on the employees and help them to increase their work performance.

H4: ‘Power’ negatively influences ‘Employee Performance’ in Private Nursing Homes of West Bengal.

Structural model supports this hypothesis. Negative use of power amongst the decision makers of the organization de-motivates the subordinates as they feel that they have zero contribution towards the functioning of the organization, thus, rendering them feeling useless. It is given that each and every decision of the organization involves a certain use of power. This leads to the generation of a lot of stress in the employees which also affects their level of job satisfaction as well. As a result, the work performance of the employees goes down altogether.

H5: ‘Employee Health’ positively influences ‘Employee Performance’ in Private Nursing Homes of West Bengal.

Structural model supports this hypothesis. Job stress is responsible for hampering the physical as well as the mental health of the employees of the nursing homes. The health of the employees should be maintained in the optimal condition as the performance of the healthy employees yield more quality services as compared to the unhealthy ones (Ratnawat & Jha, 2014)\textsuperscript{14}.

Implications of the Study

Organizational power and politics are deemed to be the evils of the organizational society and they are responsible for creating a lot of negativities in the minds of the employees. As healthcare is a service industry, the employees are the anchors of the entire organization which holds everything in place. So, the organizations must work at eradicating these useless restrictions and simultaneously put exertion on inculcating an organizational culture within the organization which facilitates the growth of the individual employees who

<table>
<thead>
<tr>
<th>Measurement Path</th>
<th>Hypothesis</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P-Value</th>
<th>Assessment</th>
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<td>.104</td>
<td>-1.665</td>
<td>.046**</td>
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</table>

Note: * & ** indicate 1% & 5% level of significance
are embedded within the organizations. Growth in the work performance of the individual employees would automatically increase the satisfaction index of the patients, who are the main customers of the nursing homes. Patient loyalty would be very easier to achieve in these cases. However, this could only be achieved through the increased quality of services being delivered by the employees of the nursing homes. Thus, the rights of the employees must be protected and an environment must be built inside the nursing home which would facilitate the growth of the employees as well. Employees will deliver their best if they are mentally fit without any stress and tension and this would only be possible by removing such factors from the organizations which proves to be a negative influence on them. Power and politics is one such negative influence and so it must be removed.

Conclusion

In this paper, it can be observed that power and politics are not seen in a positive light by the many employees in the private nursing homes of the healthcare industry. These factors are responsible for causing multiple hitches in the proper functioning of the organizations as they are having a deep impact on the health of the employees. The employees often feel powerless because of the organizational power and politics. Because of that, they become laidback in their attitude regarding their work. This restricts them from traversing the extra mile which would enrich their work performance with quality. This hindrance has a colossal impact on the growth of the organizations as well. Thus, it is in the best interest of the organizations to address the power and politics and also to devise ways by which the effect of these two factors can be negated as much as possible. The quality of work performance being delivered by the employees can lead to the satisfaction of the patients which measures the growth of the healthcare industry.

Ethical clearance: Ethical approval for this study has been taken from Authority of different Private Nursing Homes of West Bengal for executing the data collection process in their organization smoothly. Also Employees have been assured for keeping complete confidentiality of their feedback regarding our research topic.

Source of Funding: Self

Conflict of Interest: Nil

References

10. Muda I, Rafiki A, Harahap MR. Factors


Application of Laser in Caries Diagnosis and Inhibition – An Invivo Study

Sonali Sharma1, Sanjay M Londhe2, Mithra N Hegde3, Vandana Sadananda4

1Professor and Classified Specialist, Conservative Dentistry and Endodontics, Army Dental Centre R and R, Delhi, 2Director General Dental Services, PHDS and Col Comdt AD Cort, Room No. 11, L Block, Adjutant General’s Branch, IHQ of MOD (Army) New Delhi, 3Vice Principal, Head of the Department, Department of Conservative Dentistry and Endodontics, A. B. Shetty Memorial Institute of Dental Sciences, Nitte (Deemed to be University), Deralakatte, Mangaluru, Karnataka, India, 4Lecturer, Department of Conservative Dentistry and Endodontics, A. B. Shetty Memorial Institute of Dental Sciences, Nitte (Deemed to be University), Deralakatte, Mangaluru, Karnataka, India

Abstract

The aim of the study was to evaluate the potentiality of aluminium gallium arsenide laser in caries diagnosis and caries inhibition. Dental caries is the one of the most common oral affliction affecting humankind. The management strategies are dependent on the stage at which caries is detected. The incipient carious lesions are characterized by subsurface dissolution due to more fluoride ions in the 50-100 microns of the tooth’s outer surface. Sub surface, non cavitated lesions are amenable to remineralization, thus early detection and diagnosis is of prime importance. Aluminium gallium arsenide lasers have wide range of clinical applications like diagnosis in field of operative dentistry and endodontics, soft tissue conditions. Its applicability in hard tissues of teeth is still being explored. 10 Patients of either sex, between age of 18 years to 25 years having initial pit and fissure caries on first or second mandibular molar were included in the pilot study and its respective contralateral tooth served as control. The laser fluorescence method values were noted for both test/treatment and control. The concerned teeth - was irradiated with 810 nm Aluminium gallium arsenide (AlGaAs) diode laser (Whitestar™, Creation, Verona, Italy) for 30 seconds followed by application of remineralizing paste containing casein phospho peptide amorphous calcium phosphate with fluoride (CPP-ACP-F). The contralateral tooth type serve as control-(Group A), in which after noting laser fluorescence readings only remineralization paste was applied. The laser fluorescence method values are noted. Thereafter follow up at 3, 6 monthly intervals included serial scanning with Laser fluorescence pen and comparison with baseline reading. The readings determined if caries has been inhibited, arrested or progressed. Statistical analysis was done using paired ‘t’ test to compare control and test groups and calculation of the mean. Laser fluorescence values in test group have remarkably decreased soon after irradiation and this was followed by further decrease in values even during follow up. Laser fluorescence can be used as tool for diagnosis of dental caries and laser irradiation leads to caries inhibition.

Keywords: Aluminium Gallium Arsenide Laser, Laser fluorescence, Caries Inhibition, casein phospho peptide-amorphous calcium phosphate with fluoride (CPP-ACP-F)

Introduction

Dental caries is a dynamic multifactorial progressive disease of the hard tissues of the teeth with varying phases of demineralization and remineralization. When the oral condition is conducive for demineralization of the tooth, it is seen that the 50-100 microns of surface...
layer doesn’t show any dissolution, this is due to increased ion concentration of fluoride ions in surface layer. The subsurface layer has less amount of fluoride and more of carbonate ions hence this leads to sub surface carious lesions. It is such incipient subsurface lesions, non cavitated lesions which have the potentiality to be remineralized. Thus it is imperative that an accurate and reliable diagnosis of non-cavitated occlusal caries is made because these lesions can be arrested and reversed at an early stage by preventive measure like remineralization.\textsuperscript{1-3}

Traditionally diagnosis of dental caries was based on visual detection. In addition the diagnosis of early noncavitated carious lesion also requires detection and diagnostic aids which are more valid and reliable. There is a plethora of such devices flooding the market. One such valid and reliable method is laser based fluorescence caries detection method.\textsuperscript{4}

The remineralizing strategies included remineralizing paste alone or in conjunction with high powered lasers with varying results.\textsuperscript{5} High powered lasers are losing out to low powered lasers owing to their cost, bulky machines and non-availability of optimal laser beam diameter to irradiate occlusal tooth surface.\textsuperscript{5-7} Low powered laser have a large number of clinical applications mainly directed toward soft tissues. But today they are being explored as an alternative to high powered lasers in hard tissue applications.\textsuperscript{8-10} Currently the research is ongoing to develop a versatile laser which is portable, highly efficient, cost effective and has a wide range of clinical applications. One such development is aluminium gallium arsenide lasers (Al Ga As). The greater selectivity of these wavelengths in targeting and removal of the carbonate group from the enamel mineral molecule results in greatly increased acid resistant enamel. Additionally the altered mineral has greater uptake of topically applied fluoride and thus greater acid resistance and leads to remineralisation of noncavitated lesions.\textsuperscript{9,10}

Thus this study was undertaken to assess the potentiality of aluminium gallium arsenide laser irradiation in caries inhibition.

**Material and Method**

**Material**

Laser fluorescence for caries detection

Aluminium Gallium Arsenide Laser

Casein phospho peptide- amorphous calcium phosphate with fluoride paste (CPP – ACP F)

**Method**

Ethical Clearance for the study was undertaken in A. B. Shetty Memorial Institute of Dental Sciences Nitte (Deemed to be University), Mangaluru. Patients of either sex, between age of 18 years to 25 years reporting to OPD of Conservative Dentistry & Endodontics of AB Shetty Memorial Institute Of Dental Sciences, Mangalore, having initial pit and fissure caries on first or second mandibular molar were included in the pilot study and its respective contralateral tooth served as control. The carious lesion selected was designated as 1.0, where the site of lesion is 1(pit and fissure) and size 0 (The initial lesion can be identified but there is no surface cavitation and has potential of remineralization).

The proposed sample size is 10 in both groups. Informed Consent was taken. Oral prophylaxis is done. Suspected incipient lesions were short listed using Ekstrand criteria & ICDAS index during visual examination. Preoperative I.O.P.A radiograph/ OPG Digital radiograph were be taken to rule out any periapical pathology. But the diagnosis was conclusive by a more specific and highly sensitive method of caries diagnosis that is Laser fluorescence method. The Laser fluorescence pen (Laser fluorescence pen 2190, KaVo, Birbech Germany) scanned the area of interest on the tooth surface to record the peak value which could range from 0 (sound) to 99 (caries) (Lussi criteria). A reading of 15-20 indicates enamel caries (diagnostic read out is Baseline Reading). The laser fluorescence method values are noted for both test and control. The concerned teeth - (Group B) was irradiated with 810 nm AlGaAs diode laser ( Whitestar\textsuperscript{TM}, Creation, Verona, Italy) for 30 seconds followed by application of remineralizing paste CPP-ACP F.(GC –Tooth Mousse). The contralateral tooth serve as control-(Group A), in which after noting Laser fluorescence device readings only remineralization paste was applied. The laser fluorescence method values are noted for both test and control. The concerned teeth - (Group B) was irradiated with 810 nm AlGaAs diode laser ( Whitestar\textsuperscript{TM}, Creation, Verona, Italy) for 30 seconds followed by application of remineralizing paste CPP-ACP F.(GC –Tooth Mousse). The contralateral tooth type serve as control-(Group A), in which after noting Laser fluorescence device readings only remineralization paste was applied. The laser fluorescence method values are noted. Thereafter follow up at 3, 6 monthly intervals included serial scanning with Laser fluorescence pen and comparison with baseline reading. The readings determined if caries has been inhibited, arrested or progressed. A radiograph is taken to assess if caries has progressed. The results were
tabulated and computed. Statistical analysis was done using paired t test to compare control and test groups and calculation of the mean.

**Results**

Table 1 - Diagnodent values at different time intervals

<table>
<thead>
<tr>
<th>Case Nos</th>
<th>Tooth No</th>
<th>Preoperative Diagnodent Values</th>
<th>Postoperative Diagnodent Values</th>
<th>3 Months Diagnodent Values</th>
<th>6 Months Diagnodent Values</th>
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</thead>
<tbody>
<tr>
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<td>Test</td>
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<td>36</td>
<td>46</td>
<td>28</td>
<td>31</td>
<td>28</td>
</tr>
</tbody>
</table>

TABLE 1: Gives the laser fluorescence value at different time interval. It was observed that laser fluorescence values in Test group have remarkably decreased soon after irradiation and this was followed by further decrease in values even during follow up.

Table 2 - Comparison of control with test group at different time intervals

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Standard Deviation</th>
<th>p-value</th>
</tr>
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<tr>
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</tr>
<tr>
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<td>1.99</td>
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</tr>
<tr>
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<td>7.17</td>
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<tr>
<td>TEST 6M</td>
<td>7.5</td>
<td>10</td>
<td>1.43</td>
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</table>
TABLE 2: Gives comparison of control with test group at different time intervals. Comparing test value with control at each level and p-value given at the end of the table shows that there is significant difference between the values of test and control. The control group and test group are compared at each time interval i.e preoperative, postoperative, and at 3 months and six months follow up. It has been observed that soon after laser irradiation the caries inhibitory role of the laser has led to a statistically significant difference between both the groups at postoperative period, 3 months follow up and 6 months. The laser irradiation leads to decrease in caries value as assessed by diagnodent.

Table 3- Comparison between control preoperatively with control group at time intervals of postoperative, 3 months and 6 months

<table>
<thead>
<tr>
<th>Paired T-Test</th>
<th>( \text{Paired Samples Statistics} )</th>
<th>Mean</th>
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<th>Standard Deviation</th>
<th>p-value</th>
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<td>CONTROL 6M</td>
<td>34.6</td>
<td>10</td>
<td>7.17</td>
<td></td>
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</table>

TABLE 3: Gives comparison between control preoperatively with control group at time intervals of postoperative, 3 months and 6 months. Comparing control values at different level and p-value given at the end of the table shows that there is significant difference between the values. a.) The correlation between preoperative Control and postoperative control cannot be computed because the standard error of the difference is 0.

b) In the above table there is a comparison between the control preoperatively with controls at postoperative period and also at 3 months and 6 months. Comparing control values at different level and p-value given at the end of the table shows that there is significant difference between the values.

Table 4 - Comparison between test group preoperatively with test group at time intervals of postoperative, 3 mths & 6mths

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<thead>
<tr>
<th>Paired T-Test</th>
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</table>
**Table 4 - Comparison between test group preoperatively with test group at time intervals of postoperative, 3 mths & 6 mths**

<table>
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<tr>
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</tbody>
</table>

**TABLE 4:** Gives the comparison between test group preoperatively with test group at time intervals of postoperative, 3 months and 6 months.

**Graph 1 - Mean Diagnodent Values**

The mean values of diagnost show that there is decrease in values of test group at all-time interval postoperatively even though to begin with the test group had higher values than control group.

**GRAPH 1:** Gives mean values of laser fluorescence reading. The mean values of laser fluorescence show that there is decrease in values of test group at all-time interval postoperatively even though to begin with the test group had higher values than control group.

**Discussion**

Dental caries is one of the most prevalent oral diseases of the world. It is the result of localized chemical dissolution of a tooth surface resulting from metabolic events in a biofilm. There is no global consensus or construct on the criteria for detection of carious lesions. But as the current management of dental caries rests on strong foundation of minimal invasive dentistry it follows as corollary our method of caries detection, case selection and management strategies would also do so. Thus in this study we have selected site 1 size 0 lesions given by Mount and Hume.11

The initiation of carious lesion begins with subsurface dissolution, this is due to the fact that 50-100microns of surface layer is resistant to decay as a result of the increased concentration of fluoride ions. Subsurface dissolution can be remineralized 2 To harness the phase of remineralization, it is important that caries be detected before cavitation. There are various diagnostic aids available for the clinician with varying degree of sensitivity and specificity. Lussi et al in an invitro study evaluated the new laser fluorescence device – Diagnodent pen with older version of diagnodent. The clinical finding were correlated with the histogical reading. The authors found that diagnodent was more sensitive a tool than specific.12 Based on past invivo and invitro studies 12-14 laser fluorescence method of caries detection was considered in the study. It was found that laser fluorescence method can be used to monitor dynamic progression of demineralization and remineralization.

Fluoride is a gold standard in caries prevention. Newer remineralization past like CPP ACP have been used alone or in combination with fluoride with varying degree of success.15-17 Jayarajan J et al conducted an invitro comparative study of the remineralizing potentiality of CPP ACP and CPP ACP F. The changes were evaluated by diagnost and scanning electron microscopy. Both the groups showed statistically significant remineralization results. Due to inclusion of NaF in CPP ACP F, it showed better remineralizing potential than CPP ACP alone.16 Thus in our study we
used CPPACP F as a remineralizing paste both in test and control.

Hicks conducted a scanning electron microscopy to assess the surface changes when surface treatment is done with argon alone or with fluoride. Both combinations had a caries inhibitory role. Niazy MA in an in vitro study evaluated whether the enamel cream and the laser had a synergistic effect on enamel and root caries. It was observed that there was a synergistic effect of CO2 laser and CPP ACP, this was more so evident on the root dentin Lasers like CO2, Nd:YAG, Erbium :YAG have all said to have a caries inhibitory role. The mechanism of action of each is varied and still under investigation. These high power lasers didn’t sustain the interest of the researchers as clinically the machines were bulky, costly and the inability to have a beam diameter of size of the tooth’s occlusal surface led to search for an cost effective but versatile alternative. Aluminium gallium arsenide (AlGaAs) lasers were one such alternative.

Sant’anna De G R carried out a FT –Raman study to analyse the compositional changes in enamel induced by a combination of low level lasers and photo absorbing cream. It was found that low level lasers like diode lasers modified the organic matrix content which led to caries inhibition. In the study we have used 3.5 watts of aluminium gallium arsenide laser for its caries inhibitory role. It was found in this study that Laser fluorescence values in test group have remarkably decreased soon after irradiation and this was followed by further decrease in values even during follow up. With 30 sec of Aluminium Gallium Arsenide laser application the test tooth had shown remarkable reduction in laser fluorescence reading thereby indicating that tooth has been structurally altered and improved and thereby inferring that the remineralization potential of a tooth with laser treatment has been enhanced. Clinically and radiographically there was no progression of the lesion. (TABLE 1, 2 & GRAPH 1)

This was in agreement with study by Sant’anna De G R and the hypothesis that there is change in crystalline structure of hydroxypapatite crystals due to the removal of carbonate ion and increased uptake of fluoride , a change bought about by these AlGaAs lasers. The comparison between test group preoperatively with test group and similarly control groups at time intervals of postoperative, 3 months and 6 months shows that there is significant difference between the values. (TABLE 3 & 4) This was in agreement with study by Sant’anna De G R

**Conclusion**

The results of the study seem promising however long term clinical trials should be undertake to assess the viability of using aluminium gallium arsenide laser (AlGaAs) in caries inhibition.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Institutional ethical clearance obtained.

**References**

Tooth Brushing in Pre-school Children: An Indian Perspective of Parental Challenges

Sonia Sivadas¹, Ashwin Rao², Arathi Rao³, Karuna YM⁴, Anupama Nayak⁴

¹Former post graduate Student, ²Associate Professor, ³Professor, ⁴Assistant Professor, Department of Pedodontics and Preventive Dentistry, Manipal College of Dental Sciences, Mangalore, Manipal Academy of Higher Education

Abstract

Background: A number of barriers to oral hygiene maintenance of children by parents have been reported in the literature. It is important to identify barriers faced by the parents in each individual child and give them customized solutions relevant to the Indian Scenario.

Aims: To unveil the challenges faced by the parents regarding tooth brushing of their preschool child in Mangalore city and to evaluate the awareness of parents to prevailing tooth brushing recommendations.

Settings and Design: Cross sectional Questionnaire study.

Method and Materials: The parents of the preschool children were asked to complete a pre-tested and validated questionnaire evaluating the problems faced by the parent during routine tooth brushing and assessing the knowledge of the parent regarding newer tooth brushing recommendations.

Statistical analysis used: The obtained descriptive data was statistically Analyzed using SPSS version 16 software.

Results: 43.7% of the parents responded that their children do not cooperate while tooth brushing with different quoted reasons. 37% of the parents experienced difficulties to brush their child’s teeth mainly due to lack of access to all areas of the mouth. 50% of the parents were not brushing all surfaces of the teeth. Only 8% of the parents started brushing when the first tooth erupted and 38% of the parents made their children brush twice a day. 68% of the parents spent 1-3 minutes for brushing, 62% of the parents rinse their child’s mouth minimally after brushing, 63% parents used a pea size of toothpaste, 64% of the parents used children’s toothpaste, 51% of the parents thought that fluoride is more important in preventing cavities and 48% of the parents were aware that their child’s toothpaste contained fluoride.

Conclusions: Most common reasons for uncoperativeness while tooth brushing was because of the willingness of the children to brush themselves. Main difficulty in tooth brushing was to access all areas of the mouth. Knowledge of the parents regarding frequency of tooth brushing and age at which brushing has to be started was deficient.

Keywords: Tooth brushing, Children, Challenges, oral hygiene

Introduction

Good oral hygiene maintenance habits, if acquired during the early years of life, will be deeply ingrained in the child’s mind and this lays the foundation for a healthy, disease free oral cavity.¹ Also poor dental health in early childhood is a strong predictor of future dental problems.² Thus maintaining good oral health is
important among preschool children.¹

Tooth brushing remains the most efficient means of oral hygiene maintenance in children.³ While various innovative designs of toothbrushes are commercially available, effective tooth brushing however depends on use of technically correct tooth brush, brushing pattern and on patient compliance.³,⁴ The brushing ability of the children greatly varies not only according to their age but also to their individual dexterity and motivation.⁵,⁶

There exists various recommendations and guidelines on tooth brushing, as well as on selection and usage of toothpastes in children. Dental professionals should help and motivate parents to supervise and assist their children’s tooth brushing as per these guidelines.⁶

Late initiation of brushing, frequency of tooth brushing and lack of parental involvement in brushing are the significant factors responsible for caries experience at 6 years.⁷,⁸ To effectively handle these factors, it is important to identify barriers and facilitators, referred to as determinants, that parents report while maintaining the oral hygiene of their preschool children. A number of barriers to oral hygiene maintenance of children by parents have been reported in the literature viz lack of knowledge, the cost and availability of toothbrushes/toothpaste, difficulty establishing a routine, the influence of family, and managing child behavior.⁹-¹³

However, these studies are not Indian studies. Considering the Indian scenario, the challenges encountered by the parents while caring for their child’s tooth might be totally different. Thus the present study was conducted to unveil the challenges faced by the parents regarding tooth brushing of their preschool child. Another aim of the study was to evaluate the awareness of parents of preschool children to prevailing tooth brushing recommendations.

Materials and Method

Institutional ethical committee clearance was obtained before the commensal of the study. It was a cross sectional study.

Sample size and study subject selection:

Assuming prevalence of parents who faced challenges during tooth brushing and who had awareness to new tooth brushing recommendations as 60%, keeping the error as 10 % of the prevalence, the sample size obtained for the present study was 266. To obtain this sample size parents of pre-school children in the age group between 2-5 years of various English medium kindergarten schools in Mangalore were selected. Parents who either partially filled or not returned questionnaire were excluded from the study.

Procedure:

The parents of the preschool children who were included in the study were asked to complete a pre-tested and validated questionnaire. The questionnaire consisted of twelve questions. Part A of the questionnaire (3 questions) evaluated the problems faced by the parent during routine tooth brushing. Part B of the questionnaire (8 questions) assessed the knowledge of the parent regarding newer tooth brushing recommendations in preschool children. The obtained descriptive data was statistically Analyzed using SPSS version 16 software. The level significance was kept at p< 0.05.

Findings

A total of 269 completed questionnaires were collected and analyzed. The mean age of the preschoolers whose parents were included in the study was 3.84 (SD 0.78). 43.7% of the parents responded that their children do not cooperate while tooth brushing. The reasons given by the parents for uncooperativeness were various patterns of behavior viz sleepiness and crankiness just after waking up or before going to sleep (33%), willingness of the children to brush themselves (40%), dislikeness of the taste of toothpaste (6%), inattentiveness and playfulness (28%). 37% of the parents experienced difficulties to brush their child’s teeth for reasons viz lack of access to all areas of the mouth (40%), difficulty to restrain the child (17%), unawareness regarding proper child positioning while brushing (8%) and fear about toothpaste ingestion by the child (10%). When completeness of the tooth brushing was evaluated, 50% of the parents were not brushing all surfaces of the teeth. Reasons given for the same included difficulty in retracting the lips (28.7%), tightness of the cheeks posed by the child (28%) and interference of the tongue during brushing (25.6%). On analyzing the second part of the questionnaire, it was found that only 8% of the parents started brushing when the first tooth erupted, 38% of the parents made their children brush twice a day, 68% of the parents spent 1- 3minutes for brushing, 62% of the parents rinse their child’s mouth minimally after
brushing, 63% parents used a pea size of toothpaste, 64% of the parents used children’s toothpaste, 51% of the parents thought that fluoride is more important in preventing cavities and 48% of the parents were aware that their child’s toothpaste contained fluoride.

Discussion

The knowledge and beliefs of parents have direct influence on health behaviors and outcomes of their preschool children. Mothers play a pivotal role in determining children’s oral hygiene practices and behavior. To formulate the strategies to efficiently prevent caries basic knowledge about the methods of caring for the teeth is essential. Thus it is indeed meaningful to know the challenges faced by the parents while maintaining the oral hygiene of their preschool child, along with evaluating their awareness towards prevailing tooth brushing recommendations.

In the present study, out of all the oral hygiene maintenance strategies, tooth-brushing was chosen because there exists a plausible evidence which states that early brushing using fluoridated toothpaste is: associated with lower levels of mutans streptococci; highly caries protective and the predictor of future tooth brushing habits. Campanaro et al identified child’s cooperation to be the most commonly discussed facilitator to tooth brushing. In the present study, 44% of the parents responded that the children were non cooperative during tooth brushing. However, the encouraging factor was that in spite of the uncooperativeness majority of the parents (87%) did not compromise on the tooth brushing. One of the reasons that the parents gave for uncooperativeness was that children were sleepy and cranky just after waking up or before going to sleep. This may be overcome during morning by making the tooth brushing to be a part of bath. Once the child feels fresh after a couple of mugs of water during bathing, it’s good time to start brushing. Another reason given by the parents was playfulness and inattentiveness of children. Though mischievous is inbuilt by default in children, discipline in performing daily routine like tooth brushing should be cultivated by making the child importance of oral health. Shirzad et al concluded that oral health education program among pre-school children via health-promoting school approach was useful in improving the oral hygiene behaviors among the preschool children. Thus oral health education can be given to preschool children in the form of stories for instance “Spiderman would brush his teeth so he doesn’t get cavities”. Huebner et al stated various methods in their study which parents used while brushing their children’s teeth like telling stories (distraction), showing elder sibling brushing (modelling) and explaining the consequences of not brushing (emotional reactions) parents. These methods can also be tried to gain the cooperation of the child.

Another finding of our study is that 39.5% of the parents responded that children want to brush themselves, which lead to the uncooperative behavior while brushing. Thus majority of the parents (34.9%) allowed the child to brush but under their supervision. Only 1.5% of the parents brushed their children’s teeth themselves inspite of children’s demand to brush themselves. According to AAPD 2014 guidelines tooth brushing should be performed for children by a parent twice daily and according to AAP parent should brush their child’s teeth atleast once a day until the child is of 8years of age. Thus parental education in this regard is essential. However, child’s initiative to brush can be encouraged by allowing to engage in playful tooth brushing after which the parent can take over.

A small percentage of children in the present study (6%) were reluctant to brush as they did not like the taste of the tooth paste. This can be overcome by trying different mildly flavored children’s tooth paste medicated with optimum fluoride and xylitol (both are anti carious agents) according to the suitability to children’s taste. Huebner et al in their study mentioned that parents used various child-oriented supplies such as cartoon-character toothbrushes and flavored toothpastes as effective enticements.

36% of the parents in the study found brushing in children to be a difficult task for various reasons. A majority (40%) found it difficult to access all areas of the mouth as children do not retract their lips and tightens their cheeks while brushing. Retracting the child’s lips and cheeks while brushing becomes important due to the high tendency for food accumulation in this area. Ramos-Gomez et al explained the method of retracting the child’s lips and cheeks while brushing along the gingival margins. They also suggested the use of spongy handle of an age-appropriate sized toothbrush to prop open the child’s mouth. Tell-show-do and modeling may
make the brushing job easier for the parents.

Part B of our study revealed that majority of the children were brushed once a day (61.3%) and the most common age at which tooth brushing started was at 2 years while the AAPD guidelines recommend the implementation of the oral hygiene measures no later than the time of eruption of the first primary tooth. The guidelines further state that tooth brushing should be performed for children by a parent twice daily, using a soft toothbrush of age-appropriate size and the correct amount of fluoridated toothpaste. In the present study, only 41.9% of the preschool children were brushed at least twice daily. Thus the awareness of parents regarding the brushing frequency was found to be limited in comparison with that of other parts of the world. Interestingly in our study majority of the parents (51%) felt that fluoride is more important in preventing caries than calcium. Though 63.6% of the parents opted for using children’s toothpaste, majority of them did not know if their toothpaste contains fluoride or not.

The present consensus states that rinsing with water after brushing with fluoride toothpaste can reduce the benefit of fluoride toothpaste. Results of our study showed that 63% of the parents followed the current norm of minimal/no rinsing, with 68% of the parents spending average 1-3 minutes for brushing their child’s teeth. 58.6% of the parents used a pea size amount of toothpaste. However, the amount of toothpaste on the brush should be age related. No more than a smear or rice-sized amount of fluoridate toothpaste should be used for children under age three; no more than a pea-sized amount should be used for children ages three to six.

Through this study, an insight into the challenges that the parents face while performing tooth brushing for their children could be obtained along with evaluating their knowledge and awareness regarding the prevailing tooth brushing recommendations. With this background an appropriate oral health education program can be planned for the parents of preschool children of Mangalore. But, since the study sample was from English medium schools of Mangalore, results can’t be generalized to rural aspects of Mangalore, which needs further exploration.

Conclusion

Within the limitations of the study, following conclusions can be drawn:

Most common reasons for uncoperativeness expressed by children while tooth brushing was because of the willingness of the children to brush themselves and sleepiness/crankiness just after waking up or before going to sleep.

Main difficulty in tooth brushing was to access all areas of the mouth as children do not retract their lips and tightens their cheeks.

Knowledge of the parents regarding frequency of tooth brushing and age at which brushing has to be started is seen to be deficient.

Conflict of Interest: Nil

Source of Funding: Self

References


Clinicomicrobiological Insight into Bacteremia due to Gram Positive Cocci

Soumya Shrigiri¹, Sevitha Bhat², Archana Bhat K³

¹MBBS Student, ²Associate Professor, ³Assistant Professor, Department of Microbiology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, India

Abstract

Introduction: Bacteremia due to Gram positive cocci poses a challenge to clinicians due to the delay in diagnosis and multidrug resistance among these bugs.

Aim: To study the associated infections, risk factors & antibiotic resistance in Gram positive cocci, to note antibiotic treatment and outcome in bacteremia.

Materials and Method: Observational study was carried out in Microbiology laboratory of a tertiary care centre. Blood samples were cultured using BacT/ALERT system. Antibiotic susceptibility pattern was done by Vitek 2 compact system.

Results: Enterococcus faecalis and Staphylococcus aureus were the most common isolates of clinically significant Gram positive bacteremia. Skin and soft tissue infections, infective endocarditis, urosepsis and biliary tract infections were the common sources. Health care related infections (55%) were predominant in contrast to hospital acquired bacteremia (15%) indicating that prior invasive procedures increases the risk of blood stream infection. Mortality of 34% was observed.

Conclusion: Timely diagnosis of sepsis, identification of risk factors and co morbidities, choosing the appropriate antibiotic therapy is crucial in the management of Gram positive bacteremia.

Key words: Bacteremia, Gram positive cocci, Staphylococcus aureus, Risk factors

Introduction

Incidence of Gram-positive bacteremia & bloodstream infections (BSI) has increased in the hospital. Staphylococcus aureus is a major cause of endocarditis with increasing reports of MRSA. The risk factors associated with invasive S. aureus infection include dialysis, IV drug abusers, HIV infection, IV catheters, heart disease, cancer, diabetes mellitus. Vancomycin is used in the treatment of MRSA, however Vancomycin MIC >1 μg/mL may be associated with higher treatment failure and mortality.

Enterococcus spp. is a cause of Gram-positive bacteremia. Risk factors for Enterococcal infection include gastrointestinal colonization, renal insufficiency, neutropenia, transplantation, urinary or vascular catheters, prolonged hospital/ICU stay, prior surgery.

Groups A, C, G streptococci are rare causes of bacteremia & endocarditis. The associated debilitating conditions are risk factors in these patients. Group B streptococcal bloodstream infections occur in the presence of predisposing factors: age >65 years, diabetes mellitus, cirrhosis, cancer. Group D streptococcal bacteremia is associated with infective endocarditis in elderly patients with no H/O valve disease.

Streptococcus pneumoniae is another important cause of bacteremia. Invasive pneumococcal disease is
common in children <2 years old, older adults (>65 years old), immunocompromised patients and individuals with co-morbidities.6

Bacteremia due to Viridans group Streptococci is common in neutropenic patients, but can occur in non-neutropenic patients as well.5

The prompt identification and appropriate antimicrobial therapy of Gram positive bacteremia can reduce morbidity and mortality. Risk factors for acquisition, co-morbid conditions, empirical treatment, change in antibiotic after the sensitivity and MIC report and its impact on clinical outcome of bacteremia are of a concern. There has been no similar study from this region. Hence this study was undertaken.

**Aims and Objectives**

To identify the Gram positive cocci in blood and study their antibiogram.

To study the major risk factors, associated infections/co-morbidities in patients with bacteremia caused by Gram positive cocci.

To note the antibiotic treatment and outcome in patients with Gram positive bacteremia.

**Materials and Method**

**Study setting:** The study was conducted in the Microbiology laboratory, Kasturba Medical College, Mangalore, a tertiary care hospital.

**Study design:** Time bound descriptive study

**Study sample: Inclusion criteria:** Patients admitted with suspected sepsis in whom paired blood culture samples yielded Gram positive cocci. Quick SOFA score(adults) and SIRS criteria (paediatric age group) were considered for inclusion.6

**Exclusion criteria:** Patients with negative blood culture or with positive blood culture yielding coagulase negative Staphylococcus(CONS), Gram negative bacilli, and yeasts.

Hospital acquired Blood stream infection (HA-BSI): Patients with positive blood culture > 2 days of admission or ≤1 day after discharge.7 Health care related Blood stream infection (HCR-BSI): Patients with positive blood culture > 2 days of admission along with one of the following: Prior hospitalization (in the last 90 days); long term haemodialysis; prior invasive procedures; long term intravascular devices for parenteral nutrition or chemotherapy or immunosuppressive therapy.7 Community acquired Blood stream infection (CA-BSI): Patients who donot fulfill the criteria for HA- BSI or HCR-BSI and who have a first positive blood culture ≤ 2 days after admission.7

The study proceeded after clearance from the Institutional Ethics Committee. Blood culture was done using Bac-T ALERT microbial detection system(Biomeriux, Inc. Durham, North California, USA). Identification &antibiotic susceptibility was done by Vitek Compact 2 system and interpretation was as per CLSI guidelines. Medical records were examined for clinical details,treatment and outcome . Bacteriological culture from other sites was noted to trace the probable source of sepsis.

**Statistical analysis:** For categorical variables, statistical test chi square was done.p value <0.05 was taken as statistically significant.

**Results:** Of the 4812 blood culture samples received from January-August 2018, 482 (10.01%) showed positive growth. Of these 482 isolates, Gram positive cocci other than CONS constituted 47 (10.01%). The other 435 isolates were Coagulase negative Staphylococcus, Gram negative bacteria and yeast.

The Gram positive cocci isolated are as shown in table 1. The mean time to positivity (in hours) ranged from 9-18 hrs.

**Table 1. Distribution of Gram positive cocci isolated:**

<table>
<thead>
<tr>
<th>Organism</th>
<th>Number (n=47)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>19</td>
<td>40.4</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>24</td>
<td>51.1</td>
</tr>
<tr>
<td><em>Enterococcus faecium</em></td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td><em>Streptococcus pneumoniae</em></td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Viridans <em>Streptococcus</em></td>
<td>2</td>
<td>4.3</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 2. Age wise distribution of Gram positive cocci isolated from blood:

<table>
<thead>
<tr>
<th>Organism</th>
<th>Age group</th>
<th>Number (%)</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adult</td>
<td>Neonate</td>
<td>Pediatric</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>17 (89.4%)</td>
<td>0</td>
<td>2 (10.6%)</td>
</tr>
<tr>
<td>Enterococcus faecalis</td>
<td>17 (70.8%)</td>
<td>1 (4.2%)</td>
<td>6 (25%)</td>
</tr>
<tr>
<td>Enterococcus faecium</td>
<td>1 (100%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Streptococcus pneumoniae</td>
<td>1 (100%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Viridans Streptococcus</td>
<td>1 (50%)</td>
<td>1 (50%)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

$X^2 = 11.6, \ p=0.168 \ ns$

Of the 17 adult cases with *Staphylococcus aureus* bacteremia, 7 (41.1%) belonged to the age <65 yrs, and 10 (58%) belonged to the age group 65-84yrs. Of the 17 adult cases with *Enterococcus faecalis* bacteremia, 5 (29.4%) were <65 yrs in age and 12 (70.5%) belonged to the age group 65-84yrs. The isolates of *Enterococcus faecium*, *Streptococcus pneumoniae* and *Viridans Streptococci* were all isolated from adults > 65 years.

Table 3: Risk factors & co-morbidities in patients with Gram positive cocci bacteremia

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Number(n=47)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urologic abnormality/UTI</td>
<td>7</td>
<td>14.9</td>
</tr>
<tr>
<td>Respiratory tract infection</td>
<td>19</td>
<td>40.4</td>
</tr>
<tr>
<td>Skin and soft tissue infection</td>
<td>5</td>
<td>10.6</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>2</td>
<td>4.2</td>
</tr>
<tr>
<td>Endocarditis</td>
<td>4</td>
<td>8.5</td>
</tr>
<tr>
<td>Meningitis</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Hematological malignancy</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Intra-abdominal infections</td>
<td>12</td>
<td>25.5</td>
</tr>
<tr>
<td>Dialysis</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>16</td>
<td>34</td>
</tr>
<tr>
<td>Hypertension</td>
<td>16</td>
<td>34</td>
</tr>
<tr>
<td>Stroke</td>
<td>11</td>
<td>23.9</td>
</tr>
<tr>
<td>Immunocompromised</td>
<td>17</td>
<td>37</td>
</tr>
<tr>
<td>End stage renal disease</td>
<td>10</td>
<td>21.3</td>
</tr>
<tr>
<td>Neutropenia</td>
<td>11</td>
<td>23.4</td>
</tr>
<tr>
<td>Hypoalbuminemia</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Blood transfusion</td>
<td>26</td>
<td>55.3</td>
</tr>
<tr>
<td>Urinary catheterization</td>
<td>12</td>
<td>25.5</td>
</tr>
<tr>
<td>Intravenous line insertion</td>
<td>37</td>
<td>78.7</td>
</tr>
<tr>
<td>Nasogastric tube</td>
<td>6</td>
<td>12.8</td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td>9</td>
<td>19.1</td>
</tr>
<tr>
<td>Tracheostomy</td>
<td>12</td>
<td>25.5</td>
</tr>
<tr>
<td>Prior surgery</td>
<td>16</td>
<td>34</td>
</tr>
</tbody>
</table>
Of the 25 sources traced, the predominant ones included intravenous catheters (n=10, 21.3%) infective endocarditis (n=4; 8.5%) and skin and soft tissue infection (n=4; 8.5%) and urinary tract infection (n=3; 6.3%). Of the total 4 skin and soft tissue infections (n=4), 3 were due to *S. aureus* and the other was due to *Enterococcus faecalis*. All the endocarditis cases were secondary to *S. aureus*. Dialysis catheter related bacteremia was due to *E. faecalis*. Bacteremia secondary to biliary tract infection was traced in 2 cases with *Enterococcus faecalis*. The case of Pneumococcal bacteremia was secondary to Pneumonia.

Majority of Gram positive coccal bacteremia were healthcare related (n=22, 55%), followed by community acquired infections (n=13, 32.5%) and hospital acquired infections (n=5, 12.5%).

The antibiogram of *Staphylococcus aureus* and *Enterococcus faecalis* are shown in tables 4 and 5 respectively. Among the 4 MRSA strains, 1 was resistant to Linezolid.

**Table 4: Antibiotic resistance pattern of *Staphylococcus aureus* isolated from blood (n=19)**

<table>
<thead>
<tr>
<th>Staphylococcus aureus</th>
<th>Resistance</th>
<th>Percentage [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin</td>
<td>17</td>
<td>89.4</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>6</td>
<td>31.5</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>5</td>
<td>26.31</td>
</tr>
<tr>
<td>Methicillin</td>
<td>4</td>
<td>21.0</td>
</tr>
<tr>
<td>Linezolid</td>
<td>2</td>
<td>10.5</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>1</td>
<td>5.2</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rifampicin</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>11</td>
<td>57.89</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>2</td>
<td>10.5</td>
</tr>
<tr>
<td>Teicoplanin</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Only one *Enterococcus faecium* was isolated from blood and it was sensitive to Erythromycin, Vancomycin, Teicoplanin, Linezolid, Tetracycline, Ciprofloxacin but resistant to High level gentamicin, ampicillin and penicillin. The patient had an intra-abdominal source and was put on teicoplanin and meropenem.

*Streptococcus pneumoniae* was sensitive to Erythromycin, Clindamycin, levofloxacin and Vancomycin but resistant to Penicillin, ceftriaxone and cefotaxime. The patient was an elderly, immunocompromised patient with chronic lung disease and pneumonia was treated with levofloxacin and vancomycin and the condition improved.

Viridans *streptococcus* (n=2) isolated were sensitive to Ampicilin, Penicillin, cefotaxime, Erythromycin, Clindamycin, Vancomycin, Methicillin, Linezolid, Tetracycline, Ciprofloxacin but both the isolates were resistant to Clindamycin. We observed 2 cases of VGS bacteremia. 1. Elderly patient with respiratory tract infection, history of prior surgery and antacid administration, renal insufficiency and hypoalbuminemia. 2. Paediatric patient with haematological malignancy and neutropenia with sepsis. Both the patients expired.

**Table 5: Antibiotic resistance pattern of *Enterococcus faecalis* isolated from blood (n=24)**

<table>
<thead>
<tr>
<th>Enterococcus faecalis</th>
<th>Number</th>
<th>Percentage [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin</td>
<td>5</td>
<td>20.8</td>
</tr>
<tr>
<td>Penicillin</td>
<td>10</td>
<td>41.6</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>12</td>
<td>50</td>
</tr>
<tr>
<td>Linezolid</td>
<td>1</td>
<td>4.16</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>18</td>
<td>75</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>2</td>
<td>8.33</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>11</td>
<td>45.8</td>
</tr>
<tr>
<td>High level gentamicin</td>
<td>8</td>
<td>33.3</td>
</tr>
<tr>
<td>High level streptomycin</td>
<td>5</td>
<td>20.83</td>
</tr>
<tr>
<td>Teicoplanin</td>
<td>2</td>
<td>8.33</td>
</tr>
</tbody>
</table>
The empirical antibiotics used were ceftriaxone, cefaperazone, piperacillin tazobactam, clindamycin, amikacin, meropenem and Vancomycin. Clindamycin, linezolid, vancomycin or rifampicin were used for the treatment of MRSA.

Out of the total 47 patients with Gram positive cocci bacteremia, mortality was observed in 16 patients (34%). However, majority (n=25, 53.2%) showed improvement with adequate antibiotic treatment.

**Discussion**

Gram positive cocci have emerged as pathogens in bacteremia leading to sepsis and septic shock. In our study of clinically significant Gram positive bacteremia, *S. aureus* and *Enterococci* were the common agents. In a study from Spain, 37% (n=459) of the total 1229 bacteremia cases were by Gram-positive cocci. In a study by Cordonnier et al prevalence of Gram-positive cocci bacteremia was 21%. In our study, 78.7% (n=37) of the cases with Gram positive bacteremia were adults of which 54% (n=24) were >65 years. Age affects the clinical presentation and outcome of bacteremia and is an independent risk factor for death due to sepsis.11

Colonization with VRE is a risk factor for bloodstream infection. Risk factors include exposure to antibiotics, immunosupression, hematological malignancies, increased ICU stay. VRE colonization occurs in GI tract, skin, genitourinary tract and oral cavity. In our study, vancomycin (8.33%, n=2) and teicoplanin resistance (8.33%, n=2) was detected using automated methods. Both the strains that were vancomycin resistant were *E. faecalis*. One of them, was resistant to teicoplanin as well, and was isolated from an immunocompromised patient with renal failure and hypoalbuminemia and the patient died. The other strain that was resistant to vancomycin was isolated was from an immunocompromised patient was sensitive to teicoplanin. The patient condition improved with combination therapy with piperacillin tazobactam and teicoplanin. *E. faecalis* strain that was teicoplanin resistant was sensitive to Vancomycin, the patient had an intra-abdominal source and was treated with vancomycin and rifampin and the condition of the patient improved. *Enterococcus faecium* isolated from a patient with gastrointestinal insufficiency was resistant to High level gentamicin, ampicillin and penicillin. The condition of the patient improved with combination therapy with teicoplanin and meropenem. In cases of Enterococcal bacteremia empiric antibiotics used were piperacillin tazobactam, ceftriaxone, meropenem, teicoplanin and...
vancomycin. Based on the antibiotic sensitivity report a combination therapy of ampicillin and high level gentamicin or streptomycin, vancomycin or teicoplanin or rifampicin were used.

Patient with a penicillin resistant *Streptococcus pneumoniae* bacteremia was treated with levofloxacin and high dose ceftriaxone.

One of the VGS bacteremia patients died due to rapid progress to acute respiratory distress syndrome (ARDS) and shock. In one of the two total cases of VGB, Imipenem and rifampicin was used.

Our study of clinically significant Gram positive bacteremia showed a mortality of 34% and a majority (53.2%) improved with adequate treatment. This supports the view that appropriate antibiotic therapy still remains the mainstay of treatment in patients with suspected sepsis.

**Conclusion**

The current study reveals that Gram positive cocci is an emerging cause of bacteremia. *Enterococcus faecalis* and *Staphylococcus aureus* were the most common isolates of clinically significant Gram positive bacteremia. Skin and soft tissue infections, infective endocarditis, urosepsis and biliary tract infections were the common sources traced. Health care related infections (55%) were predominant indicating that prior invasive procedures increases the risk of blood stream infection. Mortality of 34% was observed and a majority (53.2%) improved with adequate treatment. Hence timely diagnosis of sepsis, identification of risk factors and co morbidities, choosing the best empiric antibiotic and de-escalation or change in antibiotic therapy is crucial in the management of Gram positive bacteremia.

**Funding Statement** : ICMR STS 2018

**Conflict of Interest** : None

**Ethical Clearance** : The study has received clearance from the Institutional Ethics Committee. IEC KMC MLR 01-18/03

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A Study on Cost Minimization in Operating Room; Through Team Learning at Tertiary Care Hospital of South India

T. Bharathi
Lecturer, Faculty of Management, Sri Ramachandra Institute of Higher Education & Research (Deemed to be University), Porur, Chennai, India

Abstract

Increase in number of surgeries and minimizing cost of surgeries will circuitously maximize OR profitability. Reducing the cost of surgery is possible only by team effort of health professional. This study analyses the cost involved in the operating room of tertiary care hospital of south India. The informative data collected from the staff members of operating room at tertiary care hospital of South India were analysed by comparing the cost incurred before the learning module presentation and after the presentation. The use of gloves varied between surgeries and the maximum of 10 pair of gloves were used in only one surgery (2%) and on an average, B. Sc Nurses used more IV fluids when compared to DGNM nurses, found to be statistically significant. After the study presentation, considerable decline in the usage of materials, machines and other things in numbers was significant. After Team learning, there is a considerable decline in the usage of materials and infrastructure. Continuous medical education should be mandatory for promotion and other human resource welfare activities, which will give complete effort for learning.

Key Word: Operating room, Surgeries, Cost management.

Introduction

Healthcare is one of the fast growing industries in both, developing and developed countries. Historically, surgical interventions has taken place in the traditional environment of the hospital operating room (OR) suite. The operating room has been one of the highest revenue generators for healthcare organizations. The OR in a hospital, is a convergence of man, materials, money, methods and so on. Infrastructure with highly advanced equipments, expenses under human resources like salary and procurement of consumables come under overhead costs. Increase in number of surgeries and minimizing cost of surgeries will circuitously maximize OR profitability and in turn hospital profitability which always stands as management staffs’ major attraction. Surgery, anaesthesia, and nursing are three vital departments involved in OR management. Cost can be minimized by mobilizing essential resources when these three fields work in an amicable manner. Learning best Operation theatre practices and reinforcement will be helpful for desired changes in the healthcare personnel, which will be helpful to reduce the cost incurred in Operating Room. Cost of surgery to be fixed based on the expenses for that particular surgery. Low operating cost is possible only when the cost of surgery is minimized. Reducing the cost of surgery is possible only by team effort as it involves anaesthetists, doctors, nurses, technicians and supporting staff.

This study analyses the cost involved in the operating room of tertiary care hospital of south India. This would helps to understand how cost of operative room could be minimized through teaching of quality practices to the operating team. Study also assesses the effectiveness of the team learning and increase in efficiency through the learning.
Method and Materials

The study area is confined to operating room of Chennai Medical College Hospital and Research Centre. This study was approved and designed by the Institutional Ethical Committee of Chennai Medical College Hospital and Research Centre, Trichy, India. The research was Descriptive Research Design depends mainly on primary data collected through well framed structured questionnaire to obtain the well considered opinions of the respondents. The sampling technique used in this research study is convenient sampling with number of participants of 100.7 Findings were about the distribution and average usage of materials for two set of samples and comparison of cost before and after the presentation. The collected data from the staff members were analyzed by comparing the cost incurred before the learning module presentation and after the presentation. Number of gloves, caps, IV fluids used, minutes of air conditioner and electrical items utilized were analysed. Learning module had a brief introduction about Building support among physicians to reduce supply costs; blocking time; adjusting or block time and releases; proactively avoiding gaps due to equipment problems; case start times and controlling turnover times.

Results

Data shows that 4 pair of gloves were used in 7 surgeries (14%), 24 surgeries (48%) used 5 pair of gloves, 16 surgeries (32%) used 6 pair of gloves, 2 respondents (4%) used 7 pair of gloves and the maximum of 10 pair of gloves were used in only one surgery (2%) (Table 1). Additional data in table 3.; showed that 3 pair of gloves were used in 5 surgeries (10%), 27 surgeries (54%) used 4 pair of gloves, 14 surgeries (28%) used 5 pair of gloves and the maximum of 6 pair of gloves were used in only 4 surgeries (8%) (Table 1).

Before presentation, among 18 B. Sc Nursing samples, none of them used 3 and 6 IV fluids for any of the surgery. 6 respondents (12%) used 5 IV fluids and 12 respondents (24%) used 4 IV fluids for each surgery. Among 32 DGNM samples, only 1 surgery (2%) used 6 IV fluids, 8 surgeries (16%) used 3 IV fluids, maximum of 19 surgeries (38%) used 4 IV fluids and 4 surgeries (8%) used 5 IV fluids. On an average, B. Sc Nurses used more IV fluids when compared to DGNM nurses (Table 2). The usage of IV fluid by the B. Sc nurses during surgery was found to be more than the usage of IV fluid by DGNM nurses which is found to be statistically significant (p<0.05) (Table 3).

After presentation, among 21 B. Sc Nursing samples, 3 respondents (6%) used 2 IV fluids, 14 respondents (28%) used 3 IV fluids for each surgery and 4 respondents (8%) used 4 IV fluids. Among 29 DGNM samples, 14 surgeries (28%) used 2 IV fluids, maximum of 14 surgeries (28%) used 3 IV fluids and 4 surgeries (8%) used 4 IV fluids. On an average, B. Sc Nurses used more IV fluids when compared to DGNM nurses (Table 3). The usage of IV fluid by the B. Sc nurses during surgery was found to be more than the usage of IV fluid by DGNM nurses which is found to be statistically significant (p=0.042) in Pearson Chi-Square.

By comparing the samples collected before and after the presentation, different statistical interpretation of different variables selected shows considerable decline in the usage of materials, machines and other things in numbers (Table 4). Students sample (t) test was administered for the two set of samples collected before and after presentation, which shows significant changes in all statistical interference (Table 5).

Table 1: Distribution of respondents based on pair of gloves used among the samples collected before and after presentation

<table>
<thead>
<tr>
<th>S. NO</th>
<th>PAIR OF GLOVES USED</th>
<th>NUMBER OF RESPONDENTS</th>
<th>PERCENTAGE OF RESPONDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>
Table 1: Distribution of respondents based on pair of gloves used among the samples collected before and after presentation

<table>
<thead>
<tr>
<th>S. NO</th>
<th>PAIR OF GLOVES USED</th>
<th>NUMBER OF RESPONDENTS</th>
<th>PERCENTAGE OF RESPONDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>27</td>
<td>54</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Table no. 2: cross tabulation for usage of intravenous fluids based on qualification among the samples collected before and after the presentation

<table>
<thead>
<tr>
<th>S. NO</th>
<th>QUALIFICATION</th>
<th>NUMBER OF IV FLUIDS</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B. Sc NURSING</td>
<td>0 12 6 0</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>DGNM</td>
<td>8 19 4 1</td>
<td>32</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>8 31 10 1</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S. NO</th>
<th>QUALIFICATION</th>
<th>NUMBER OF IV FLUIDS</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B. Sc NURSING</td>
<td>3 14 4</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>DGNM</td>
<td>14 11 4</td>
<td>29</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>17 25 8</td>
<td>50</td>
</tr>
</tbody>
</table>

Table 3: chi-square tests for cross tabulation of iv fluids usage based on qualification (before the presentation)

<table>
<thead>
<tr>
<th>VALUE</th>
<th>DEGREES OF FREEDOM</th>
<th>ASYMP. SIG. (2- SIDED)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>7.661a</td>
<td>3</td>
</tr>
<tr>
<td>Number of valid cases</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>
Table 4: Comparison of statistics for samples collected before and after the presentation

<table>
<thead>
<tr>
<th>STATISTICS</th>
<th>GLOVES</th>
<th>CAP</th>
<th>IV FLUIDS</th>
<th>STAY IN RECOVERY ROOM (MINUTES)</th>
<th>AC (MINUTES)</th>
<th>ELECTRICAL ITEMS (MINUTES)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>MEAN</td>
<td>5.36</td>
<td>4.34</td>
<td>7.34</td>
<td>6.00</td>
<td>4.08</td>
<td>2.82</td>
</tr>
<tr>
<td>STD ERROR OF MEAN</td>
<td>0.14</td>
<td>0.10</td>
<td>0.29</td>
<td>0.25</td>
<td>0.09</td>
<td>0.00</td>
</tr>
<tr>
<td>MEDIAN</td>
<td>5</td>
<td>4</td>
<td>6.50</td>
<td>6.00</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>MODE</td>
<td>5</td>
<td>4</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>S.D</td>
<td>1.00</td>
<td>0.77</td>
<td>2.05</td>
<td>1.78</td>
<td>0.66</td>
<td>0.69</td>
</tr>
<tr>
<td>VARIANCE</td>
<td>1.01</td>
<td>0.59</td>
<td>4.22</td>
<td>3.18</td>
<td>0.44</td>
<td>0.47</td>
</tr>
<tr>
<td>RANGE</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>MINIMUM</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>MAXIMUM</td>
<td>10</td>
<td>6</td>
<td>10</td>
<td>12</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>SUM</td>
<td>268</td>
<td>217</td>
<td>367</td>
<td>300</td>
<td>204</td>
<td>141</td>
</tr>
</tbody>
</table>

Table 5: paired samples test for the samples collected before and after presentation

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>PAIRED DIFFERENCE</th>
<th>95% CONFIDENCE INTERVAL OF THE DIFFERENCE</th>
<th>DIFFERENCE</th>
<th>SIGNIFICANT(2 TAILED)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MEAN</td>
<td>S.D</td>
<td>STANDARD ERROR MEAN</td>
<td>t</td>
</tr>
<tr>
<td></td>
<td>LOWER</td>
<td>UPPER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GLOVES</td>
<td>1.020</td>
<td>1.270</td>
<td>0.180</td>
<td>0.659</td>
</tr>
<tr>
<td>CAPS</td>
<td>1.340</td>
<td>2.767</td>
<td>0.391</td>
<td>0.554</td>
</tr>
<tr>
<td>IV FLUIDS</td>
<td>1.260</td>
<td>0.922</td>
<td>0.130</td>
<td>0.998</td>
</tr>
<tr>
<td>RECOVERY ROOM</td>
<td>4.000</td>
<td>5.051</td>
<td>0.714</td>
<td>2.565</td>
</tr>
<tr>
<td>AC MINUTES</td>
<td>38.000</td>
<td>26.65</td>
<td>3.769</td>
<td>30.426</td>
</tr>
<tr>
<td>ELECTRICAL ITEMS</td>
<td>21.100</td>
<td>44.09</td>
<td>6.236</td>
<td>8.569</td>
</tr>
</tbody>
</table>
**Discussion**

Two sets of data were collected with the same questionnaire, whereas 50 samples were collected before the presentation and 50 samples were collected after the presentation. Findings were about the distribution and average usage of materials for two sets of samples and comparison of cost before and after the presentation. After Team learning, there is a considerable decline in the usage of materials and infrastructure. Continuous medical education should be mandatory for promotion and other human resource welfare activities, which will give complete effort for learning. Periodical individual material audit for a staff should be in practice to give them ideas about their scientific procedures. Check list should be checked and counter signed in various levels of personnel for the materials used in operating room. This will ensure the optimum utilization of materials which impact the cost of the surgery. Exchange of staff members on routine at possible places will help the project manager/ Head of the department to identify the root cause of excessive cost if any.

Team work is essential for the success of anything. To bring out remarkable output, change should be adapted by each and every one participating in an event. Team in Operating room includes the personnel involved in holding area, surgical ward, surgical suite and they have to analyze in planning, implementation and evaluation. Starting from assessment of patient for anaesthesia fitness, room preparation, transferring the patient, scrubbing, gloving, gowning, basic aseptic techniques, assisting the anaesthetist, positioning the patient, preparing the surgical suite, safety of the patient and post-operative care in the recovery room involves cost to the patient as well as cost to the management if the surgery cost are fixed before the surgery.

Cost minimization in operation room is not possible without team effort. For most of the cases, lack of awareness about the value of cost and its influence made the team to ignore significant things which impact in revenue and other promotional activities. Team should focus on the same goal to achieve it with ease. As like that, with team learning cost levied by the patient can be reduced and revenue can be increased on other hand. It is important to learn things in work place, also to bring in behavioral changes to practice the learnt model. Advancements in science and technology always results in downsizing the utility in all aspects. It will be excellent if a cordial team with learning interest is involved in any process to bring fruitful results.

**Compliance with Ethical Standards**

**Ethical Clearance:** This study was approved and designed by the institutional ethical committee of Chennai Medical College Hospital and Research Centre.

**Disclosure of potential Conflict of Interest:** Author has nothing to disclose.

**Conflict of Interest:** Authors do not have anything to disclose and declare not conflict of interest.

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Oral Health Education Intervention among Preschoolers: A Randomized Controlled Trial

Thara Chandran¹, Nagashree Savanur Ravindranath², Deesha Kumari³, Nagaland Tirupati⁴, Mithun K⁵, Shilpa M⁶, Bless Annie Philip⁷

¹Senior Lecturer, Department of Public Health Dentistry, AB Shetty Memorial Institute of Dental Sciences, Nitte Deemed to be University, Deralakatte, Mangalore, ²Reader, Vokkaliga Sangha Dental College and Hospital, K.R. Road, V.V. Puram, Bengaluru, ³Senior Lecturer, Department of Public Health Dentistry, AB Shetty Memorial Institute of Dental Sciences, Nitte Deemed to be University, Deralakatte, Mangalore, ⁴Senior Lecturer, Department of Public Health Dentistry, Chettinad Dental College and Research Institute, Rajiv Gandhi Salai, Kelambakkam, ⁵Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, AJ Institute of Dental Sciences, Kuntikana, Mangalore, Karnataka, ⁶Senior Lecturer, ⁷Tutor, Department of Public Health Dentistry, AB Shetty Memorial Institute of Dental Sciences, Nitte Deemed to be University, Deralakatte, Mangalore 575018.

Abstract

The global prevalence of oral diseases across all ages demands the immediate need for oral health promotion measures. The impact and retention of oral health message vary depending upon the mode of delivery. Thus present study compared the effectiveness of different modes of oral health education delivered to preschoolers. A randomized controlled study with three groups (n=40) compared the effect of oral health education delivered through drama mode enacted by peers, dentists and a control group with no oral health education intervention. Debris Index Simplified (DI –S) component of Oral Hygiene Index Simplified (OHI –S) modified for primary dentition was used to measure the oral hygiene status. Statistical analysis was performed using SPSS version 21 for descriptive and inferential statistics like paired t test, ANOVA and post hoc tests. p< 0.05 was considered statistically significant. Oral health education delivered by drama mode had a significant impact on the preschoolers. The study concluded that the same oral health information when delivered by different modes had different impact on the preschoolers.

Key words – Preschoolers, Drama, Oral health education.

Introduction

The prevalence of dental caries varies from 27 to 54% in Indian preschoolers¹. The prevalence of gingivitis is 53%². The cost of dental treatment is increasing at a catastrophic rate and a large proportion finds dental treatment unaffordable. Hence these dental diseases can cause a huge impact on the quality of life of this age group later in life. An array of determinants contribute to this high rate including dietary pattern, oral hygiene practices, socioeconomic status of parents and lifestyle³. China.¹

METHODS: In total, 2880 cases involving preschool children were selected by stratified cluster sampling. The dental examination methods and criteria followed the WHO guidelines. SPSS 19.0 was used for the statistical analysis. Chi square tests were used to compare the caries prevalence among children with different social characteristics. Non-parametric tests were used to compare the decayed, missing and filled teeth (dmft. Primary prevention focusing on health promotion measures at a professional level can be carried out by dentists by diet and oral hygiene practice counseling.

Health education is the pillar in prevention of disease. School years are the most influential period in any individual’s life and oral health information can be disseminated and periodically reinforced in these years. This is the period when a person develops attitudes, beliefs and skills which he sustains lifelong⁴. Various behavioral factors like frequent intake of sugary food, improper oral hygiene measures and failure to visit a dentist influence oral health of preschoolers⁵.
Conventional health education which gives normative advice does not result in sustained dental behaviors. Research has shown that peer led health education is as effective as health education given by experts. Innovative approaches engaging the peers, experts and teachers may have a better effect in retaining the oral health messages. The present study thus aims at comparing the effectiveness of conventional health education given by dentists, health education by peers through drama mode and a control group.

**Materials and Method**

The study was conducted in an aided higher secondary school in Bengaluru from March 2015 to June 2015. Ethical clearance was obtained from the Institutional Review Board of Vokkaligara Sangha Dental College. Permission for conducting the study was obtained from the school authorities. Informed consent was obtained from the parents. Sample size was estimated from results of a previous study. A total sample size of 120 was estimated for a power of 80% at 5% level of significance using nMasters 2.0 Sample size software.

A pilot study was conducted on 20 participants. 2 examiners recorded oral health status. They were trained and calibrated before the study. Inter examiner reliability was obtained as 0.78. Children who were found uncooperative, whose parents failed to give informed consent and who had the index teeth missing were excluded from the study. Children who had a full set of primary dentition were included. Oral Hygiene Index Simplified modified for primary dentition was used to record the oral hygiene status. The study group was divided into 3 groups. Children were randomly allotted to the three groups by systematic sampling and the examiners were blinded of the allotment. From the school register, the class teacher allotted the first child to dentist group, second child to drama group and every third child to control group.

Oral hygiene status of the preschoolers was measured before the intervention. Examination was done using mouth mirror and explorer under natural light. For children in the drama group, a 15 minute drama which gives information on oral hygiene practices, correct brushing technique, diet and dental caries and importance of dental visit was shown. The drama was enacted by senior students of the school who were given a four hour training by the dentist. The drama was video graphed. Group B received oral health education from the dentist. This oral health educational lecture by the dentist lasted for 10 minutes by the use of layman language, and active participation and appreciation of a positive behavior was ensured. Model and oral hygiene aids like tooth brush and toothpaste were used. The third group, Group C acted as the control group in whom oral examination was done at baseline and no oral health education was given.

The programme was evaluated three months later and the DI-S scores were recorded for all the three groups of pre-schoolers. Oral health education was given to all groups by dentists as well as drama mode and participants of all the three groups were distributed toothbrushes at the end of the study.

Statistical analysis was done using SPSS version 21 and level of significance was set at 5%. Paired t test was used for comparing the oral hygiene scores of each group before and after intervention. ANOVA and Tukey’s post hoc tests were used for comparing the oral hygiene scores of the three groups.

**Results**

A total of 120 preschoolers took part in the study of whom 42.5% were females and 57.5% were males. The difference in age and gender between the three groups was not statistically significant (Table 1).

At baseline, the mean DI-S values for drama, dentist and control groups were 1.8043 +/- 0.85516, 1.8118 +/- .73908 and 1.7823 +/- .68190 respectively. ANOVA showed no significant difference in mean DI-S values between the three groups at baseline (p = 0.984) (Tables 2,3).

Post intervention, the mean DI-S values for drama, dentist and control groups were 0.9727 +/- 0.65981, 1.6418 +/- .67624 and 1.7885 +/- .67624 and the difference in means was significant (p=0.000). ANOVA showed a significant difference in the mean DI-S scores between the three groups. Post hoc tests revealed that the mean difference in DI-S scores between drama and dentist group and drama and control group was statistically significant (Tables 4, 5).

When the baseline and post intervention values were compared for each of the three groups, the mean difference in DI-S was significant for both drama
and dentist group. The control group had a slightly higher DI-S compared to baseline which was not statistically significant (Table 6, Figure 1).

Table 1: Gender and age distribution of the participants in three groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Males(n)</th>
<th>Females(n)</th>
<th>Age (Mean +/- S.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drama</td>
<td>23</td>
<td>17</td>
<td>4.08 +/- 0.96</td>
</tr>
<tr>
<td>Dentist</td>
<td>27</td>
<td>13</td>
<td>4.00 +/- 0.78</td>
</tr>
<tr>
<td>Control</td>
<td>19</td>
<td>21</td>
<td>4.10 +/- 0.82</td>
</tr>
</tbody>
</table>

Table 2: DI –S score before and after intervention

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drama</td>
<td>40</td>
<td>.16</td>
<td>2.83</td>
<td>1.8043</td>
<td>.85516</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>.00</td>
<td>2.40</td>
<td>.9727</td>
<td>.65874</td>
</tr>
<tr>
<td>Dentist</td>
<td>40</td>
<td>.33</td>
<td>2.83</td>
<td>1.8118</td>
<td>.73908</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>.50</td>
<td>2.83</td>
<td>1.6418</td>
<td>.65981</td>
</tr>
<tr>
<td>Control</td>
<td>40</td>
<td>.33</td>
<td>2.83</td>
<td>1.7823</td>
<td>.68190</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>.50</td>
<td>2.83</td>
<td>1.7885</td>
<td>.67624</td>
</tr>
</tbody>
</table>

Table 3: ANOVA showing pre intervention scores

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.019</td>
<td>2</td>
<td>.009</td>
<td>.016</td>
<td>.984</td>
</tr>
<tr>
<td>Within Groups</td>
<td>67.958</td>
<td>117</td>
<td>.581</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>67.977</td>
<td>119</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: ANOVA showing post intervention scores

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>15.127</td>
<td>2</td>
<td>7.564</td>
<td>17.105</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>51.737</td>
<td>117</td>
<td>.442</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>66.864</td>
<td>119</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5: Comparison of post intervention DI-S scores by Tukey’s Post hoc tests.

<table>
<thead>
<tr>
<th>(I) Post intervention group</th>
<th>(J) Post intervention group</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>p value</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drama</td>
<td>Dentist</td>
<td>-.66900*</td>
<td>.14869</td>
<td>.000</td>
<td>-1.0220 - .3160</td>
</tr>
<tr>
<td>Drama</td>
<td>Control</td>
<td>-.81575*</td>
<td>.14869</td>
<td>.000</td>
<td>-1.1687 - -.4628</td>
</tr>
<tr>
<td>Dentist</td>
<td>Control</td>
<td>-.14675</td>
<td>.14869</td>
<td>.587</td>
<td>-.4997 - .2062</td>
</tr>
</tbody>
</table>

* The mean difference is significant at the 0.05 level.

Table 6: Comparison of DI-S within the groups following intervention.

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drama baseline – Drama post intervention</td>
<td>.8315</td>
<td>.59168</td>
<td>.09355</td>
<td>.64227 - 1.02073</td>
<td>8.888</td>
<td>39</td>
<td>.000</td>
</tr>
<tr>
<td>Control baseline – Control post intervention</td>
<td>-.0062</td>
<td>.36135</td>
<td>.05713</td>
<td>-.12181 - .10931</td>
<td>-.109</td>
<td>39</td>
<td>.913</td>
</tr>
</tbody>
</table>

Figure 1: Comparison of pre and post intervention OHI-S scores
Discussion

The present study compared the effectiveness of oral health education by three different modes among preschoolers. Retention of messages is the indicator of success of any health education program. The mode of delivery of any oral health education should be determined by the age of the recipients. This study compared health education delivered by drama enacted by senior students of the school, dentists and a control group.

Drastic improvement in oral hygiene was noted among the drama group. Children in this group had oral health education delivered with fun and in an interactive manner which made learning an enjoyable activity and kept them motivated. Children found the drama very interesting and their known seniors enacting their favorite cartoon characters created an element of attention in them. The same information when conveyed by dentists also significantly improved the oral hygiene of the preschoolers but lesser than that by the drama group and the difference was statistically significant. The formal delivery of oral health education by the dentists might not have created the level of motivation as the one delivered by the drama. The control group had an increase in the oral hygiene score which was not significant.

Friel S. et al found that mass media has a positive impact on the oral health knowledge and behavior of Irish children compared to a control group\textsuperscript{10}. Srivastava R. et al compared the effectiveness of oral health education delivered by teacher and a dental professional in school children. The oral health education delivered by the dental professional was more effective compared to the former group\textsuperscript{11}. Soleymani MR et al compared story telling and creative drama modes in improving children’s personal hygiene. Both these methods improved personal hygiene but there was no statistically significant difference between the two modes.(6)Haleem A et al compared the effect of repeated and reinforced oral health education by dentists, teachers and peers. One time oral health education could not bring any marked change in oral health status in any of the three groups while 6 months after repeated and reinforced education oral health status improved significantly in all the groups\textsuperscript{12}. The results of our study are similar to that by John et al where oral health education was delivered by three groups, dentist, school teachers and dental residents mimicking cartoon characters. There was a significant improvement in oral health in all three groups except the control group and the highest improvement was for the drama group\textsuperscript{13}.

Teachers are often the role models for students. The information conveyed to the students must be imparted to the parents also for effective maintenance of oral hygiene. Different vehicles of health education can be used in combination and the idea of health promotion schools should be emphasized. Parents can be given oral health education by teachers who are already trained by dentists. Frequent reinforcement of these messages is mandatory. Behavior changing theories like Social Learning Theory and Health Belief Model emphasize that knowledge, attitude and behavior can be changed by a joint effort of mass media, community and individual interactions\textsuperscript{10}. The WHO Health Promoting School approach mandates a combination of school teachers, health professionals, students, school personnel, parents and policy makers for promoting health in school children. Our study showed a significant improvement in oral hygiene in the groups educated by dentists as well as in the drama group. So a combination of these modes is likely to produce more promising results. A study by Shirzad et al in Iran showed that the health promoting school approach is more effective in improving the oral health behavior than a control group in preschoolers\textsuperscript{14}.

Long term effects of any health education intervention need to be evaluated. The persistent effects are usually seen with reinforcement of health education messages. It is seen that the positive effects of oral health education interventions are generally short lived with the effects fading away in the course of time\textsuperscript{15}. The effects of repetition and reinforcements on oral hygiene status have to be evaluated with long term longitudinal studies. The number of contacts with the target group is one factor determining the success of a health education program. Evidence suggests that at least four contacts with a target is necessary for the intervention to be successful\textsuperscript{16}.

This study had certain limitations. It was conducted in only a single school which limits the generalizability of the study. It considered only oral hygiene status before and after intervention. The various other factors that can affect the oral hygiene practices like parents knowledge and socioeconomic factors were not evaluated. The most prevalent diseases of preschoolers being caries and gingivitis would also have been considered. The time
period of 3 months is not sufficient to measure these diseases.

**Conflict of Interest** – Nil

**Source of Funding** – Nil

**Ethical Clearance** - Obtained

**References**


A Population Based Study on ‘At-Risk’ Under 5 Children in Rural South-India

V. Samya1, A Meriton Stanly2, Ramesh Harihara Iyer2

1Assistant Professor, 2Professor, Sri Ramachandra Institute of Higher Education and Research, Porur, Chennai

Abstract

Introduction: Most of the childhood morbidities that occur under 5 years of age are preventable by taking very simple methods. Application of risk strategy in under-5 children help in improving the health-status and decreasing the childhood mortality.

Aim: To estimate the prevalence of ‘at-risk’ under 5 children in a rural area and to find out its associated factors.

Materials and Method: A population based cross-sectional study was undertaken in the rural area of Tamil Nadu. 370 children were selected by simple random sampling method.

Results: 55.9% of the children were at-risk (95 % CI 53.32-58.48). Majority (66%) of the at-risk children were 37-48 months. Type of family (adjusted OR 2.1, 95% CI 1.3-3.5, p=0.003), type of housing (kutcha house: adjusted OR 6.3, 95%CI 2.7-14.8, p=0.000; semi pucca house: adjusted OR 1.9, 95% CI 1.1-3.6, p=0.026), and personal hygiene of the primary care giver of the child (adjusted OR 3, 95% CI 1.9-4.8, p=0.000) were significantly associated with ‘at-risk’ under 5 children.

Conclusion: there is a high prevalence of ‘at-risk’ children, which indicates the need for risk approach in preventing the morbidity and mortality in under 5 children.

Keywords: under 5 children, at-risk, prevalence.

Introduction

The problem of overpopulation poses as a great burden and an obstacle to achieve adequate health care for the vulnerable population in India which mainly constitutes women and children. Children especially those who are less than 5 years are affected by various health issues and morbidities which may ultimately lead to childhood mortality. Indicators of child health in middle income countries show that there is still a long way to go to improve child health. The census 2011 shows, the percentage distribution of deaths to total deaths are maximum in the under 5 age group and more among the female children. Infant deaths in India and death of 0-4 year children account for 13.6% and 16.7% respectively of the total deaths in the country.

The mortalities in children under 5 years of age are mostly due to infective origin or due to lack of proper sanitary measures which can be prevented easily by taking appropriate measures. The ‘risk approach’ can prove as a good strategy to provide better health care services. It aims at correcting the inverse proportion of availability and accessibility of health care vis-a-vis its need by reallocation of existing resources. An individual may be at risk because of biomedical, social or environmental reasons. When a group is identified as ‘at risk’ it indicates that the frequency of risk factors is higher compared to others.

Corresponding Author:
Dr. V. Samya
Assistant Professor, Sri Ramachandra Institute of Higher Education and Research, Porur, Chennai
Email- vsamya@gmail.com, Ph-9003027485
Though there are many studies about ‘at risk’ under 5 children done in various parts of India, there weren’t any done in south India. The prevalence rate of at risk under 5 children is quite high in the other studies. Hence is important in taking up this study which will bring out magnitude of the ‘at risk’ under 5 children in the rural community which when adequately addressed can help in achieving better health and good quality life in rural India.

The objectives were to estimate the prevalence of ‘at risk’ under 5 children and its associated demographic and environmental factors

**Methodology**

A population based cross sectional study was done at the field area of Nemam village in Poonamallee block of Thivallur District in Tamilnadu. Among the 2373 children under 5 years in the village, 841 were from Nemam sub-centre, 541 children belonged to Kuthambakam sub-centre and 991 children were from Pappanchanthram sub-centre.

The lowest prevalence used to estimate sample size was 54.5%. With limit of accuracy 10% of prevalence and Z (1-α/2) value 1.96, the estimated sample size was 319. Assuming a non-response of 15%, the final sample size was 370. Using under 5 children register maintained at the PHC, 131 children from Nemam, 84 children from Kuthambakkam, and 155 children from Pappanchathram were selected by simple random sampling method.

**Operational Definitions:**

‘At risk’ under 5 child

Based on WHO criteria, the child was identified as ‘at risk’ if they had any one of the following

- Birth weight <2.5kg
- Twin births
- Birth order 5 or above
- Birth spacing < 2yrs
- Present weight below 70% of expected weight for age
- Early lactation failure and artificial feeds below 6 months
- Major congenital anomaly
- History of deaths of >2 siblings below 12 months of age
- Death of either or both parents
- Chronic or recurrent gastroenteritis and/or recurrent respiratory infection (recurrent infections that is >5-6 episodes of infection per year)
- Mother working outside >8hrs a day
- Delay in giving supplementary feeds i.e. more than 6 months
- Mid arm circumference <12.5cm (1-5yrs)

**Data Analysis**

Data entry and analysis was done using Statistical Package for Social Sciences (SPSS) version 16 software. Descriptive statistics was used to analyse the background variables and using chi square, the associations of risk factors were analysed. Backward Wald logistic regression model was used to analyse the significantly associated factors and adjusted OR and 95% CI was obtained.

**Results**

There were 51.1% male children and were males and 48.9% female children with a mean age of 32.4 months (SD 15.58) ranging from 1 to 60 months. (Table-1) 72.7% of the children lived in nuclear or extended nuclear families and 27.3% of them belonged to joint family. Majority of the children (72.4%) belonged to medium SLI followed by high SLI (21.6 %) and low (5.9%). Majority of the mother’s occupation (94.9%) belonged to the semiskilled category followed by unskilled work (5.1%). Among the mothers, 5.4% of the mothers were working for more than 8 hours. Most of the fathers (52.4%) were unskilled workers followed by semiskilled work (45.9%) and skilled worker was 0.3%.

**PREVALENCE OF ‘AT RISK’ UNDER 5 CHILDREN**

A child was considered to be ‘at-risk’ even if one of the 13 criteria given by WHO was present. 207 (55.9%) children were found to be at-risk with a 95% CI of 53.32 to 58.48. The prevalence was 55.6% among the male children and 56.4% among the females. Among those
children at-risk, majority of them belonged to the age group of 37-48 months (66%). Children less than 1 year of age had the lowest prevalence 46.2%. (Table-2)

It was found that the majority of the children at-risk (47.6%) had only one of the 13 risk factors, followed by 30.6% of the children had 2 risk factors, 17% children had 3 risk factors, 4.4% of the children had 4 risk factors and only 0.5% of the children had 5 risk factors.

The most common at-risk factor was birth spacing <2 years which was 42 %, followed by delay in supplementary feeds (27.9%). The prevalence of chronic or recurrent diarrhoea and/or ARI was 2.2% and 15.8% respectively. Low birth weight and weight <70% of the expected weight for age was 14.3%. (Table-3)

Children living in nuclear family (OR 2.2, p = 0.001), children born to illiterate mothers (OR 1.8, p<0.05) and the children who lived in houses with low or medium SLI (standard of living index) were significantly at a higher risk to become an at risk child. As the standard of living increased, the risk of being at risk decreased which was statistically significant (table 4).

Children living in kutchha houses were at a higher risk of being at risk when compared to children living in pucca houses (OR 7.16, p<0.0001), similarly children in semi pucca houses were at a significantly higher risk of being at risk compared to those children in pucca houses (OR 2.42, p<0.05). As the housing standard decreases, the risk of being at risk increases. Children living in overcrowded houses (OR 2.3, p<0.0001), living in houses without a sanitary latrine (OR 2, p<0.003) were significantly at a higher risk of being ‘at risk’. There was a significantly increased chance of the child to be at risk where the personal hygiene of the caregiver was unsatisfactory (OR 3.04, p<0.0001).

The significant risk factors associated with ‘at risk’ under 5 children were included in the logistic regression model. Using Backward Wald, the logistic regression model revealed that unsatisfactory personal hygiene of the care giver (Adjusted OR 3.007, 95%CI 1.9-4.8, p<0.001) was a significant risk factor. Children living in a katcha house had a higher risk (adjusted OR 6.3, 95%CI 2.7-14.8, p=0.000), followed by children living in semi pucca house (adjusted OR 1.9, 95% CI 1.1-3.6, p=0.026) than those living in pucca houses. Children belonging to a nuclear family (Adjusted OR 2.2, 95% CI 1.3-3.5, p<0.001) were significantly associated to children at risk. Details in table 4.

**Table-1: Age and sex distribution of children**

<table>
<thead>
<tr>
<th>AGE OF THE CHILD (months)</th>
<th>Male</th>
<th>Female</th>
<th>No of children</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td>n</td>
</tr>
<tr>
<td>0-12</td>
<td>19 (48.7)</td>
<td>20 (51.3)</td>
<td>39</td>
</tr>
<tr>
<td>13-24</td>
<td>53 (62.4)</td>
<td>32 (37.6)</td>
<td>85</td>
</tr>
<tr>
<td>25-36</td>
<td>41 (48.8)</td>
<td>43 (51.2)</td>
<td>84</td>
</tr>
<tr>
<td>37-48</td>
<td>41 (43.6)</td>
<td>53 (56.4)</td>
<td>94</td>
</tr>
<tr>
<td>49-60</td>
<td>35 (51.5)</td>
<td>33 (48.5)</td>
<td>68</td>
</tr>
<tr>
<td>TOTAL</td>
<td>189 (51.1%)</td>
<td>181 (48.9%)</td>
<td>370</td>
</tr>
</tbody>
</table>

**Table-2: Age-wise distribution of ‘at risk’ under 5 children**

<table>
<thead>
<tr>
<th>Particulars</th>
<th>n</th>
<th>%</th>
<th>95 % CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-12</td>
<td>18</td>
<td>46.2</td>
<td>33-59.5</td>
<td>0.071</td>
</tr>
<tr>
<td>12-24</td>
<td>40</td>
<td>47.1</td>
<td>36.5-57.7</td>
<td></td>
</tr>
<tr>
<td>25-36</td>
<td>46</td>
<td>54.8</td>
<td>44.1-65.4</td>
<td></td>
</tr>
<tr>
<td>37-48</td>
<td>62</td>
<td>66</td>
<td>56.4-75.6</td>
<td></td>
</tr>
<tr>
<td>49-60</td>
<td>41</td>
<td>60.3</td>
<td>48.7-71.6</td>
<td></td>
</tr>
</tbody>
</table>
Table-3: Details of ‘at risk’ factors

<table>
<thead>
<tr>
<th>S No</th>
<th>AT RISK FACTORS</th>
<th>Males n (%)</th>
<th>Females n (%)</th>
<th>Total n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Birth weight &lt;2500gm</td>
<td>24 (45.3)</td>
<td>29 (54.7)</td>
<td>53</td>
</tr>
<tr>
<td>2.</td>
<td>Twin birth</td>
<td>5 (62.5)</td>
<td>3 (37.5)</td>
<td>8</td>
</tr>
<tr>
<td>3.</td>
<td>Birth order ≥ 5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td>Birth spacing &lt;2yrs(188)</td>
<td>32 (40.5)</td>
<td>47 (59.5)</td>
<td>79</td>
</tr>
<tr>
<td>5.</td>
<td>Present weight &lt;70% of expected weight for age</td>
<td>24 (45.3)</td>
<td>29 (54.7)</td>
<td>53</td>
</tr>
<tr>
<td>6.</td>
<td>Lactational failure/artificial feeds &lt;6months</td>
<td>19 (51.4)</td>
<td>18 (47.6)</td>
<td>37</td>
</tr>
<tr>
<td>7.</td>
<td>Major congenital anomaly</td>
<td>1 (33.3)</td>
<td>2 (66.7)</td>
<td>3</td>
</tr>
<tr>
<td>8.</td>
<td>Death of &gt;2 siblings in the family</td>
<td>3 (75)</td>
<td>1 (25)</td>
<td>4</td>
</tr>
<tr>
<td>9.</td>
<td>Death of either/or both parents</td>
<td>4 (80)</td>
<td>1 (20)</td>
<td>5</td>
</tr>
<tr>
<td>10 a b</td>
<td>Chronic/recurrent ARI</td>
<td>31 (53.4)</td>
<td>27 (43.6)</td>
<td>58</td>
</tr>
<tr>
<td>11.</td>
<td>Chronic/recurrent diarrhoea</td>
<td>3 (37.5)</td>
<td>5 (62.5)</td>
<td>8</td>
</tr>
<tr>
<td>12.</td>
<td>Mother working &gt;8hrs/day</td>
<td>11 (55)</td>
<td>9 (45)</td>
<td>20</td>
</tr>
<tr>
<td>13.</td>
<td>Delay in supplementary feeds &gt;6 months(n 359)</td>
<td>49 (49)</td>
<td>51 (51)</td>
<td>100</td>
</tr>
<tr>
<td>14.</td>
<td>Mid-arm circumference &lt;12.5cm(n 336)</td>
<td>19 (45.2)</td>
<td>23 (54.8)</td>
<td>42</td>
</tr>
<tr>
<td>15.</td>
<td>Presence of any 1 of above Is at risk child</td>
<td>105 (50.7)</td>
<td>102 (49.3)</td>
<td>207</td>
</tr>
</tbody>
</table>

Table-4: Significant risk factors associated with ‘at-risk’ under 5 children - multiple logistic regression analysis

<table>
<thead>
<tr>
<th>S no</th>
<th>Risk factor</th>
<th>Unadjusted OR</th>
<th>Adjusted OR</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Unsatisfactory Personal hygiene</td>
<td>3</td>
<td>3.007</td>
<td>1.89-4.77</td>
<td>0.000</td>
</tr>
<tr>
<td>2.</td>
<td>Pucca house (Reference)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Semi pucca house</td>
<td>2.4</td>
<td>1.988</td>
<td>1.08-3.64</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td>Kutcha house</td>
<td>7.2</td>
<td>6.29</td>
<td>2.67-4.8</td>
<td>0.000</td>
</tr>
<tr>
<td>3.</td>
<td>Nuclear family</td>
<td>2.2</td>
<td>2.115</td>
<td>1.28-3.49</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Discussion

The prevalence of at-risk under 5 children (55.9%) in this study was similar to the study done in Loni, Ahmednagar, Maharashtra [4] which reported a prevalence of 54.7 % S.Sharma and B.P. Gupta in Pachhad block Sirmour district, Himachal Pradesh also showed a high prevalence (65.7%). Another study by S.K. Bhasin et al. showed the prevalence of at-risk under 5 children to be 65.3%. Aswar et al. reported a
prevalence 64.97% in the rural district of Nagpur, and Singh et al reported 47.9% Kapil et al reported a figure of 63%, while Chaudhary et al and Lai et al reported 51% of children were classified ‘at-risk’. P.K. Dutta et al reported 51.7% of the children to be at risk. This reinforces the fact that ‘risk approach’ is an appropriate and effective strategy.

Those children belonging to a nuclear family were having a significantly higher chance to be-at-risk (OR 2.2, p = 0.001, $\chi^2$ 11.6). The absence of grandparents and other near relatives places a greater burden on the nuclear families in terms of responsibilities of child rearing where as in a joint family there is sharing of responsibilities which gives the family greater economic and social security and support in child rearing. Similar results were found in the study done in Loni and Mohd Juniad, where a significant association was found between type of family and at-risk children; children reared in nuclear families were more at risk.

There was a significant association of at-risk children with the type of house in which they lived. Similar findings were observed in the study by Shubhada Sunil Avachat et al, where 31.3% of the children in kaccha houses, 32.2% of the children in semi pucca and 36.4% of the children in pucca houses were found to be at risk. ($\chi^2$ for linear trend 21.6, p<0.05). The study by Sharma et al also had similar findings; 96.8% of those children in kaccha houses, 74.3% of the children in semi pucca houses and 30.7% of the children in pucca houses were at risk ($\chi^2$ for linear trend 122.6, p<0.001). Similar findings were observed in a study by Mohd Juniad where type of housing was significantly associated. This reinforces the fact that good housing standards is known to be associated with increased morbidity and mortality.

The current study showed there was a significantly increased chance of the child to be at-risk when the personal hygiene of the caregiver was unsatisfactory (OR 3.04, p<0.001). When the personal hygiene is good, it is definitely effective against diarrhea. Khadse et al had similar findings where proper handwashing after defecation and before food handling protected against recurrent diarrhoeal episodes which is one of the risk factors for a child to be coined as ‘at-risk’. Another study by Kariuki et al showed significant reduction in diarrhoeal episodes where the child handlers practiced handwashing, had a soap for handwashing at household. The study by Vani K. Boorah concluded that washing hands by the caregiver before feeding the children can reduce diarrhoeal incidence.

**Conclusion**

Prevalence of ‘at-risk’ under 5 children in the rural population of Tamil Nadu is high. This points out the need to identify the ‘at-risk’ children in the Indian villages. This study has also confirmed that fact that improving the educational status of the mother, standard of living, personal hygiene and sanitation are important strategies in lowering the prevalence of ‘at-risk’ under 5 children. While the healthcare workers provide a routine health care to all under 5 children, simultaneous identification of ‘at-risk’ children can be done. By doing so depending on the risk factors, the children can be given appropriate care depending upon the availability of resources and proper referrals can be done. Thus there is a need and scope for identification of ‘at-risk’ children by the health workers and enhancement of their competence for appropriate management.

**Funding:** Self

**Conflict of Interest:** None

**Ethics:** Approval from IEC number CSP/12/FEB/21/14

**References**


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Friction Fit Implant Supported Removable Prosthesis

Vignesh Kamath¹, Shruthi Rao², Arjun Hegde³

¹Assistant Professor, Department of Prosthodontics, Faculty of Dentistry Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, Karnataka, India, ²Private Practitioner, ³Assistant Professor, Department of Conservative Dentistry, Faculty of Dentistry Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, Karnataka, India

Abstract

The field of implant dentistry has gained vast acceptance and popularity over the years. The ideology and concepts in this field have evolved and changed dramatically in recent years. Although implants offer a good outcome in partially edentulous patient, the outcomes have been better in completely edentulous patients in whom the retention and stability of the denture were extremely poor. A newly evolving idea in the field of implant dentistry is the use of SynCone for the rehabilitation of edentulous ridges. SynCone helps in immediate loading of the prosthesis under local anesthesia whereas in case of delayed restoration it serves as a prefabricated retentive component for both maxillary and mandibular edentulous ridge. This is a case report of rehabilitation of partially edentulous maxillary arch.

Keywords: SynCone Concept, Delayed Loading and Friction Fit.

Introduction

The field of implant dentistry has gained vast acceptance and popularity over the years. The ideology and concepts in this field have evolved and changed dramatically in recent years. Although implants offer a good outcome in a partially edentulous patient, the outcomes have been better in completely edentulous patients in whom the retention and stability of the denture were extremely poor. Before the introduction of these Osseointegrated prostheses complete dentures were the only treatment option available for patients with the edentulous ridge. The treatment of patients with edentulous ridges with the help of Osseointegrated implant-supported prostheses have shown effective results in numerous studies. A newly evolving idea in the field of implant dentistry is the use of SynCone for the rehabilitation of edentulous ridges. The main quality of this concept is its adaptability, cost-effectiveness, and minimal invasion. SynCone helps in immediate loading of the prosthesis under local anaesthesia whereas in case of delayed restoration it serves as a prefabricated retentive component for both maxillary and mandibular edentulous ridge.

This is a case report of rehabilitation of maxillary arch with metal reinforced denture. (SynCone Concept)

Material and Method

A 47-year-old male patient reported to the Department of Prosthodontics with a chief complaint of missing teeth [Figure 1a-c]. The patient who was already a denture wearer was not satisfied with his present denture due to lack of retention. Patients overall systemic condition was unremarkable. Based on the overall intra oral health and condition of the patient, overdenture using Syncone concept (delayed loading) was considered as a suitable treatment option as the
patient can remove the denture for better maintenance.

**Treatment Planning:**

After the clinical examination of the maxillary ridge, a radiographic stent was fabricated after which Orthopantomograph (OPG) was carried out. Adequate bone was noticed in the maxillary arch. Hence it was decided to place 4 Ankylos CX (Dentsply Implants, Germany). Two 8 mm implants were placed in the posterior region and two 11mm implants in the anterior region.

The radiographic stent was converted to a surgical stent which was used during the implant placement for knowing the exact position for the implants.

**Surgical Procedure:**

The entire procedure was done by infiltrating local anaesthesia (LA), 2% lignocaine with adrenaline. After injecting the LA a full thickness mucoperiosteal flap was then raised by placing a buccal releasing incision at the midline. Following this sequential osteotomy was done. A Lindemann side cutting bur was used to perforate through the cortical plate, followed by 2mm pilot drill, 3.2 mm final osteotomy drill and 3.5 x 11 mm bone reamer were used. Between each drill paralleling pins were placed to check for the parallelism between the implants. Two 3.5 x 11 mm and two 3.5 x 8mm Ankylos CX (Dentsply Implants, Germany) implants were placed [Figure 2]. Sulcus formers were placed for all the implants to avoid second stage surgery [Figure 3]. The flaps were approximated and sutured using 4-0 vicryl sutures.

**Prosthetic Part:**

The patient was recalled after four months of the initial procedure for the prosthetic phase. The abutment parallelism was checked in the cast using paralleling gauge [Figure 4a and 4b]. Taper cap degulor for syncone (5˚) were placed on to the abutments [Figure 4c]. A pattern resin framework was made on the cast and was casted using chrome cobalt so that strength of the denture is improved and to obtain a passive fit [Figure 5a and 5b]. Retentive beads were incorporated on the pattern resin framework for the retention of acrylic. Vent holes were made on the metal frame so that excess resin cement flows out and which will also act as retentive tags. A special tray was fabricated on the working cast [Figure 6a]. The abutments were transferred in the patient’s mouth using transfer jig. Following which the degulor cap was then transferred into the patient’s mouth. Next, the degulor caps were sandblasted on the outer surface to increase micro and macro mechanical retention. The degulor caps were picked into the metal framework using resin cement. The metal framework with the degulor cap was placed back into the abutment in the patient’s mouth. The special tray was used to make pick up impression using polyether impression material [Figure 6b]. The metal framework with the cap was then picked up in the impression which was followed by pouring the cast. The secondary cast was obtained [Figure 6c] then a denture base and occlusal rim were fabricated which was followed by recording jaw relation. Trial of waxed up denture was done [Figure 7a and 7b], and later it was processed [Figure 8]. Denture fit in was done, and an orthopantomograph (OPG) was made to check for the fit [Figure 9a-b].

Figure1.(a) and (b) Preoperative photograph of the patient; (c) preoperative Orthopantomogram (OPG)

Figure 2. Surgical photograph showing implant

Figure 3. Surgical photograph showing implant
Figure 3. Orthopantomogram (OPG) showing Osseo integrated implants and sulcus former after 4 months.

Figure 4. (a) Cast with abutment placement; (b) Abutment parallelism; (c) Cast showing placement of degulor caps.

Discussion

The major factor responsible for the success of any implant-supported prosthesis is the primary stability. According to Engqvist et al. the two essential aspects for the survival of an implant is the bone quality and bone resorption.

The use of conservative complete denture is very popular in edentulous patients, but they are associated with many shortcomings including lack of required retention, stability support which leads to other drawbacks like difficulty in speech mastication and aesthetics. Adelle et al. in their study highlighted the effective result of treatment of patients with edentulous ridges with the help of Osseointegrated implant-supported prostheses in their 15 years follow up study.

An implant-supported prosthesis helps in overcoming these disadvantages especially in patients with limited capability, severely resorbed alveolar ridges and loss of facial tissue support. The taper principle over the years has clinically proven its benefit in the implant-supported prosthesis. SynCone concept aims at providing the benefits for anchoring implant-abutment connections providing an extremely stable fit without any micro-movement thus facilitating a tension free fit.

This concept provides a great reduction in the prosthetic body. This system constitutes of pre-machined titanium abutment with predetermined sulcus heights and a particular angulation of 4°, 5°, or a 6° taper. For the maxillary arches with the correction factor included these abutments are also fabricated in 15°, 22.5° and 30° angulation.

Studies have concluded that in spite of periodic removal and cleaning of the denture a constant retentive force expected was about five years.

Zhang et al. conducted a study assessing the long term retentive characteristics of the Ankylos SynCone. The study concluded that the SynCone conical crown system potentially provides better adequate and constant retentive force in implant supported overdentures.

Marco et al. in their study found out that implant supported overdenture using SynCone concept had a success rate of 98.9%.

Studies have shown that the survival rate of implants is better and more in the lower jaw than in the upper jaw.

A study conducted by Jemt revealed that the five-year survival rate of the fixed implant-supported prostheses in the edentulous maxilla was 92%.

A randomized controlled trial carried out by Fischer et al. showed no significant difference in early and delayed loading of implants in the edentulous upper arch after five years of function. Overdentures that are supported by Osseointegrated implants help in overcoming the drawbacks of overdenture supported by natural teeth like dental caries and periodontal disease they also concluded in their study that when lip or facial support is required for a prosthesis the implant supported overdenture is the treatment of choice.

The SynCone concept is gaining wide popularity because of the telescopic design of the coping and its high-end retention. These two characteristics of this system help the prosthodontist in fabricating a prosthesis that has high stability and excellent performance as a fixed restoration which at the same time can be removed by the patient for daily maintenance. By using the SynCone system in the field of implant dentistry, a new dimension in the rehabilitation of missing natural teeth can be foreseen.

Conclusion

An implant supported maxillary overdenture along with sufficient retention and stability also restores
proper phonetics, aesthetics and good hygiene. The excellent retention, stability and functional and aesthetic properties offered by the SynCone concept make it a favorable choice in implant supported overdentures and the field of implant dentistry.

Conflict of Interest: None

Source of Funding - Self

Ethical Clearance – Didn’t mention identity of any patient.

References


Analyses of Subject Wellbeing on Exercising Men, Women Students and Sedentary Men, Women Students

W. Vinu1, A. Arun Mozhi2

1Assistant Professor, Department of Physical Education and Sports Sciences, Annamalai University, Chidambaram, India, 2Assistant Professor, co-ordinator Psychology Wing, D.D.E, Annamalai University, Chidambaram

Abstract

The purpose of the study was to analyse the men and women students with habit of exercise and sedentary men, women students on psychological variable subject wellbeing. For the purpose of the study 60 students were selected from Annamalai university, in which 30 from department of physical education which consist of 15 women regular exercise practicing students the group was named as EWG and 15 men regular exercise practicing group which was named as EMG. and 30 students were selected from other departments who did not participate in any physical exercise and were sedentary which consist of 15 female students and the group was named as SWG and another 15 consists of men students and the group was named as SMG. The EWG and EMG groups participated in regular physical activities and SWG and SMG group underwent their routine life and did not under go any physical exercises. The Students were tested on their well beingness with Subject wellbeing inventory by Suhanya, B.T and Sananda Raj. H (2002). The data collected from the Four groups were statistically analysed by ANOVA. Both exercise groups (EWG and EMG) had influence of exercise over Subject wellbeing. But It was found Exercise influence on subject wellbeing was higher in EMG when compared with other three groups.

Key Word: Subject Wellbeing, Exercising Men, Women, Sedentary Men, Women Students.

Introduction

Earlier analysing the benefits of Physical exercise, it is necessary to define Physical Exercise precisely. Exercise is any activity that enhances or maintains physical fitness and overall health and wellness. Kylasov1. It is performed for various reasons, to aid growth and improve strength, preventing aging, developing muscles and the cardiovascular system, honing athletic skills, weight loss or maintenance, improving health and also for enjoyment. Many individuals choose to exercise outdoors where they can congregate in groups, socialize, and enhance wellbeing. In the adult population regular exercise has consistently been associated with higher levels of wellbeing such as fewer depressive and anxious symptoms and higher levels of subjective wellbeing. Longitudinal studies showed that exercise participation at baseline predicted fewer internalizing problems at follow up 2(Camacho et al.,1991; Wise et al.,2006; de Moor et al.,2008). In general, studies show increased levels of psychological wellbeing found in exercisers are the reflection of causal effects of exercise

Diener, Ed (1984)3. developed a tripartite model of subjective well-being in 1984, which describes how people experience the quality of their lives and includes both emotional reactions and cognitive judgments.

Quality of life is an overarching term for the quality of the various domains in life. It is a standard level that consists of the expectations of an individual or society for a good life. These expectations are guided by the values, goals and socio-cultural context in which an individual life. It is a subjective, multidimensional concept that defines a standard level for emotional, physical, material and social wellbeing. It serves as a reference against which an individual or society can measure the different domains of one’s own life. The extent to which one’s own life coincides with this desired standard level, put differently, the degree to which these domains give satisfaction and as such contribute to one’s subjective
well-being, is life satisfaction.

Emotions can be defined as a positive or negative experience that is associated with a particular pattern of physiological activity.” Emotions produce different physiological, behavioural and cognitive changes. The original role of emotions was to motivate adaptive behaviours that in the past would have contributed to the passing on of genes through survival, reproduction, and kin selection.4, 5

Cognition is “the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses”.6 It encompasses many aspects of Intellectual functions and processes such as attention, the formation of Knowledge, memory, judgement and evaluation, reasoning, problem solving and decision making, comprehension and production of language. According to LauraMandoloni physical exercise is a strong gene modulator that induces structural and functional changes in the brain, determining enormous benefit on both cognitive functioning and wellbeing. Physical Exercise is also a protective factor for neurodegeneration. The term subjective well-being is defined as an individual’s experience of affective reactions and cognitive judgments. Happiness is sometimes used interchangeably with subject wellbeing, but the terms mean different things. Although wellbeing and happiness are correlated, subject wellbeing has a more wide-ranging definition. Subject wellbeing looks at satisfaction generally, as well as a sense of satisfaction according to a person’s standard. Assessing life satisfaction involves experience and future expectations. Having a high Subject wellbeing involves having “pleasant emotions, low level of negative mood, and high life satisfaction” (Diener, Lucas, & Oishi, 2002)7. (Puetz et.al., 2006)8. Exercise psychologists have recently examined the relationship between the different types of commitment to exercise operationalized through the notion of motivation toward physical exercise and Subject wellbeing. (Carver and Scheier, 1998; Tangney et al., 2004)9 and was found to play a key role in the development of Subject wellbeing (Hofman et al., 2011)10.

Subjective well-being measures how people think and feel about their life. It has three components. Cognitive evaluations of a person’s life, Positive affects (a person’s emotions, moods and feelings) Negative affects

12American psychologist Ed. Diener is credited with developing subjective well-being. He noted in The Oxford Handbook of Positive Psychology that an essential ingredient to the good life is that people like their lives. An ideal subjective well-being “includes experiencing pleasant emotions, low levels of negative moods, and high life satisfaction.”

Methodology

Normative survey method has been used in the present study to collect data from men and women students with habit of exercise and sedentary men, women students on psychological variable Subject wellbeing from Annamalai university, Department of Physical Education and from other departments, Chidambaram, TamilNadu. This study is an attempt to analyse the men and women students with habit of exercise and sedentary men, women students on psychological variable Subject wellbeing. This study was made use of comparison of different groups used have been categorised as follows 15 women regular exercise practicing students EWG and 15 men regular exercise practicing group which was named as EMG. and 30 students were selected from other departments were sedentary group which consist of 15 female students and the group was named as SWG and another 15 consists of men students and the group was named as SMG. The EWG, EMG groups participated in regular physical activities and SWG, SMG group underwent their routine life and did not under go any physical exercises.

Tool Used: Subject wellbeing inventory by Suhanya, B.T and Sananda Raj. H (2002.)13. The personal data Schedule is used to collect relavent information from the four groups of viz ‘Women, Men exercise practicing (EWG, EMG) and Sedentary Women and Men Group (SWG, SMG). The instructions for administration have explained to the subjects and Confidence of the responses assured by the investigator. (ANOVA) was computed for the data collected from ‘Women, Men exercise practicing (EWG, EMG) and Sedentary Women and Men Group (SWG, SMG). Further, since four groups were involved, whenever the F ratio was significant, Scheffé’s post hoc test used to determine which of the paired mean differed significantly.
Result of Study

The data collected from the Four groups were statistically analysed by ANOVA and the results are presented in table-1

Table 1: Analysis of variance on four groups

<table>
<thead>
<tr>
<th></th>
<th>EWG</th>
<th>SWG</th>
<th>EMG</th>
<th>SMG</th>
<th>SOV</th>
<th>Sum of Squares</th>
<th>Difference</th>
<th>Mean Square</th>
<th>F ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>53.20</td>
<td>51.26</td>
<td>53.66</td>
<td>51.53</td>
<td>B</td>
<td>64.18</td>
<td>3</td>
<td>21.39</td>
<td></td>
</tr>
<tr>
<td>Sd</td>
<td>0.77</td>
<td>0.96</td>
<td>0.72</td>
<td>1.06</td>
<td>W</td>
<td>44.40</td>
<td>56</td>
<td>0.79</td>
<td>27*</td>
</tr>
<tr>
<td>Adjusted</td>
<td>52.64</td>
<td>51.26</td>
<td>53.82</td>
<td>51.53</td>
<td>B</td>
<td>23.19</td>
<td>3</td>
<td>7.73</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>W</td>
<td>42.73</td>
<td>54</td>
<td>0.79</td>
<td>9.76*</td>
</tr>
</tbody>
</table>

(The required table value for significance at 0.05 level of confidence with degrees of freedom 3 and 56 is 2.77 and degree of freedom 3 and 54 is 2.78)

*Significant at .05 level of confidence.

Table-1 shows that the mean value of EWG, SWG, EMG and SMG groups are 53.20, 51.26, 53.66 and 51.53 respectively. The obtained ‘F’ ratio value of 27 for mean values of EWG, SWG, EMG and SMG were higher than the required table value of 2.77 for the degrees of freedom 3 and 56 at 0.05 level of confidence. So, there was a significant difference found between the groups due to exercise training.

The adjusted test means of EWG, SWG, EMG and SMG groups are 52.64, 51.26, 53.82 and 51.53 respectively. The obtained ‘F’ ratio value of 9.76 for adjusted test means of EWG, SWG, EMG and SMG groups were higher than the required table value of 2.78 for the degrees of freedom 3 and 54 at 0.05 level of confidence. It is observed from this finding that significant differences exist among the adjusted test means of between four groups Since, the adjusted test for ‘F’ ratio value is found to be significant the Scheffe’s test is presented in table: 2.

Table:2 Scheffe’s Test for the Difference Between the Adjusted Means of Subjects

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>Subject</th>
<th>Mean</th>
<th>MD</th>
<th>C.I</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EWG</td>
<td>52.64</td>
<td>1.38*</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>SWG</td>
<td>51.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>SWG</td>
<td>51.26</td>
<td>0.27</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>SMG</td>
<td>51.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>EMG</td>
<td>53.82</td>
<td>2.56*</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>SMG</td>
<td>51.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>EMG</td>
<td>53.82</td>
<td>2.33*</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>SWG</td>
<td>51.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>EMG</td>
<td>53.82</td>
<td>1.18*</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>EWG</td>
<td>52.64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The result of Table - 2 shows the adjusted mean differences between the EWG and SWG is 1.38 showing there was a significant difference occurred among EWG and SWG. Meanwhile the obtained mean value EWG of 52.64 is higher than the mean value of SWG 51.26 so effect of exercise has influence over the psychological dimension of subject wellbeing. The comparison between SWG and SMG mean difference of 0.27 shows there is insignificant difference occurred between both men and women sedentary group so there was no positive sign in subject wellbeing and it was also found men sedentary group was better than the women sedentary group with the confirmation to post mean value of SMG was higher than the SWG. The comparison between EMG and SMG mean difference of 2.56 shows there is significant difference occurred between both EMG and SMG and it was also found EMG group was better than the SMG with the confirmation to adjusted mean value of EMG was higher than the SMG it is confirmed exercise has influence on the psychological dimension subject wellbeing. The comparison between EMG and SWG mean difference of 2.33 shows there is significant difference occurred between both EMG and SWG and it was also found EMG group was better than SWG with the confirmation to adjusted mean value of EMG was higher than the SWG it is confirmed exercise has influence on the psychological dimension subject wellbeing. The comparison between EMG and EWG with a mean difference of 1.18 shows there is significant difference occurred between both EMG and EWG and it was also found EMG group was better than the SMG with the confirmation to adjusted mean value of EMG was higher than the EWG it is confirmed exercise has more influence on the psychological dimension subject wellbeing on EMG group. Both exercise groups (EWG and EMG) had influence of exercise over Subject wellbeing. But it was found Exercise influence on subject wellbeing was higher in EMG when compared with other three groups.

**Discussion on Findings**

The results of the present study reveal that both exercise groups (EWG and EMG) had influence of exercise over Subject wellbeing.

These results are in conformity with the findings of the studies undertaken by the following Psychologist and Sports Scientist. According to (Argyle, 2001) Leisure and recreation have beneficial effects on Subject wellbeing. Exercise, for example, improves mood states in the short term and, in the long term, leads to increased subject wellbeing. Exercise provides better psychological and physical health outcomes; the pursuits of leisure and recreation and exercise often involve interaction with other people. Like places of work and places of worship, places of recreation and exercise classes all involve connection with other people which research shows promotes Subject wellbeing. (Gregory A Panza) “These findings were generally consistent with subjective measurements of physical activity. Higher levels of sedentary behaviour are associated with lower subjective well-being”.

The following studies are lined up with cognitive associated with physical exercise which is one of the important dimension of subject wellbeing. Physical Exercise affects brain plasticity, influencing cognition and wellbeing (Weinberg and Gould, 2015). (Fernandes et al., 2017). Experimental and clinical studies have reported that Physical Exercise induces structural and functional changes in the brain, determining enormous biological, and psychological benefits. Physical Exercise stimulates blood circulation in the neural circuits involved in cognitive functioning (Erickson, 2012).

The effects of physical Exercise on cognitive functioning have been shown across the lifespan from childhood to the old age (Hotting and Roder, 2013). It has been evidenced that cognitive functions that are influenced the most by brain maturation, such as attention or cognitive flexibility, and the cognitive functions that depend the most upon experiences, such as memory, are the most sensitive ones to Physical Exercise.

Due to Physical Exercise Cerebral structural changes, levels of neurotransmitters increased (e.g., serotonin, beta-endorphins) Physical exercise decreases anxiety, depression, dysfunctional and psychotic behaviours, hostility, tension, phobias, headaches. Physical Exercise increases assertiveness, confidence, emotional stability, cognitive functioning, internal locus of control, positive body image, self-control, sexual satisfaction.

There are consistent evidences that Physical Exercise has many benefits for people of any age, improving psychological wellbeing (Zubala et al., 2017) and quality of life.
Psychological research evidenced that Physical Exercise can even modulate the personality and the development of Self (Rodgers W. M)\(^2\). Moreover, Physical Exercise has been correlated with hardiness, a personality style that enables a person to withstand or cope with stressful situations (Weinberg and Gould, 2015)\(^3\).

These results should lead to reflect on beneficial effects of physical exercise and to promote its use as a modifiable factor for prevention, to improve cognitive abilities, Quality of life and Emotions which are the dimensions of subject wellbeing.

![Figure:1 Showing the mean value of four groups](image)

**Conclusion**

Both physical exercise practicing groups (EWG and EMG) had influence of exercise over Subject wellbeing. But it was found Exercise influence on subject wellbeing was higher in EMG when compared with other three groups. Further study is required to find out why women exercise group is lesser in subject wellness compared with men exercise group.

**Ethical Clearance:** Ethical clearance was obtained from D.R.C. Committee, Annamalai University, Department of Psychology and Physical Education and Sports Sciences, Chidambaram-608002.

**Source of Funding Agencies:** Self.

**Conflict of Interest:** Nil.

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Knowledge, Attitude and Practices Towards Household Solid Waste Management among Semi-Urban Residents- A Community based Cross Sectional Study from Southern Part of Coastal Karnataka, India

Eshwari K1, Ranjitha S Shetty2, Akhila D3, Beulah Sarah James4, Akhilesh Kumar Pandey5

1Assistant Professor; 2Associate Professor; 3Postgraduate, Department of Community Medicine, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, India, 4Palliative Care Officer, E.D Hospital, District Health and Family Welfare, Mysore, India, 5Lecturer/Statistician, Department of Community Medicine, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, India

Abstract

Objectives: To determine the knowledge, attitude and practices towards household solid waste management and the perceived barriers for its proper disposal among residents of a semi-urban area.

Method: A community based cross sectional study was conducted among semi-urban residents of field practice area of a Medical College in Karnataka, India. A total of 441 households were included in to the study. A face-to-face interview was conducted using a pretested semi-structured questionnaire to assess the knowledge, attitude and practices among the residents towards management of household solid waste. Data was entered using Epi info mobile app and was analyzed using Easy R(EZR) software.

Results: The overall knowledge (60.3%), attitude (61.5%) and practices (72.8%) towards solid waste among the participants was near satisfactory. More than 90% were aware about the effects of inappropriate management of waste on health and environment. It was identified that having a better education and holding a skilled and professional jobs were the independent predictors of knowledge and attitude.

Conclusion: The gaining momentum among public towards management of solid waste can be further strengthened by taking in to account the identified predictors like education and occupation of the residents.

Keywords: Solid waste, Household, Knowledge, Attitude, Practices, Waste management, Environment

Introduction

Improper solid waste disposal and management is the source of air, water and soil pollutions and a cause of serious health hazard.1,2 Globally, million tons of municipal solid waste are generated every day and India with the fastest growing economy and as the second most populated country in the world, facing a major challenge in handling solid waste.3,4 India with rising population and living standards is struggling to handle the simultaneous acceleration in waste generation. The appropriate management of household solid waste requires a combination of methods like recycling, municipal landfill and source reduction.5,6 In metropolitan cities nearly one fourth of the municipal waste is not even collected due to the existing inadequacies in transportation and disposal mechanism.7
Understanding the public concerns, knowledge and behaviours is critical to achieve an efficient solid waste management system. A study among coastal residents of southern India documented unsatisfactory waste management practices in nearly three fourth households and it also concluded, the lack of knowledge on segregation and recycling as major determinants. The existing literatures also highlights the lack of knowledge and poor attitude among the residents for inappropriate waste management. Therefore, the present study was undertaken to assess the knowledge, attitude and practices regarding household solid waste management among residents in one of the semi-urban area of a coastal district, Karnataka, India.

Method

A community based cross sectional study was carried out among semi-urban residents of a coastal district of Karnataka. Anticipating an average knowledge of 50% towards household solid waste management among the residents, sample size was estimated to be 441. Study protocol was approved by the Institutional Ethics Committee (IEC No.-175/2018) prior to initiation of the study.

Data collection methodology

A responsible adult from each household was chosen and a face-to-face interview was conducted using a pre-tested semi-structured questionnaire after obtaining written informed consent. The socioeconomic status was assessed using modified BG Prasad classification. The responses were entered through Epi-info application on android mobile devices.

Information regarding socio-demographic characteristics of the study participants, their perception about different methods of waste disposal and its harmful effects on health and environment etc. were documented. Likewise, participant’s opinion regarding segregation of waste at the source and responsibility of keeping the community clean were recorded to assess their attitudes. The household’s method of waste collection and storage practices were observed with help of a checklist.

In all the respective domains the responses were scored, the correct responses were given the score of one whereas zero for wrong answers. All the scores in the respective domains were summed to obtain the final scores for every respondent. The final scores in the respective domains were divided using percentiles into three parts, first 30% of the score was categorized as poor, between 30% to 60% as average and above 60% as satisfactory. During analysis average and satisfactory categories were merged and named satisfactory and compared against poor or unsatisfactory category.

Statistical method

Data was analyzed using SPSS version 15.0 and was summarized as frequencies and percentages. Further to identify the predictors of knowledge, attitude and practice scores univariate and multivariate analysis were carried out.

Results

A total of 441 households were visited interviewing one adult member from each household. Of the study participants, 91.61% were in the age range of 26 to 50 years. The female predominance (60.14%) in the present study could have been due to the study team visit to households during working hours. Majority (80.7%) of the participants were Hindus followed by Muslims (11.6%) and Christians (7.7%) while 60.79% of them belonged to nuclear families. About two third (68.03%) of the participants had completed secondary education and nearly one fourth (24.72%) graduation. About 38.5% participants were engaged in unskilled work, 35.60% professional, 16.33% skilled and whereas 9.52% were unemployed. Nearly half (53.1%) belonged to middle socio-economic status followed by 26.3%, 20.6% to upper and lower class respectively.

![Figure 1: Prevalence of Knowledge, attitude and practice about solid waste management among the study participants (n = 441)](image-url)
As shown in Fig [1], the knowledge, attitude and practices regarding household solid waste management were above average in three fourth of the study participants based on the scores. Majority (90.25%) considered waste collection by the municipality on a regular basis to be the safest method followed by composting (20.86%). Burning (67.57%) and dumping indiscriminately (64.17%) and throwing away to water body (53.06%) were considered the most unsafe methods of waste disposal. More than 90% of the residents were aware about the adverse health effects and environmental damages of inappropriate waste management. Similarly, diarrhoeal diseases and respiratory illnesses were quoted by 65% and 43% of the participants respectively as adverse health effects.

About 72.79% of the residents were of the opinion that wastes should be segregated as bio-degradable / non-biodegradable at household level. Although 44.22% of the respondents believed that it is impractical to live without using plastic material, 50% opined re-using the plastics would reduce its load on the environment. Encouragingly, 85.94% felt that it is necessary to attend activities related to waste management at community level. Similarly, 91.16% said proper disposal of waste is a shared responsibility of government and the residents.

During the visits, 71.20% of the residents had maintained separate bins for dry and wet waste and on a regular basis it was collected by the municipality. Also 20.18% of the participants reported using burning as a modality for dry, non-plastic wastes.

Spearman rank correlation test demonstrated a positive linear relationship between knowledge, attitude and practice scores although the strength of correlation was weak.

### Table 1: Association of knowledge scores with socio-demographic factors of the study population (n = 441)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Knowledge Score</th>
<th>OR (95% CI)</th>
<th>Unadjusted</th>
<th>p-value</th>
<th>Adjusted</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unsatisfactory (%)</td>
<td>Satisfactory (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>9 (75.0)</td>
<td>3 (25.0)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1-4th std</td>
<td>9 (45.0)</td>
<td>11 (55.0)</td>
<td>3.66 (0.75-17.72)</td>
<td>0.106</td>
<td>3.52 (0.69-17.82)</td>
<td>0.130</td>
</tr>
<tr>
<td>5-12th std</td>
<td>123 (41.0)</td>
<td>177 (59.0)</td>
<td><strong>4.32 (1.14-16.27)</strong></td>
<td><strong>0.031</strong></td>
<td><strong>3.40 (0.85-13.53)</strong></td>
<td><strong>0.082</strong></td>
</tr>
<tr>
<td>≥Graduation</td>
<td>34 (31.2)</td>
<td>75 (68.8)</td>
<td>6.62 (1.68-25.99)</td>
<td>0.007</td>
<td>4.45 (1.04-18.96)</td>
<td><strong>0.044</strong></td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>54 (34.4)</td>
<td>103 (65.6)</td>
<td><strong>1.57 (1.01-2.46)</strong></td>
<td>0.045</td>
<td>1.13 (0.67-1.91)</td>
<td>0.624</td>
</tr>
<tr>
<td>Skilled</td>
<td>22 (30.6)</td>
<td>50 (69.4)</td>
<td><strong>1.88 (1.04-3.37)</strong></td>
<td>0.034</td>
<td>1.69 (0.91-3.11)</td>
<td>0.092</td>
</tr>
<tr>
<td>Unemployed</td>
<td>22 (52.4)</td>
<td>20 (47.6)</td>
<td>0.75 (0.38-1.48)</td>
<td>0.411</td>
<td>0.71 (0.34-1.44)</td>
<td>0.337</td>
</tr>
<tr>
<td>Unskilled</td>
<td>77 (45.3)</td>
<td>93 (54.7)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Socioeconomic status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper class</td>
<td>33 (28.4)</td>
<td>83 (71.6)</td>
<td><strong>1.97 (1.1-3.52)</strong></td>
<td>0.021</td>
<td>1.79 (0.93-3.46)</td>
<td>0.081</td>
</tr>
<tr>
<td>Middle class</td>
<td>102 (43.6)</td>
<td>132 (56.4)</td>
<td>1.02 (0.62-1.65)</td>
<td>0.952</td>
<td>0.93 (0.55-1.57)</td>
<td>0.792</td>
</tr>
<tr>
<td>Lower class</td>
<td>40 (44.0)</td>
<td>51 (56.0)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

As illustrated in Table [1] although knowledge was determined by level of education, occupation and socioeconomic status, on multivariable analysis only education status emerged as an independent predictor (p<0.05). With respect to attitude occupation of the participants was found to be associated, however on multivariable analysis it was insignificant.
Table 2: Association of Practice scores with socio-demographic factors of the residents (n = 441)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Practice Scores</th>
<th>OR (95% CI)</th>
<th>Unadjusted</th>
<th>p-value</th>
<th>Adjusted</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unsatisfactory (%)</td>
<td>Satisfactory (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
<td>Unadjusted</td>
<td>p-value</td>
<td>Adjusted</td>
<td>p-value</td>
</tr>
<tr>
<td>Illiterate</td>
<td>7 (58.3)</td>
<td>5 (41.7)</td>
<td>1.71 (0.40-7.27)</td>
<td>0.467</td>
<td>1.32 (0.29-6.03)</td>
<td>0.715</td>
</tr>
<tr>
<td>1-4th std</td>
<td>9 (45.0)</td>
<td>11 (55.0)</td>
<td>3.60 (1.12-11.66)</td>
<td>0.033</td>
<td>2.34 (0.67-8.18)</td>
<td>0.180</td>
</tr>
<tr>
<td>5-12th std</td>
<td>84 (28.0)</td>
<td>216 (72.0)</td>
<td>6.23 (1.79-21.66)</td>
<td>0.004</td>
<td>3.89 (1.10-15.12)</td>
<td>0.049</td>
</tr>
<tr>
<td>≥Graduation</td>
<td>20 (18.3)</td>
<td>89 (81.7)</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td>Unadjusted</td>
<td>p-value</td>
<td>Adjusted</td>
<td>p-value</td>
</tr>
<tr>
<td>Professional</td>
<td>34 (21.7)</td>
<td>123 (78.3)</td>
<td>2.07 (1.27-3.39)</td>
<td>0.004</td>
<td>1.63 (0.92-2.88)</td>
<td>0.094</td>
</tr>
<tr>
<td>Skilled</td>
<td>14 (19.4)</td>
<td>58 (80.6)</td>
<td>2.37 (1.22-4.61)</td>
<td>0.010</td>
<td>2.27 (1.14-4.54)</td>
<td>0.020</td>
</tr>
<tr>
<td>Unemployed</td>
<td>10 (23.8)</td>
<td>32 (76.2)</td>
<td>1.83 (0.84-3.99)</td>
<td>0.124</td>
<td>1.85 (0.81-4.24)</td>
<td>0.143</td>
</tr>
<tr>
<td>Unskilled</td>
<td>62 (36.5)</td>
<td>108 (63.5)</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

As depicted in Table [2], high literacy levels and having skilled or professional jobs were found to be significantly associated with practices and these factors emerged as significant predictors on multivariate analysis as well.

**Discussion**

In present study knowledge regarding waste management was above average in nearly three fourth (60.3%) of the participants. Studies have documented prevalence ranging from 70 to 90% during 2015 through 2019.\(^9,13,14\) Whereas a study by Kumar et al reported, 85.2% of residents being unaware about waste generation and its disposal and the busy work schedule of the residents was reported as the barrier for the appropriate management.\(^15\) The attitude (61.5%) and practices (72.8%) towards waste management were in line with knowledge in present study and were in concordance with the study results of Almasi et al and Shahzadi et al.\(^13,14\) However, the proportion of participants with satisfactory practices were fewer in comparison to present study and the lack of resources and help from the municipal authority were the identified causes.

According to a study by Ogah et al from Nigeria, handing over the waste to collecting agency or municipality was considered safest (71%) and it is in agreement with the present study (79.13%).\(^16\) Probably better education could have lead to greater awareness among the residents. However, in a study among rural residents 60% considered burning as the primary method followed by mixed opinion of burning and burial (40%).\(^9\) Similarly, Shahzadi et al mentioned that 40% of the respondents quoting burial as method for disposal of household waste.\(^14\) With respect to effects of mismanagement of waste, according to Kiran et al 82.5% participants knew spread of diseases as impact on health and rodent nuisance, unpleasant site and unpleasant odor as effects on environment and this was in concordance with the present study (90%).\(^9\)

Based on community studies the proportion of residents practicing waste segregation at generation extends between 10-40%, whereas in the present study almost three fourth were practicing segregation.\(^9,17,18\) This was possible because separation of waste in to wet and dry was made mandatory by the municipality. In a study by Kiran et al, nearly one third residents were reusing the carry bags to reduce its purchase and in present study 50% preferred reusing plastic bags.\(^9,15\) According to Kiran et al, 90.8% of the residents felt as a generator of waste, they play a major role in its disposal and this was in agreement with present study and similar opinion by Ambat et al.\(^9,19\) In disagreement to above the residents in China felt that government should play a major role in recycling the waste than residents as mentioned by Huang P et al.\(^20\)
The statistically significant linear relationship between knowledge, attitude and practices (p< 0.001) scores in present study signify any action towards improving awareness regarding waste management is expected to bring a definitive positive change in attitude and practice. Similar observation has been documented by Laor et al.8

In agreement with the saying that older persons have greater desire to conserve resources for future generations by optimum utilization of valued resources many studies have reported higher abstract knowledge and practices towards solid waste management among elderly and this was in concordance with present study.21,22 Educational status, professional job and high socioeconomic status were identified as significant correlates for knowledge, attitude and practices towards solid waste management and this was in conformity with studies by Almasi et al and Banga et al.13,23

**Conclusion**

In present study majority of the people were aware that improper disposal of waste damages the environment and can spread various infections affecting health. Also the efforts towards reusing the plastic waste by the residents is commendable. However, a significant proportion were burning the waste which needs to be addressed through awareness programs explaining the effects of burning and on health and environment. Having better education and occupation were identified as determinants of perception and practice regarding waste management and this will definitely help in sustaining further efforts.

**Acknowledgement:** Authors would like to thank all the research participants for their active participation in the study. We also acknowledge the invaluable help of the Medico-Social Workers and Auxiliary Nurse Midwives of the Department of Community Medicine, KMC, MAHE, Manipal in data collection process.

**Funding:** Nil

**Conflict of Interest:** Authors declare no conflicts of interest.

**Ethical Clearance:** Study protocol was approved by the Institutional Ethics Committee (IEC No.-175/2018) prior to initiation of the study.

**References**


Awareness Regarding Preconception Care among Women in Reproductive Age Group

Sunila L1, Lekha Viswanath2, Anju Philip T3

1Postgraduate Student, 2Associate Professor, 3Assistant Professor, Dept of Obstetrics and Gynecologic Nursing, Amrita College of Nursing, Amrita Vishwa Vidyapeetham, Health Sciences Campus, Kochi, Kerala, India

Abstract

Preconception care is an important factor which determines the outcome of pregnancy. Many of the women among reproductive age group are unaware about the importance of preconception care and they do not follow preconception care. The purpose of the study is to assess the awareness regarding preconception care among women in reproductive age group. A quantitative research approach with descriptive survey design was used in the study. The study was conducted at Nayarambalam panchayath in Ernakulam District and ward 9th and 11th was selected using one stage cluster sampling. The study was conducted among 200 women with in the age group of 18-44 years. The awareness regarding preconception care was assessed using a semi structured questionnaire. Data analysis was done by using descriptive and inferential statistics like frequency, percentage and chi square. The study shows that 15% of the participants have good level of awareness, 74% have average level of awareness and 11% have poor level of awareness regarding preconception care. More than 60% of the participants responded correctly to items like the importance of preconception care (77%), early sign of pregnancy (69%), number of TT immunization during pregnancy (63%). The areas were least number of women responded correctly are importance of smoking cessation (33%), immunization against Rubella (37.5%) and Birth spacing (39.5%). Only 48% of the women were aware of folic acid supplementation during preconceptional period. This study highlights the role of nurse to make the women aware about the preconception care and importance of practicing preconception care.

Key words: awareness ,preconception care ,women,reproductive age group

Introduction

Preconception care is an important part of health care for women of reproductive age. Majority of women did not realize that they are pregnant until the first trimester. By that time organogenesis is well advanced and it may have been affected the women. Knowledge on preconception care has the potential of changing behavior, modifying risk factors and improving the health status of women in reproductive age2. So advice regarding preconception care should be given to all individuals of reproductive age.

The major aspects of preconception care include practicing regular and moderate exercises, taking a well balanced diet involving fruits and vegetables, avoid exposure to pollutants, hazards and infections, correction of medical disorders, weight management, financial preparation and immunization.
A cross sectional survey was conducted by Coonrod D V et al to determine knowledge and attitudes regarding preconception care in a low income Mexican American population. The sample consisted of 305 reproductive age women at an urban public hospital. The average knowledge of preconception care score was less. Areas of higher knowledge included the effects of pregnancy of folic acid, alcohol use, substance use, verbal, physical and sexual abuse, and lower knowledge was found for the effects of cat litter and fish products. The study concluded that most participants are interested in preconception education and preconception health has a positive effect on pregnancy.

Public health service recommended that all women of child bearing who are capable of becoming pregnant should consume 400 microgram of folic acid daily. A study conducted by Hilton J on folic acid intake of women in USA. The result showed that all the participants were found to have an inadequate intake of folic acid. They lack knowledge about folic acid and the role of folic acid to prevent birth defects.

Every women of child bearing age should be viewed as a potential mother. There fore awareness regarding preconception care, identifying and treating risk factors prior to conception and adopting healthy life styles may improve the health of the women and coming generation. Thus a study on preconception care has a great concern in this present scenario.

The purpose of the present study is to identify the awareness regarding preconception care among women of reproductive age group in order to identify the need for preconception care.

Method

A quantitative research approach with descriptive survey design was used for the study. The study was conducted in a semi urban area (Nayarambalam panchayath) of Ernakulam District, Kerala. Two wards of the area are selected using one stage cluster sampling. All the women of reproductive age group(18-44 years) who were willing to participate were till the required sample size of 200 was met. The unmarried women were excluded from the study.

A semi structured questionnaire was used to assess the awareness regarding preconception care. It consists of 26 items distributed into the areas of importance of preconception care, components of preconception care, folic acid supplementation, diet, avoidance of smoking, time for stopping oral contraceptives, genetic counseling, prevention of infections, teratogenicity, early pregnancy signs of ovulation and normal duration of pregnancy.

Ethical clearance was obtained from Thesis review committee of Amrita Institute of Medical Sciences and Research Center. Permission for conducting the study obtained from the concerned authorities of selected area (Nayarambalam panchayath). Informed consent was obtained from each participant before collecting the data.

Results

The collected data was analysed using both descriptive and inferential statistics.

Socio demographic data

Most of the samples 90(45%)are in the age group of 30-40 years with a mean age of 34 years. Regarding duration of married life majority 74(36%) of them between 5-10 years. 63(31.5%) samples had completed higher secondary education and 60(30%) of them are graduate. Majority of them 131(65%) are multi gravid mothers and most of them 181(91%) had no history of abortion.167(83.5%) of samples had no history of medical illness like hypertension ,anemia, diabetes mellitus ,thyroid disorders ,and epilepsy. Most of them 199(99.5%) had no history of genetic disease.

Awareness regarding preconception care

The awareness regarding preconception care was good in 15%,average in 74 % and poor in 11%.( figure 1). The mean score was 13.48+/-. 3.9 (Max.26) and the scores ranged from 02-24 (Table .1).
Fig. 1 Distribution of participants based on level of awareness regarding preconception care.

Table 1. Mean, Standard deviation and Range of score on awareness regarding preconception care. 

<table>
<thead>
<tr>
<th>Variable</th>
<th>Maximum Score</th>
<th>Mean</th>
<th>S.D</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness regarding preconception care</td>
<td>26</td>
<td>13.48</td>
<td>3.9</td>
<td>2-24</td>
</tr>
</tbody>
</table>

Table 2. Distribution of participants based on level of awareness of individual items of preconception care

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency(f)</th>
<th>Percentage(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance of preconception care</td>
<td>154</td>
<td>77</td>
</tr>
<tr>
<td>Components of preconception care</td>
<td>152</td>
<td>76</td>
</tr>
<tr>
<td>Early sign of pregnancy</td>
<td>138</td>
<td>60</td>
</tr>
<tr>
<td>Preparation for pregnancy</td>
<td>133</td>
<td>66.5</td>
</tr>
<tr>
<td>TT immunization</td>
<td>126</td>
<td>63</td>
</tr>
<tr>
<td>Duration of pregnancy</td>
<td>122</td>
<td>61</td>
</tr>
<tr>
<td>Diet helps in embryo genesis</td>
<td>120</td>
<td>60</td>
</tr>
<tr>
<td>Time for stopping OCPs to get pregnant</td>
<td>119</td>
<td>59.5</td>
</tr>
<tr>
<td>Sign of Ovulation</td>
<td>113</td>
<td>56.5</td>
</tr>
<tr>
<td>Importance of folic acid supplementation</td>
<td>111</td>
<td>55.5</td>
</tr>
<tr>
<td>Diet rich in iron</td>
<td>108</td>
<td>54</td>
</tr>
<tr>
<td>Time for sexual intercourse to get pregnant</td>
<td>104</td>
<td>52</td>
</tr>
<tr>
<td>Teratogenicity</td>
<td>103</td>
<td>51.5</td>
</tr>
</tbody>
</table>
More than 70% of the women were aware of importance and components of preconception care. The areas were the awareness scored least was importance of cessation of smoking (33.5%), immunization (37.5%) and birth spacing (39.5%). (Table 2)

Association between awareness and selected demographic variables

There was no significant association between the level of awareness and selected demographic variables like educational qualification, monthly income, duration of married life, number of pregnancies and abortions.

Discussion

The findings of the present study showed that 15% of participants had good, 74% had average and 11% had poor level of awareness regarding preconception care. The mean score of participants regarding preconception care was 13.48 +/- 3.9. The areas were the awareness scored least was importance of cessation of smoking (33.5%), immunization (37.5%) and birth spacing (39.5%). The majority of the women responded correctly for importance of preconception care (77%), early sign of pregnancy (69%) and time for preparation for pregnancy (66.5%). Only 48% of women were aware about preconceptional folic acid supplementation and only 45.5% were aware about the diet rich in folic acid, 55% were aware about diet rich in iron, 61% were aware about duration of pregnancy and 56% were aware about sign of ovulation. There was no statistically significant association found between awareness regarding preconception care and variables like duration of married life, monthly income, educational qualification, number of pregnancies, number of abortions.

Similar study conducted in USA by Moura.ER et.al (2010) among 106 women with DM to identify their knowledge regarding maternal and fetal risk related to diabetes and preconception care. It is found that 41% have adequate knowledge regarding preconception care and 54% had limited knowledge regarding maternal and fetal risk. The study findings are consistent with the findings of the present study as majority had average awareness regarding preconception care and complication of diabetes (50.5%) . A cross sectional study conducted by Nasar .H., Jalloun .m, Sabbah .M to assess the awareness and intake of folic acid among 600 married Lebanese woman showed that 60% of the women were heard about folic acid. Only 6.2% had taken folic acid during pregnancy. These study results supporting the present study.

A cross sectional study conducted by Bener.A, A.L Maadid regarding knowledge, attitude and practice on folic acid among 1480 Arabian Quatar women. The results showed that 53.7% were heard about folic acid awareness of folic acid were significantly associated with educational status of women. The findings of study shows less consistent with present study may be because of less sample size.
Since the sample of the study is selected from a semi urban area, the findings cannot be generalized, but the study findings have implications in various areas like community settings. Midwives can conduct home visit and screen for high risk couples who have family history of genetic illness, poor glycemic control, complaint of infertility, anemia, hypertension and make appropriate referrals. Although medical education curriculum includes the content of preconception care, the different aspects of it especially diet, exercise, teratogenicity and genetic counselling can be included in detail. The administrators can make policy to impart various health education programmes to eligible couples. And based on the present study the field of research on preconception care can be expanded.

Majority of the women lacked knowledge on the important aspects of preconception care like immunization ,cessation of smoking, birth spacing, time of sexual intercourse to get pregnant. The findings of the study conclude that measures should be taken for improving the awareness regarding preconception care so that better maternal and fetal outcome can be achieved.

**Conclusion**

The study results shows that majority of the women were unaware about preconception care and did not practicing preconception care. Many of the women were unaware about the importance of Pre conceptional folic acid supplementation. This study highlights the role of nurse to make the women aware about preconception care and the importance of practising preconception care.

**Conflict of Interest** : There is no conflict of interest among the researchers

**Source of Funding- Self**

**References**

5. Moura ER,Evangelista .Knowledge of women with diabetes mellitus regarding preconception care and maternal-fetal risks. Available at Rev.Esc Enferm USP. 2012 Feb;46 (1) 22-29
A Comparative Study on Health Profile and Health Seeking Behaviour of the Elderly in Urban and Rural Areas of Bangalore, Karnataka

Akila GV1, Arvind BA2, Arjunan isaac3

1Assistant Professor, Sri Ramachandra Institute of Higher Education and Research-Chennai, 2Associate Professor, Department of Epidemiology, NIMHANS-Bangalore, 3Associate Professor, MSRamaiyah Medical College-Bangalore

Background: Significant variation is observed in medical disorders and age-related physiological decline among the elderly.1 Insights can be gathered from the variation of health profile depending on the geographic location.

Method: This comparative cross sectional study was conducted among the 510 elderly, aged 60 years and above, in the Urban and Rural field practice area of a medical college. Information were obtained using predesigned pretested semi structured questionnaire

Results – Three fourth of the study population complained of suffering from at least one morbidity. Diabetes (28%) and hypertension (27%) were the common morbidities identified in urban area whereas it was joint pain (39%) and visual impairment (23%) in the rural area. In urban area, 86.3% used private health facilities whereas in rural area, 89% used public health facilities.

Conclusion- Study showed a significant difference in the health profile and health seeking behaviour of the elderly in urban and rural areas. Hence health intervention and health programmes have to be planned taking into account these differences.

Key Words: health profile; health seeking behaviour; elderly; urban; rural.

Introduction

Longevity is the victory of development; better nutrition, health care, sanitation, education and socio-economic well-being has led to longer lives of humans.2 Across the world, countries are experiencing population ageing.3 According to Census 2011, elderly population constituted 8.3% of the total population.4

Age, socio-economic status, living condition, health issues and other background characteristics determine the needs and problems of the elderly.5 Living conditions, availability of resources and facilities are notably different in urban as compared to rural areas, resulting in differential influence on elderly morbidity.6 According to 2011 Census, 71% of elderly population reside in rural areas; 29 % live in urban areas.7 However, only limited information is available based on comparison of health problems and health care utilization of the elderly residing in rural and urban areas in our country.

India being a developing country with majority of its population below 30 years, serious consideration has not been given to problems of the elderly.8 Furthermore, studies on various aspects of elderly health are conducted either in the context of urban societies or rural societies, comparative studies are scarce. In this context, the present study was undertaken with the objective of comparing health problems and health seeking behaviour of the elderly in urban and rural field practice area of a medical college in Karnataka, India.
Methodology

A comparative community based cross sectional study was undertaken for a period of one year (2014) in the urban and rural field practice area of Medical College, Bangalore. Urban Health centre provides health services to people in two wards covering a population of 87,259. Primary Health centre in rural area caters to the health needs of 23 villages covering a population of 20,835. The study subjects were persons aged 60 years and above and permanent residents (residing for > 6 months) of the study area. Assuming prevalence of geriatric morbidity as 43%, at 80% confidence level and design effect of 1.5, the minimum required sample size for urban and rural area worked out to be 242 and 240 respectively. Sample size was calculated using the software open epi version 3.01.

For the present study, we adopted stratified multistage cluster random sampling technique. In the urban area, the sample size of 242 was proportionately divided between two wards (Ward 17 and 36). The wards are further divided into Census Enumeration Block (CEB) which is taken as a cluster for the study (107 CEBs and 70 CEBs in ward 17 and 36 respectively). Assuming an average of 500 individuals in each CEB and if 7% of them are elderly, 4 CEB from ward 17 and 3 CEB from ward 36 were selected using simple random sampling technique in order to get the required sample size. In the selected CEBs, the households were numbered serially and complete enumeration of the elderly was carried out.

In rural area, the villages were taken as a cluster and were stratified according to sub-centres and the sample size of 240 was proportionately divided among the three sub-centres. Under each sub-centre, one village was selected using simple random sampling technique. In the selected villages, houses were numbered serially and survey was undertaken.

Before conducting the study, ethical clearance was obtained from Institutional Ethics Committee. House to house survey was conducted to identify all the elderly in the study area. An informed written consent with either signature or thumb print was obtained from each individual, prior to interview. A pre-tested semi-structured questionnaire was used to collect information on socio demographic characteristics and health profile of geriatric population. Information pertaining to socio demographic factors/characteristics such as, age, gender, education, religion, employment status, marital status, type of family, family size, socio economic status, were collected. Socio economic status was assessed using updated B.G Prasad classification. Based on the perception about current health status, the elderly were asked to self-rate their health as very good, good, moderate, bad, very bad. It indicated a subjective assessment about their own health status. Information on all morbidities, both acute and chronic, which the elderly person was suffering from at the time of questionnaire administration was obtained and corroborated with medical records, wherever available. Information pertaining to medication that the elderly person took for the health problem was obtained. Place where the elderly subject sought treatment was also collected.

Statistical Analysis

Qualitative variables such as, socio demographic characteristics, morbidity profile were expressed as frequency and percentages. Quantitative variables such as age was summarized using mean and standard deviation. Difference in proportions of health problems and health seeking behaviour in urban and rural areas was tested using chi- square test / Fishers exact test of significance. P<0.05 was considered as statistically significant.

Figure 1: Percentage distribution of self reported morbidity pattern among study population

Figure 2: Percentage distribution of study population according to place of treatment for common ailments
Results

Table 1: Distribution of the study population according to morbidity and medication status

<table>
<thead>
<tr>
<th></th>
<th>Urban n(%)</th>
<th>Rural n(%)</th>
<th>Total n (%)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-reported status of physical health*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very good</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>169 (66.3)</td>
<td>108 (42.4)</td>
<td>277 (54.3)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Moderate</td>
<td>75 (29.4)</td>
<td>109 (42.7)</td>
<td>184 (36.1)</td>
<td></td>
</tr>
<tr>
<td>Bad</td>
<td>11 (4.3)</td>
<td>38 (14.9)</td>
<td>49 (9.6)</td>
<td></td>
</tr>
<tr>
<td>Very bad</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Presence of Self-reported morbidity$</td>
<td></td>
<td></td>
<td></td>
<td>0.099</td>
</tr>
<tr>
<td>Yes</td>
<td>185 (72.5)</td>
<td>201 (78.8)</td>
<td>386 (75.7)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>70 (27.5)</td>
<td>54 (21.2)</td>
<td>124 (24.3)</td>
<td></td>
</tr>
<tr>
<td>Medication status*</td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Yes</td>
<td>119 (46.7)</td>
<td>43 (16.9)</td>
<td>162 (31.8)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>136 (53.3)</td>
<td>212 (83.1)</td>
<td>348 (68.2)</td>
<td></td>
</tr>
<tr>
<td>Number of morbidities /person</td>
<td>Urban n = 185</td>
<td>Rural n = 201</td>
<td>Total n = 386</td>
<td></td>
</tr>
<tr>
<td>1 morbidity</td>
<td>75 (40.5)</td>
<td>88 (43.7)</td>
<td>163 (42.2)</td>
<td></td>
</tr>
<tr>
<td>2 morbidities</td>
<td>62 (33.5)</td>
<td>77 (38.3)</td>
<td>139 (36.1)</td>
<td></td>
</tr>
<tr>
<td>3 morbidities</td>
<td>38 (20.5)</td>
<td>29 (14.4)</td>
<td>67 (17.3)</td>
<td></td>
</tr>
<tr>
<td>4 and above morbidity</td>
<td>10 (5.4)</td>
<td>7 (3.4)</td>
<td>17 (4.4)</td>
<td></td>
</tr>
</tbody>
</table>

Results

Mean age of the study population was 69.6±8.8 years. Mean age of the elderly in urban area was 67.8±7.2 years and in rural area, 71.4± 9.8 years (P < 0.001). Females (59.4%) were predominant in the study settings. In rural area, 83.9% of the elderly were not literate yet 20% of the elderly were employed whereas in urban area, 31% were not literate and only 9.4% were employed. For an elderly family plays a major support system. In rural area, joint family system was predominant whereas in urban area, it was nuclear family ( P < 0.001). Most of the elderly in urban area belonged to upper socioeconomic class whereas those in rural area belonged to lower socioeconomic class( P < 0.001).

Table 1 indicates morbidity status of the study population. It is observed that in urban area, 66.3% of
the elderly rated their health to be good whereas in rural area, only 42.4% rated their health as good \([P<0.001]\). Majority (75.7%) of the study population complained of some disease or disorder but only 31.8% of the study population were taking medication for their morbidity. The elderly taking medication were less in rural (16.9%) area when compared to urban area (46.7%) even though the proportion of elderly suffering from morbidity was not significantly different. Among the elderly, 36.1% complained of two morbidities and 17.3% of them complained of three morbidities. The proportion of number of morbidities per person was similar in both urban and rural areas.

In the present study, it was observed that 29.1% of the elderly in the study area suffered from joint pains followed by hypertension (19.0%) and diabetes (18.0%). In urban area, the elderly suffered mainly from lifestyle disease such as, diabetes (27.97%), hypertension (27.40%), followed by joint pains (22.59%) and visual impairment (9.6%). In rural area, 38.93% of the elderly suffered from musculoskeletal problems like joint pains, followed by visual impairment (22.7%), hypertension (10.32%) and diabetes (7.66%) (Figure 1).

Among the study population, 51.4% and 47.8% accessed public health system and private health system respectively. In urban area, 86.3% of elderly accessed private health system and in rural area 89% of elderly accessed public health system for treatment of common ailments \([P<0.001]\) (Figure 2).

**Discussion**

Health care should be based on the felt needs of the elderly. Problems and needs of the elderly in urban areas are different from that in rural areas. Deeper comparative studies will help in better understanding of the health problems, enabling the government to provide better health services. Majority of studies in India are done in either urban or rural area.\(^{10-16}\) Comparative community based studies are very few. Highlight of the present study is that it focuses on difference in morbidity pattern and health seeking behaviour of the elderly between urban and rural areas.

Only half (54.3%) of the elderly in the study population perceived their health to be good. Similar results were observed in a study based on the data collected by National Sample Survey Organization (NSSO).\(^{17}\) Different pattern of morbidity in urban and rural area, better socio economic status and literacy in urban area could be some of the factors influencing this observation. Three fourth of the study population complained of some morbidity. A study done by Srinivas PJ et al. (64%) in both urban and rural areas and studies done Kumar et al. (65.3%) and Bhat et al. (65.3%) in rural area showed slightly lesser prevalence of morbidity than our study area whereas studies done in urban area by Barua et al. (78.4%), Nikumb et al. (93.12%), Gurmeet Kaur et al. (87.6%) showed higher prevalent morbidity than our study area.\(^{11-15,18}\) Differing study settings, nature of morbidity assessed and the way it was assessed could contribute to these observed differences. But generally, these studies, including the present study, indicate that prevalence of morbidity is considerably high among the elderly.

In the present study, in rural area, majority (38.93%) of the elderly reported having musculoskeletal problems like joint pains, whereas in urban area, the elderly mainly reported diabetes (27.97%), hypertension (27.40%). This increase in the level of musculoskeletal problems in the elderly in rural area may be due to occupation since majority of elderly in rural area were working as farmers or agricultural labourers, which involves strenuous physical activity. Similar observation was seen in studies done by Sharma et al., Alam M et al. in urban and rural areas.\(^{19,20}\) Large population based studies in diabetes and hypertension observed their prevalence to be more in urban area when compared to rural area, similar to our study findings.\(^{21,22}\) Studies done by Jadav et al. (65.5%) and Anand et al. (36.6%) showed high prevalence of joint pains among the elderly in rural area, similar to our study findings.\(^{23,24}\) This highlights the need to plan and deliver area specific health services based on the epidemiology of health conditions among the elderly. Since nearly 2/5 of the elderly are having musculoskeletal problems, rural health teams must be adequately trained to identify and provide appropriate care for such conditions.

Proportion of elderly taking medication was less in rural area (16.9%) when compared to urban area (46.7%). Difference in morbidity pattern could possibly explain this variation. Urban elderly mainly suffered from lifestyle disorders such as, diabetes and hypertension, which require lifelong medication, whereas rural elderly suffered mainly from joint pain for which they were taking intermittent treatment. A study done by Swami MH et al. reported similar findings.\(^{25}\)
In urban area, 86.3% of elderly accessed private health system and in rural area 89% of elderly accessed public health system for treatment of common ailments. Similar pattern was observed in studies by Alam M et al. in selected states in India, and Hakmoosa A et al. in rural area. Issues regarding availability, accessibility, affordability, and also quality of health services, are more likely to determine the choice of health care services.

Though the study was undertaken systematically with all methodological rigour, it does have certain limitations. Firstly, we collected information on self-reported morbidity and this can result in underestimation of actual morbidity among elderly, both in urban and rural areas. Secondly, elderly population selected in the urban area were from generally upper socio economic status and hence they do not represent urban elderly population, thereby limiting the generalisability of the findings.

**Conclusion**

The present study uncovers the difference in morbidity and treatment seeking pattern among elderly in the study area based on the background of differing socio-demographic profiles. This has as an implication for planning and implementing appropriate health services in the study area. Larger representative studies using standard diagnostics methods to detect morbidity would facilitate policy makers, program managers and health service providers to completely understand the urban-rural difference in morbidity among the elderly. Such observations may provide evidence to reorient the service being provided through existing health care facilities and also support National Programme for the Health Care for the Elderly and policies related to elderly, to comprehensively address the needs of elderly in urban and rural areas.

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**Source-of-Funding- Self**

**References**


Effectiveness of a Parent Education Programme on Quality of Life of Children with Epilepsy

Anila K P1, Rajee Reghunath2

1Professor, Amrita College of Nursing, AMRITA Vishwa Vidyapeetham, Kochi, Kerala, India,
2Principal, Amala College of Nursing, Amalanagar PO., Thrissur, Kerala, India

Abstract

Purpose: To assess the effectiveness of a parent education programme on quality of life of children with epilepsy and find correlation between the quality of life and the selected demographic and clinical variables of children.

Method: The research approach was quantitative and the design was one group pre-test post-test. The sampling technique was convenience sampling. The sample size was 30 children affected with epilepsy. Data was collected by using the standardized tool of Quality of Life in Epilepsy for Adolescents Questionnaire: QOLIE AD 48 Version1 and a questionnaire on demographic data. The analysis was done by using descriptive statistics, paired t-test and Pearson correlation.

Results: The findings showed that the mean score in pre-test in epilepsy impact in children is 14.14±2.89 and the average value of post-test is 15.80±2.80 and the p-value shows <0.001, so there is a statistical significant change in quality of life in pre and post-test intervention. In memory/concentration, the pre-test mean score is 8.34±1.22 and the post-test mean score is 9.35±1.06. In attitude towards epilepsy, pre-test mean score is 3.48±0.45 and the post-test is 3.98±0.45. In physical functioning the pre-test mean score is 3.73±0.86 and the post-test is 4.77±1.02. In social support, pre-test mean score is 1.42±0.36 and the post-test is 1.42±0.36. Since the p-value is <0.001 for all these areas, the relation with the quality of life of children is statistically significant. The variables of social stigma, school behavior and health perception are also shows significant relation (p-value is <0.05) with the quality of life. The demographic variable of standard of studying and quality of life of children shows positive correlation and it is statistically significant (p value-0.000). The clinical variables of age at diagnosis (0.375, p value-0.04) and duration of seizure time (0.583, p value-0.001) are having statistically significant relation with the quality of life of children with epilepsy.

Conclusion: The study depicts the importance of implementing an education programme for parents and children with epilepsy it would help to improve knowledge and follow healthy practices and through which the children can lead a good quality of life.

Key words: Epilepsy, Children, Parent Education Programme, Quality of Life.

Introduction

Epilepsy is a chronic disorder of the brain that affects people in every country of the world. It is characterized by recurrent seizures. Seizures are brief episodes of involuntary shaking which may involve a part of the body (partial) or the entire body (generalized) and sometimes
accompanied by loss of consciousness and control of bowel or bladder function. The episodes are a result of excessive electrical discharges in a group of brain cells. Different parts of the brain can be the site of such discharges. Seizures can vary from the briefest lapses of attention or muscle jerks, to severe and prolonged convulsions. Seizures can also vary in frequency, from less than one per year to several per day.¹

Epilepsy is the tendency to have seizures for two or more episodes. As many as 1 in 20 people will have a single isolated seizure at some point in their lives whereas 1 in 200 will subsequently be diagnosed with epilepsy. In children the rates are 1 in 100 having epilepsy. Of those diagnosed with epilepsy throughout the lifespan an estimated 30% have first seizures in the preschool years with 17% of those being in the first two years of life alone. So seizures are common place events in the early childhood years.¹

In recent years there has been a broadening of focus on the measurement of health, beyond traditional indicators like mortality and morbidity to include measures like impact of illness on daily living. ‘Quality of life’ has been described as the missing measurement of Health which has been given due attention in the last few years.²

Quality of Life is an important consideration of ill health, as it has a great impact on health and illness, and has emerged as an important indicator of the success or failure of the treatment of disease. Health related QOL has become an important outcome measure in chronic disease. The children with epilepsy are at increased risk for poor health related QOL/ (HRQOL) even in the absence of active seizures. Clinicians who aim to achieve optimal seizure control also need to focus on improving HRQOL. This can only be accomplished by recognizing how different features of the epilepsy itself ie. Co-morbid conditions, as well as psychosocial factors can all make a difference to health related QOL.³

A research study conducted on quality of life among 102 children with epilepsy between 5-15 years of either sex. QOL was measured by QOLCE questionnaire, a 76 item, parent reported questionnaire. Cronbach alpha was used to determine the internal consistency of the subscales and Pearson correlations to determine construct validity. The t-test and analysis of variance were used to compare mean QOLCE scores. The factors affecting QOL included age, place of residence, socioeconomic condition, maternal education, seizure type and frequency and number of anti epileptic drugs.⁴

The children with epilepsy and their families face a variety of mental, social, emotional and physical issues that requires a comprehensive, holistic health care. It was also noticed that there are misconceptions about epilepsy among parents. The misunderstanding and negative attitude towards children with epilepsy is likely to contribute to perceived feeling of stigma and discrimination among the affected children and it can affect their quality of life. The emphasis on holistic care would equip the nurse begin an integral part of the health care team to be more competent and sensitive while caring for the child which would in turn improve the quality of Life.⁵

Although anxiety disorders are highly common and have a negative impact on quality of life in patients with epilepsy of all ages, the number of studies in children and adolescents is relatively small. In a sample of 44 children and adolescents with epilepsy, it was found that 16% prevalence rate of anxiety using the revised Children’s Manifest Anxiety Scale (RCMAS).⁶

Children with epilepsy are also reported to experience academic underachievement in relation to their IQ. The child often experiences significant restrictions of activities, leading to lower QoL. Children with chronic illness have been shown consistently to be at a greater risk of behavioural disturbances than healthy children. This applies particularly to children with neurological disorder such as epilepsy. Although the effort to control seizures is of primary importance, there remain many problems concerning the psychological management of the child and his or her parents and their relationship to the social milieu in which they live.⁷

Nursing is concerned not only with outcomes like survival and decrease morbidity but that with the patient as a whole and also the quality of life. Since nurses are concerned with how perceptions shape the response and reactions of human beings, information about quality of life will provide an insight to a child’s expectations, vulnerable domains and perceived needs. And the insight will help nurse to engage themselves in nursing interventions that are appropriately to the needs of such children. Quality of life refers to that which makes life worth living and connotes the caring aspects of nursing
because nursing is concerned not only with survival and decreased morbidity but with the whole wellbeing of children.  

A controlled multicenter evaluation study on efficacy of an educational program for parents of children with epilepsy (FAMOSES), reveals that parents of the group significantly improved in epilepsy specific knowledge (group x time interaction<0.001), coping (p<0.01), fears (p<0.05) and in speaking about epilepsy (p<0.05) compared with the control group. No effects were found on disease related variables. Nearly all of the participants rated the programme as very good (71%) or good (27%). The participants improved in knowledge, coping and epilepsy related fears. The education program is a valuable component of comprehensive epilepsy care.

A systematic review of qualitative studies on experiences of children with epilepsy conducted among 43 articles involving 953 participants aged 3 to 21 years across 21 countries. Children with epilepsy often require antiepileptic medications. An estimated 80% of participants have an associated behavioural disorder or cognitive impairment. Studies have shown that children with epilepsy report impaired quality of life, low educational attainment, social stigma, and low self esteem. Peer and parental support is most important in health related quality of life of children. Most of the participants with epilepsy believed that strong social support enabled them to accept the disease.

The objectives of the study were to assess the effectiveness of a parent education programme on quality of life of children with epilepsy as well as to find the correlation between the quality of life of children and the selected demographic and clinical variables.

Materials and Method

The study was conducted among 30 children with epilepsy admitted in Paediatric Neurology ward at AIMS, Kochi. The data collection was started after obtaining Ethical Clearance certificate from the Ethics Committee and Scientific committee of Amrita Institute of Medical Sciences and Research Centre(AIMS), Kochi. The sample was selected by convenience sampling technique based on inclusion criteria. After building rapport with the parents and children, written informed consent was obtained from each parent and written assent from each child. Administered the questionnaire of QOLIE AD-48. The tool consists of two sections; section A includes 20 items related to socio demographic and clinical variables, section B includes 48 items. It took approximate one hour to complete the data collection from each child.

Statistical Analysis

Statistical Analysis has done using IBM SPSS statistics 20 windows (SPSS Inc., Chicago, USA). For all the continuous variables the results are either given in mean ± standard deviation and for categorical variables as percentage. To compare the mean difference of Pre and Post Intervention Paired sample t- test applied for parameter test. To obtain the relationship between two variables correlation is applied. Probability value (p value) less than 0.05 is considered for statistical significance.

Results

Section I - Description of Sample Characteristics based on Socio-demographic variables.

The socio demographic profile of the children with epilepsy revealed that most of them 18(60%) were male children. Also 13(43.3%) of them had only one sibling and 19(63.3%) of them were second born child. Regarding the recreation in leisure time, 18(60%) of them were interested in watching TV . In response to the food habits, 30(100%) of them were prefer to have non-vegetarian food.

Section II - Description of Sample Characteristics based on Clinical Variables.

The sample characteristics based on the clinical variables show that the frequency of seizures among children, 8(26.7%) of them get seizures once in five months. Also among 6(20%) of subjects each get monthly and once in six months respectively. Out of total subjects 16(53.3%) of them get seizures during sleep. With regard to the medications 16(53.3%) of them have three medications regularly. Also 8(26.7%) of them are taking medications for more than four years. The immunization status shows that 100% of the subjects are immunized. Among all the subjects 29(96.7%) of them do not have any co-morbidities. The data show that 14(46.7%) of them have stress as the predisposing factor for epilepsy and 11(36.7%) of them have loud noise as the predisposing factor for epilepsy.
Section-III - Effectiveness of the Parent Education programme on Quality of Life of Children with Epilepsy.

Table 1: Comparison of Pre-test and Post-test Scores of Quality of life of Children with Epilepsy.

<table>
<thead>
<tr>
<th>Subscale</th>
<th>n</th>
<th>Pre-test Mean Score</th>
<th>Standard Deviation</th>
<th>Post-test Mean Score</th>
<th>Standard Deviation</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epilepsy Impact</td>
<td>30</td>
<td>14.14</td>
<td>2.89</td>
<td>15.80</td>
<td>2.80</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Memory/Concentration</td>
<td>30</td>
<td>5.34</td>
<td>1.22</td>
<td>9.35</td>
<td>1.06</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Attitude</td>
<td>30</td>
<td>3.48</td>
<td>0.45</td>
<td>3.98</td>
<td>0.45</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Physical Functioning</td>
<td>30</td>
<td>3.73</td>
<td>0.86</td>
<td>4.77</td>
<td>1.02</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Stigma</td>
<td>30</td>
<td>5.32</td>
<td>0.80</td>
<td>4.92</td>
<td>0.60</td>
<td>0.033</td>
</tr>
<tr>
<td>Social Support</td>
<td>30</td>
<td>1.42</td>
<td>0.36</td>
<td>1.42</td>
<td>0.36</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>School Behaviour</td>
<td>30</td>
<td>3.67</td>
<td>0.66</td>
<td>3.92</td>
<td>0.74</td>
<td>0.006</td>
</tr>
<tr>
<td>Health Perception</td>
<td>30</td>
<td>5.16</td>
<td>0.83</td>
<td>4.80</td>
<td>1.02</td>
<td>0.025</td>
</tr>
</tbody>
</table>

Data on Table-1 shows that the average score in pre-test in the subscale variable of epilepsy impact in children is $14.14 \pm 2.89$ and the post-test value is $15.80 \pm 2.80$ and the p value shows $<0.001$, so there is a statistical significant change in quality of life in pre and post-test intervention. In memory/concentration, the pre-test mean score is $8.34 \pm 1.22$ and the post-test mean score is $9.35 \pm 1.06$. In attitude towards epilepsy, pre-test mean score is $3.48 \pm 0.45$ and the post-test mean score is $3.98 \pm 0.45$. The values in physical functioning show that the pre-test mean score is $3.73 \pm 0.86$ and the post-test mean score is $4.77 \pm 1.02$. In social support, pre-test mean score is $1.42 \pm 0.36$ and the post-test mean score is $1.42 \pm 0.36$. Since the p-value is $<0.001$ for all these areas, the relation with the quality of life of children is statistically significant. The subscale variables of social stigma, school behavior and health perception are also shows significant relation (p-value is $<0.05$) with the quality of life of children with epilepsy.

Section-IV – Correlation of Quality of Life of Children and the selected Demographic variables.

Table-2 Correlation of Quality of Life of Children and the selected Demographic variables.

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>n</th>
<th>Quality of Life Pearson Correlation Coefficient</th>
<th>p-value</th>
</tr>
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<tbody>
<tr>
<td>Age</td>
<td>30</td>
<td>-0.071</td>
<td>0.708</td>
</tr>
<tr>
<td>Standard of Studying</td>
<td>30</td>
<td>0.871</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Order of Birth</td>
<td>30</td>
<td>-0.486</td>
<td>0.006</td>
</tr>
</tbody>
</table>
The data on Table 2 explains the comparison of scores of quality of life of children with selected demographic variables. The variable of standard of studying and quality of life shows positive correlation and it is statistically significant (p value-0.000). The variables such as age of the children and order of birth are having negative correlation but it is statistically significant. There is no significant association between quality of life of children and the demographic variables such as gender of the child, number of siblings, recreation etc.

**Section-V – Correlation of Quality of Life of Children and the selected Clinical Variables.**

Analyses on correlation of quality of life and the selected clinical variables done. The result shows that the clinical variables of age at diagnosis (0.375, p value-0.04) and duration of seizure time (0.583, p value-0.001) are having statistically significant relation with the quality of life of children with epilepsy.

**Discussion**

Objective-1: Assess the effectiveness of a parent education programme on quality of life of children with epilepsy.

The pre-test mean score subscale variable of epilepsy impact in children is 14.14 and the post-test value is 15.80±2.80. In memory the pre-test mean score is 8.34 and the post-test mean score is 9.35. In attitude towards epilepsy, pre-test mean score is 3.48 and the post-test score is 3.98. The values in physical functioning show that the pre-test mean score is 3.73 and the post-test score is 4.77. In social support, pre-test mean score is 1.42 and the post-test score is 1.42. Since the p-value is <0.001 for all these areas, the relation with the quality of life of children is statistically significant. The variables of stigma, school behavior and health perception do not have any significant relation with the quality of life.

The present study is supported with a study on education of children with epilepsy and their parents by the modular education programme for families. It was a prospective, controlled and multicenter study with a pre-post design. The sample were 31 children with epilepsy participated in the education programme. The study revealed that children who attended the program, showed improvements in the domains perceived restrictions (significant, medium effect size) absence from school and seizure frequency.11

Objective-2: Find correlation between quality of life of children and the selected demographic and clinical variables.

The variable of standard of studying and quality of life shows positive correlation and the age of the children and order of birth are having negative correlation. There is no significant correlation between quality of life and the variables such as gender of the child, number of siblings, recreation etc. The clinical variables of age at diagnosis and duration of seizure time are having statistically significant correlation with the quality of life.

**Conclusion**

Children with epilepsy experience vulnerability, disempowerment, and discrimination. Addressing stigma, future independence, and fear of death may improve the overall quality of life of children with epilepsy. Hence, measures to improve the QoL of children with epilepsy should be stressed upon in addition to the regular treatment.

**Conflict of Interest:** None

**Source of Funding:** None

**References**

Modelling the Factors Responsible for Better Health Service Quality: Perception of Service Providers

Meenakshi Sood¹, Bunty Sharma², Sahil Gupta³, Shuchi Dawra⁴, Chanchal Kaushik²
¹Associate Professor, ²Assistant Professor, Chitkara School of Health Sciences, Chitkara University, Punjab, India, ³Assistant Professor, ⁴Associate Professor, Chitkara Business School, Chitkara University, Punjab, India

Abstract

The aim of present study is to explore various dimensions of service quality of Indian Healthcare sector from care provider’s perspective. Total of 362 healthcare providers including clinicians, staff nurses, lab & Imaging technologists, pharmacists and hospital management staff from both private and government hospitals participated in the study. The questionnaire had 5 dimensions taken from SERVQUAL along with three newly identified dimensions. Descriptive analysis of data was done besides mean for each dimension. Finally, exploratory and confirmatory analysis on SPSS 23 and AMOS version 21 was done to arrive at final set of dimensions and items under each. The findings suggested that all 8 dimensions are important for service quality of healthcare sector in India. The study adds to existing knowledge on service quality of healthcare by taking a different and unique care providers’ perspective.

Keywords: Accessibility, Accreditation, Affordability, Healthcare service quality, Service providers, SERVQUAL

Introduction

The healthcare industry has emerged vastly in India and is expected to advance at a compound annual growth rate (CAGR) of 16-17 per cent during the year 2017-2022 and plays an undisputed role in improving the facilities and access to medical facilities and quality care for the people worldwide. In addition to quality healthcare services, healthcare industries are providing enormous job opportunities and playing a critical role in the country economy¹. Quality is an important aspect of the healthcare industry and is responsible for important and productive strategy for stability and profits of the industry, which ultimately affect the economy.² There are challenges in measuring healthcare service quality. Firstly, patients do not have necessary information and capability to assess technical quality. Secondly, the relationship between quality and patients’ satisfaction is still not very well understood.³

Healthcare service quality is closely associated with patient satisfaction, loyalty, and healthcare organizations⁴ productivity and profitability.⁴ There are wide spread factors that are responsible for heterogeneity and dynamism of healthcare service quality, making it very important to understand and identify them.⁵

There is a need to develop a scale that measures the quality of hospital services. Academicians, practitioners, policy and decision makers are still in the process of identifying valid tools to assess service quality.⁶ The first tool was developed by Donabedian in 1980 and it had 4 factors namely, timeliness, efficiency, effectiveness and improvement of care services.⁶ Later in 1988 Parasuraman et al. developed the famous tool SERVQUAL for service industries banking, telecom etc. This tool had 5 factors tangibility, empathy, responsiveness, reliability and Assurance.⁷ The factors are always susceptible to changes according to the economy of a country, type of service sector and development & growth of countries. Babakus 1992 and Bowers 1994 emphasised the need to tailor it according to healthcare industry.⁸

Most of the studies have been done around the globe using SERVQUAL questionnaire to assess the quality of healthcare industry. However, studies
identified new factors in addition to SERVQUAL, which show remarkable impact on the quality of healthcare industry. Among the newly identified factors, three factors accreditation, affordability and accessibility have been proven to contribute major role in improving the quality of industry. Accreditation has emerged as a new perspective to assess the quality of healthcare industries as it contributes to loyalty and commitment of the consumers to industry and provides scope for the industry to improve by reducing the gap between patient expectations and perceptions.

Cost is another important factor for the patients mainly in developing countries like India. Therefore, the affordability of patients concerning healthcare services is an important variable to consider. However, affordability could be an important factor in developing countries like India.

While quantifying the service quality of healthcare industries, ease of service access for the patients is an important area to be considered. Waiting list, distance of healthcare facility and stay length of the patient in the hospital are the major variables under accessibility. Although the contribution of accessibility was not that significant in comparison with other SERVQUAL factors in developed countries but it could be an important asset for quantifying the quality of service provided in Indian hospitals.

Although loyalty of consumer has always been the top priority in every business sector, healthcare concerns suffice with excellent medical services alone. Singularly, healthcare stands out giving much lower credence to have loyal patients. After all medical care is a type of service where people seek when they need but of course do not want it. Therefore, healthcare quality evaluations are problematic due to difference in service size, complexity, specialization within healthcare organizations.

Objective of the study: The main objective of the study was to get healthcare provider’s perspective on service quality dimensions of healthcare. The study added 3 dimensions namely affordability, accessibility and accreditation to existing 5 dimensions of SERVQUAL. The study identified and analysed the impact of each dimension on service quality of Indian Healthcare.

Theoretical Framework

According to present research framework, the relationship between provider’s perception and quality has been observed. Servqual factors like tangibility, reliability, responsiveness, empathy, assurance and 3 newly identified factors, viz, accessibility, affordability, accreditation can work as precursors for healthcare service quality.

Research Methodology

Object/Respondent of study: The service providers including clinicians, nursing staff, pharmacists, laboratory technicians, imaging technologists, hospital administrative, healthcare researchers and academicians belonging to seven public and private hospitals of Chandigarh (U.T), Panchkula (Haryana) and Mohali (Punjab) were involved in this study. Data was taken on and off the campus of hospitals. The respondents, which were involved in present study had at least two years of experience in healthcare industry and sufficient knowledge of health system of India.

Questionnaire design

The questionnaire for the study was designed and edited in the month of September to October 2017 using SERVQUAL scale as baseline and broadening it based on literature review (research papers, articles, magazines and manuscripts on healthcare service quality, patient’s expectations and satisfaction, and databases like Web of Science, Science Direct, EBSCO, ProQuest) to understand healthcare service quality, views of hospital administrative staff and healthcare professionals. Three new dimensions were added namely, accreditation, accessibility and affordability after extensive literature review and in depth interviews of researchers, academicians and clinicians to check their implications and importance in India.

Pre-questionnaire/Pilot study

The pre-testing of questionnaire was done in November 2017-January, 2018 on healthcare service providers of public and private hospitals on 45 respondents. The reliability and validity/internal consistency of questionnaire was also analyzed. The Cronbach’s alpha was found to be more than 0.8, which was found to be in acceptable limits.

Formal questionnaire

In questionnaire, total 33 questions were present representing the 5 dimensions of ServQual and 3 new
dimensions identified. Questions from TAN (1-5) for Tangibility, REL (6-10) for Reliability, RES (11-14) for Responsiveness, AS (15-18) for Assurance, EMP (19-22) for Empathy, ACE (23-26) for Accessibility, AFF (27-28) for Affordability, and ACC (29-33) for Accreditation. Likert-type scale was used for scoring of responses: 1- very dissatisfied, 2- satisfied, 3- neutral, 4- satisfied and 5- very satisfied.

The final and formal questionnaire was distributed to respondents using snowball sampling in the seven hospitals. A total of 392 respondents/service providers questionnaire were recovered. Incomplete, invalid and outliers were excluded and finally 369 valid questionnaires were retained.

**Data entry, proofreading and analysis**

For data entry and proofreading software SPSS version 23 was used. To address the described objectives, tools and technique used were Exploratory Factor Analysis, Confirmatory Factor Analysis to confirm and validate the factors, and then Structural Equation Modelling (SEM) was to measure the influence.

**Data Analysis and Results:**

Data was analyzed using the Statistical Package of Social Sciences (SPSS) version 23 and AMOS version 21 for calculating means, correlation and conducting exploratory and confirmatory factor analysis.

The Bartlett’s test of Sphericity confirmed (Chi square=4316.988, df= 233, p= 0.001) the factorability of data. The KMO measure here is 0.823, which is greater than 0.5, hence there is a more than sufficient sample size to run the PC Analysis as KMO measure above 0.7 means data is suitable for EFA.

**Results**

The mean and standard deviation of the constructs were Tangibility (4.54, 1.02), Reliability (4.49, 1.12), Responsiveness (4.29,1.12), Assurance (4.25,1.19), Empathy (4.4,1.13), Accessibility (4.45,1.07), Accreditation (4.55,1.08) and Affordability (3.87,1.07). The primary steps in analysis was measuring the proposed model using EFA that confirms the correct loading of variables and corresponding factors with the help of Eigen value. Total 33 variables were studied, which were already existing and newly identified as well. Only 8 factors had been extracted with Eigen value of 1 and theses contribute to 74.8% of total variance.

The problem of common method bias was identified using Harman’s one factor test. However, the common method bias was not considered in present study as the variance by first factor was less than 50%.

The use of CFA (Confirmatory factor analysis) was done to test the validity of factors and measurement model as well. The results of CFA confirmed a good fit ($\chi^2 = 1261.6$, DF$= 1115$, GFI=0.88, AGFI= 0.81, NFI= 0.90, RMSA= 0.022 and CI= 0.025-0.048) (Table2). The unidimensional motion of constructs was also confirmed with CFA, which provides a strong confirmation of validity of factors. The value of cronbach’s alpha for all the measures was observed higher than 0.70, which confirmed the reliability of studied factors/constructs. Similarly, the factor loading of all the measures was found significant (p<0.0001) and within adequate limits. The range for construct reliabilities was observed from 0.812(Affordability) to 0.765(Accessibility). Two-step confirmation of convergent validity of measurement model was recorded. The first step of confirmation was significant and high value of factor loadings and construct reliability. The high value of average variance extracted (AVE) than 0.5 but lower than values of composite reliability confirmed the convergent validity of model.

The average variance extracted, MSV and ASV values of the construct are found to be Tangibility (0.733,0.72,0.519), Reliability (0.741,0.67,0.587), Responsiveness (0.730,0.718,0.499), Assurance (0.761,0.690,0.674), Empathy(0.749,0.732,0.523), Accessibility (0.718,0.701,0.393), Accreditation (0.716,0.654,0.513) and Affordability(0.725,0.721,0.631) respectively which was also confirmed as AVE of each construct was higher than squared correlation coefficient of other coefficient. The maximum shared variance (MSV) and average shared variance (ASV) were also measured and confirmed the divergent validity of present model as their values were less than respective AVE of given construct.

**Structural Equation Model (SEM)**

The hypothesis was tested using structural equation model to establish the relationship between health service quality and patient satisfaction along with studied variables, considering the cause and effect. Several indicators were used to evaluate overall model
fitness such as $\chi^2(<3)$, GFI ($>0.90$), AGFI ($>0.80$) and RMSR ($<0.080$), which proved validity of direct effect model.

Moreover, the relationship was statistically significant (at 0.001 probability level) and in the hypothesized direction.

This showed that Healthcare Service Quality contributes positively towards Patient Satisfaction.

Table 1: Demographic data of the participants

<table>
<thead>
<tr>
<th>Providers’ details (369)</th>
<th>Frequency (s)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>203</td>
<td>55.1</td>
</tr>
<tr>
<td>Female</td>
<td>166</td>
<td>44.9</td>
</tr>
<tr>
<td>Age</td>
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<td></td>
</tr>
<tr>
<td>24-34 Years</td>
<td>58</td>
<td>15.7</td>
</tr>
<tr>
<td>35-46 Years</td>
<td>179</td>
<td>48.5</td>
</tr>
<tr>
<td>47 Years and more</td>
<td>132</td>
<td>35.7</td>
</tr>
<tr>
<td>Education</td>
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<tr>
<td>Diploma</td>
<td>67</td>
<td>18.1</td>
</tr>
<tr>
<td>Graduate</td>
<td>203</td>
<td>55.1</td>
</tr>
<tr>
<td>Post graduate</td>
<td>99</td>
<td>26.8</td>
</tr>
<tr>
<td>Occupation</td>
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<td></td>
</tr>
<tr>
<td>Clinicians</td>
<td>108</td>
<td>29.2</td>
</tr>
<tr>
<td>Nurses</td>
<td>130</td>
<td>35.2</td>
</tr>
<tr>
<td>Imaging / Laboratory Technologists</td>
<td>87</td>
<td>23.5</td>
</tr>
<tr>
<td>Administrators</td>
<td>44</td>
<td>11.9</td>
</tr>
</tbody>
</table>

Table 2: Results for fit indices of structural model

<table>
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<tr>
<th></th>
<th>$X^2$</th>
<th>$X^2$/df</th>
<th>GFI</th>
<th>AGFI</th>
<th>CFI</th>
<th>RMSEA</th>
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</thead>
<tbody>
<tr>
<td>Direct Effect Model</td>
<td>4316.988</td>
<td>1.85</td>
<td>0.88</td>
<td>0.81</td>
<td>0.90</td>
<td>0.41</td>
</tr>
</tbody>
</table>

(df=2333)

Table 3: Pearson correlations matrix of studied dimension

<table>
<thead>
<tr>
<th></th>
<th>Tangibility</th>
<th>Reliability</th>
<th>Responsiveness</th>
<th>Assurance</th>
<th>Empathy</th>
<th>Accessibility</th>
<th>Accreditation</th>
<th>Affordability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tangibility</td>
<td>0.733</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td>0.56</td>
<td>0.741</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Responsiveness</td>
<td>0.45</td>
<td>0.59</td>
<td>0.730</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assurance</td>
<td>0.59</td>
<td>0.62</td>
<td>0.62</td>
<td>0.761</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empathy</td>
<td>0.49</td>
<td>0.55</td>
<td>0.49</td>
<td>0.48</td>
<td>0.749</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessibility</td>
<td>0.65</td>
<td>0.64</td>
<td>0.55</td>
<td>0.52</td>
<td>0.71</td>
<td>0.718</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accreditation</td>
<td>0.72</td>
<td>0.55</td>
<td>0.45</td>
<td>0.60</td>
<td>0.69</td>
<td>0.48</td>
<td>0.716</td>
<td></td>
</tr>
<tr>
<td>Affordability</td>
<td>0.48</td>
<td>0.49</td>
<td>0.59</td>
<td>0.59</td>
<td>0.53</td>
<td>0.62</td>
<td>0.68</td>
<td>0.725</td>
</tr>
</tbody>
</table>
Discussion

In present study, comprehensive exploration of service quality from service provider’s perspectives with qualitative and quantitative methods had been done. Total eight domain had been finalized for determining service quality in healthcare industry namely tangibility, empathy, reliability, responsiveness, assurance, accessibility, accreditation and, affordability, while five other domains had been deleted during EFA for having less than 0.5 value and considered as irrelevant in context to healthcare service quality. The present study generated a total of 33 items and reduced to 24 items after EFA and discussion with experts. High correlation was observed between the items having factor loading above 0.5 and hence the factors were identified. The final 24 items were loaded logically and rechecked by experts in order to confirm that all the domains were sufficiently observed and calculated.

The concept of health service quality from service provider’s perception was not standardized; hence, internal validity was determined in order to validate present questionnaire. The items construction was explored broadly and CFA was tested out on six models. Out of six models, only one model was accepted as best appropriate model in present context. The model retained all the original items of finalized eight domains. With the help of CFA, percentage variance due to individual domain/construct and their respective relationship with service quality is also determined. A significant and moderate positive relationship was observed (Table 3). Maximum variance was contributed by tangibility (86.1%) followed by responsiveness (77.3%) and reliability (76.2%), while minimum variance given by affordability (62%) followed by accessibility (69.6%) and accreditation (72%). The present results testify the already confirmed and significant variable of healthcare service quality. 11,12

The present study emphasized on addition of new dimensions like accreditation, affordability and accessibility to the concept of SERVQUAL while measuring service quality of health sector, which could contributes significantly in changing the perception of healthcare service quality among service providers and service users.

However, the present study was done in a small geographical area; hence its transferability to whole of India needs to be confirmed by further studies.

Theoretical Implications

The study helps us to understand various factors contributing to service quality of healthcare sector in India. It emphasizes that there are factors beyond five given in SERVQUAL, which could be industry specific and should be considered while studying service quality.

Practical implications

The current study has added to the existing knowledge pool in terms of service quality of Indian health system as understanding healthcare service quality. It will help the health authorities to formulate new health policies ensuring better patient satisfaction.

In conclusion, the research will be useful for all stakeholders all patients, providers of health care and policy makers:

- Patients/Consumers: They will receive better quality of service or treatment, once the areas with scope for improvement are identified
- Health care Professionals/Providers: will understand dimensions of service quality and their priority for good and satisfactory services to patients
- Policy Makers: to formulate new Health Policy, Accreditation norms keeping dimensions of service quality in consideration

However, we strongly recommend that further research to evaluate overall service quality score for healthcare sector in India in addition to comparison of service quality of healthcare providers in the public Vs the private sector should be carried out.

Ethical Clearance- Taken from Chitkara university Ethical committee- IERB

Source of Funding- Self

Conflict of Interest - Nil

References


Effectiveness of Prenatal Classes During Third Trimester to Reduce Anxiety Level and to Improve Birth-Preparedness among Primigravid Women

Divya Bhadran¹, Anusuya. V. Prabhu², Lakhra Alma Juliet³

¹2nd year MSc Nursing, Obstetrics and Gynecological specialty, ²Assistant Professor, Sr. Scale, Dept. of Obstetric and Gynecological Nursing, Manipal College of Nursing Manipal, ³Assistant Professor Dept. of Fundamental Nursing, Manipal College of Nursing Manipal, Manipal University, Manipal, Karnataka

Abstract

Background: The pain during labor is because of uterine contractions and cervical dilation and psychological factors like stress, anxiety and fear. The labor pains can affect a woman’s emotional control and it can be correlated with the anxiety and fear¹.

Objective: To determine the effectiveness of prenatal classes on reduction in anxiety level and birth-preparedness among primigravid women.

Method and Material: A quasi-experimental one group pretest-posttest study design was used comprising of 76 primigravid women. Purposive sampling technique was used to select the samples and simple random sampling technique (chit method without replacement) was used to select the samples for experimental and control groups. 38 samples each in experimental and control group. Data were collected using Demographic Proforma, anxiety assessment scale and knowledge regarding birth preparedness. Experimental group received prenatal classes during 35 and 36 weeks of gestation. Control group received routine care.

Results: Study results showed prenatal classes found to be effective in reducing anxiety level regarding labour and improved birth preparedness among primi gravid mothers. Majority of the primigravid women did not had prior information regarding birth preparedness 36 (97%) in control group and 31 (89%) from experimental group. Comparison of pretest post-test anxiety scores of experimental group was df 26, t (18.9) (p < 0.001). And comparison of post-test anxiety score of experimental and control group was df 70, t (16.61), (p < 0.001). Effectiveness of pre-test and post-test birth-preparedness scores of experimental group df 36 , t (23.38), (p < 0.001).

Conclusion: The findings of the study illustrated that anxiety is common during pregnancy. Birth preparedness classes will help primi mothers to reduce anxiety regarding delivery and well prepare physiologically and psychologically to phase delivery and to have better pregnancy outcome.

Key words: prenatal classes, labor, third trimester, anxiety, birth preparedness Primigravidas

Introduction

In olden days mothers used to pass their knowledge to their daughters in order to guide them throughout their pregnancy. In current scenario, women’s wisdom about birth is lost as birth has become a medical event. So, in order to support the woman throughout her pregnancy structured educational programs for preparation in childbirth called prenatal classes has come up².
A quasi-experimental study was conducted among the pregnant women to find out the impact of childbirth preparation on antenatal depression. One group pre-test, posttest research design was used. In the pretest 70% of antenatal mothers had moderate level of depression. After the childbirth preparation classes the percentage of depression has come down to 43% of borderline clinical depression. On analysis by paired ‘t’ test a statistically significant impact of childbirth preparation classes was found on the antenatal depression. Thus the study concluded that the childbirth preparation during the antenatal period has a positive impact on decreasing the depression among pregnant women.

A quasi-experimental study was conducted to assess the effects of antenatal education on maternal prenatal and postpartum adaptation among 120 antenatal mothers. The experimental group received antenatal education, the control group received only standard care. The data was collected using demographical data form, prenatal self-evaluation questionnaire (PSEQ) and postpartum self-evaluation questionnaire (PPSEQ). There was a statistically significant difference between the intervention and control groups. Hence they concluded that antenatal education had a positive effect on prenatal adaptation, but no effect on postpartum adaptation.

A randomized controlled trial was conducted to evaluate the Birth Preparation Programme (BPP) on lumbo-pelvic pain, urinary incontinence, anxiety and exercise among 197 low risk primigravid aged between 16 to 40 years with gestational age more than 18 weeks. The data collection was done on three occasions, initially at 18 – 24 weeks, next at 28 – 30 weeks and final at 36 – 38 weeks of pregnancy. The tools used in this study were STAI (State Trait Anxiety Inventory) and PPAQ (Pregnancy Physical Activity Questionnaire). The risk of urinary incontinence in BPP participants was found significantly lower at 30 weeks of pregnancy (42.7%), whereas in control group it was 62.2% and at 36 weeks of pregnancy in experimental group 41.2% and in control group 68.4%. Participation in the BPP encouraged women to exercise during pregnancy (p=0.009). No significant difference was found between the groups regarding the anxiety level, lumbopelvic pain, type or duration of delivery and weight or vitality of the newborn infant.

**Material and Method**

A quantitative study using Quasi-experimental pretest-posttest study design was adopted to investigate the effectiveness of prenatal classes regarding labor during third trimester to reduce anxiety level and to improve birth-preparedness among primigravid women of Udupi District Karnataka.

Purposive sampling technique was carried out to select the samples and simple random sampling technique (chit method without replacement) was used to select the samples for experimental and control groups. The inclusion criteria for sample selection were, Primigravidas with 35 weeks of gestation, who were aged between 18 to 30 years, who were able to speak, read, write and understand Kannada or English language, with no complications related to pregnancy and without any history of psychiatric illness attending the OBG Out Patient Department’s of tertiary level Hospital Udupi and Manipal. Purposive sampling technique was used to select the samples and simple random sampling technique (chit method without replacement) was used to select the samples for experimental and control groups. 38 samples each in experimental and control group. Data were collected using Demographic Proforma, anxiety assessment scale and knowledge regarding birth preparedness after explaining the purpose of the study and getting the written consent. Experimental group received prenatal classes during 35 and 36 weeks of gestation. Control group received routine care. One antenatal mother from experimental group and 3 antenatal mothers from control group were excluded from the middle of the study because they have delivered before 37 completed weeks of gestation.

Anxiety Assessment Scale was developed by the researcher which consisted of 36 items and evaluated by using four point Likert type scale, the options being strongly agree, agree, disagree and strongly disagree with a score of 1, 2, 3 and 4 respectively for positive items and reverse scoring of 4, 3, 2, and 1 for negative items. The maximum score of the tool was 144 and the minimum score 36. The scoring system of level of anxiety was 36:

- 72 low level anxiety, 73 – 109 moderate level anxiety and 110 – 144 high level anxiety. Birth-Preparedness
Knowledge Questionnaire consisted of 28 items. The score ranges are 0 – 9 poor preparedness, 10 – 19 average preparedness and 20 – 28 good preparedness. Institutional Ethics Committee clearance and Hospital Ethical Committee clearance (IEC 734/2014) was taken from the Institution and hospital and confidentiality was maintained where ever required. Content validity was obtained by administering the tool to seven experts. Data was collected from 21st January, 2015 till 28th February 2015. Identified the samples who are at 35 weeks of gestation with help of their antenatal card. Antenatal women between 18–30 years of age with 35 weeks of gestation meeting the sampling criteria were selected for the study. Pre-test of anxiety and birth-preparedness were assessed in both the groups. Following the pretest, on the same day, first session of prenatal classes were taken for experimental group which included the signs of labor, physiological changes during labor, and deep breathing exercise demonstration along with re-demonstration. On the next visit at 36 weeks experimental group received the second session of prenatal classes which included the deep breathing exercise, care of newborn and breast feeding. Post-test was assessed at 37 weeks of gestation. The relevant data were collected, compiled and analyzed using SPSS 17.0 version for calculation of percentages.

Results

Data presented in Table 1, shows that majority of primigravid women belonged to the age group of 20–24 years in experimental (62.2%) and control group (71.4%). Most of them were PUC qualified in both experimental group (45.9%) and control group (57.1%). Majority of primigravid women in experimental group (100 %) and control group (74.9 %) were married for 12 – 24 months. Majority of the primigravid women from experimental group (97.3 %) and control group (87.9 %), did not have any prior information regarding childbirth.

Table 2 depicts that there is a significant difference in the mean pre-test and post-test anxiety scores of primigravidas within the experimental group since the p value 0.001 is < 0.05. Therefore, it is inferred that prenatal classes has a significant effect on reducing the anxiety of primigravidas in the experimental group than the control group. Table 3 depicts that the mean post-test scores in the experimental group is greater than the mean post-test scores of the control group with a mean difference of 19.74. The independent sample ‘t’ test was computed which shows that the p value 0.001 is < 0.05, which is statistically significant. Therefore, it is inferred that the prenatal classes on labor helped in reducing the anxiety of primigravid woman on childbirth. Table 4 depicts that there is a significant difference in the mean pre-test and post-test birth-preparedness scores of primigravidas within the experimental group since the p value 0.001 is < 0.05. Therefore, it is inferred that prenatal classes has a significant effect on enhancing the birth-preparedness among primigravidas in the experimental group. Table 5 depicts that the mean post-test birth preparedness score in the experimental group is greater than that of the control group with a mean difference of 9.57. The independent sample ‘t’ test computed shows that the p value = 0.001 which is < 0.05. Hence, it was inferred that there is significant improvement in the birth preparedness. Therefore, it is inferred that the prenatal classes on labor helped in enhancing the birth preparedness of primigravid woman on childbirth.

Table 1

<table>
<thead>
<tr>
<th>S.I No.</th>
<th>Sample Characteristics</th>
<th>experimental group (n=37)</th>
<th>control group (n=35)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>frequency (f)</td>
<td>percentage (%)</td>
<td>frequency (f)</td>
</tr>
<tr>
<td>1.</td>
<td>Age (in years0</td>
<td>20 - 24</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25 - 29</td>
<td>14</td>
</tr>
<tr>
<td>2.</td>
<td>Education</td>
<td>SSLC</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Graduate and above</td>
<td>19</td>
</tr>
<tr>
<td>3.</td>
<td>Months of married life</td>
<td>12 months – 24 months</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25 months – 37 months</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Prior information on Childbirth</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>36</td>
</tr>
</tbody>
</table>
Table 2

Comparison of pre-test and post-test anxiety scores of experimental group (n=72)

<table>
<thead>
<tr>
<th>Experimental group</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test anxiety score</td>
<td>84.56</td>
<td>4.62</td>
<td>18.9</td>
<td>36</td>
<td>0.001*</td>
</tr>
<tr>
<td>Post-test anxiety score</td>
<td>64.91</td>
<td>5.69</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p < 0.05 *significant at < 0.05 level significance

Table 3

Comparison of post-test anxiety score of experimental and control group (n=72)

<table>
<thead>
<tr>
<th>Anxiety score</th>
<th>Mean</th>
<th>SD</th>
<th>Mean difference</th>
<th>df</th>
<th>t</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental group</td>
<td>64.91</td>
<td>5.69</td>
<td>19.74</td>
<td>70</td>
<td>16.61</td>
<td>0.001*</td>
</tr>
<tr>
<td>Control group</td>
<td>84.65</td>
<td>4.23</td>
<td>22.40</td>
<td>70</td>
<td>16.61</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

p < 0.05 *significant at < 0.05 level significance

Table 4

Comparison of pre-test and post-test birth-preparedness scores of experimental group (n=72)

<table>
<thead>
<tr>
<th>Experimental group</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test birth-preparedness score</td>
<td>11.35</td>
<td>2.27</td>
<td>23.38</td>
<td>36</td>
<td>0.001*</td>
</tr>
<tr>
<td>Post-test birth-preparedness score</td>
<td>19.64</td>
<td>1.54</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p < 0.05 *significant at < 0.05 level significance

Table 5

Comparison of post-test birth-preparedness score of experimental and control group (n=72)

<table>
<thead>
<tr>
<th>Birth-preparedness</th>
<th>Mean</th>
<th>SD</th>
<th>Mean difference</th>
<th>df</th>
<th>t</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental group</td>
<td>19.64</td>
<td>1.54</td>
<td>9.50</td>
<td>70</td>
<td>22.40</td>
<td>0.001*</td>
</tr>
<tr>
<td>Control group</td>
<td>10.14</td>
<td>2.03</td>
<td>22.40</td>
<td>70</td>
<td>16.61</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

p < 0.05 *significant at < 0.05 level significance

Discussion

Findings of the present study showed prenatal classes were found to be effective in reducing the anxiety of primigravidas. On comparison of the post-test scores of the experimental and control group a mean difference of 19.73 was obtained. Independent ‘t’ test shows t = 16.61 and p = 0.001, which shows a statistically significant difference. The findings of the present study were supported by a study conducted among 195 Iranian mothers to assess the effects of prenatal education on stress and labor pain who attended the health center after their 16 weeks of gestation. The experimental group received six to eight sessions of prenatal education about childbirth whereas control group received only routine care. The tools used to collect data were Visual Analogue Scale (VAS) and McGill questionnaire, and Hospital Anxiety and Depression Scale (HADS). The ‘t’ test result showed a significant difference in levels of stress experienced by experimental group (Mean:14.±4.69 ) and control group (Mean :16.79± 4.86 ) with p value of 0.002. The VAS suggested that the level of pain perceived by the experimental group (Mean: 85.68± 18.5) was lower compared to the control group (Mean: 90.99 ± 14.72) by a p value of 0.03. According to this study, prenatal education and the presence of a doula during birthing will significantly reduce childbirth stress and labor duration.
Effectiveness of prenatal classes on birth preparedness of primigravidas.

The findings of the present study showed prenatal classes were found to be effective in enhancing the birth preparedness of primigravidas. On comparison of the post-test scores of the experimental and control group a mean difference of 9.50 was obtained. Independent ‘t’ test shows $t = 22.40$ and $p = 0.001$, which shows a statistically significant difference. The findings of the present study was supported by a study conducted by Stoll & Hall among a total of 624 antenatal Canadian women on childbirth education and obstetric interventions. The aim of this study was to determine the association between attendance at childbirth classes and maternal psychological states, rates of obstetric interventions and breastfeeding initiation. From that 350(56 %) attended the childbirth education classes. Attending prenatal classes was associated with higher rates of vaginal delivery among women in the study samples.

Conflict of Interest: Nil

Sources of Funding: Self

References

Knowledge, Attitude, Practice and Barriers for Self-care among Type 2 Diabetes Mellitus Patients in Rural Tamil Nadu

Aliya Jasmine¹, Ramesh Harihara Iyer²

¹Assistant Professor, ²Professor, Dept. of Community Medicine, Sri Ramachandra Medical College & Research Institute, Porur, Chennai

ABSTRACT

Objective: To assess the knowledge, attitude, practice and barriers for self-care among type 2 diabetes mellitus patients attending a rural health centre in Tamil Nadu.

Methodology: This was a part of a quasi-experimental study. Diabetes patients attending the rural health centre were included. A structured questionnaire was used to assess the knowledge, attitude, practice and barriers against self-care.

Results: Most of the study participants had good (76.6%) or moderate knowledge (6.5%). Attitude (96.1%) and practice (85.7%) towards the disease was poor. The most commonly reported barrier for self-care was either lack of awareness or lack of time.

Conclusion: Improved self-care practices will minimize morbidity and mortality associated with Diabetes. This study has highlighted lack of awareness as a major barrier for self-care. This has to be addressed by improving health literacy in the community. Developing Behavioural Change Communication programmes need to be developed to address poor awareness in both clinical and community settings.

Keywords: attitude, barriers, Diabetes, knowledge, practice, self-care.

Introduction

Diabetes Mellitus is a group of chronic metabolic disorder causing hyperglycemia or raised blood sugar, which eventually leads to serious damage involving various parts of the body. It is a major public health problem of the 21st century. Currently, there are 425 million people with diabetes and by 2045 this number is predicted to increase to 629 million. The largest increase in prevalence will take place in developing economies. India has around 73 million people living with diabetes. Indians present with diabetes one or two decades earlier when compared with their western counterparts. The age of onset in India has been shifting towards ever-younger people within the past decade.

Diabetes is responsible for various multi-systemic complications causing diabetic nephropathy, diabetic neuropathy, diabetic retinopathy, foot ulcers and gangrene leading to amputations, increased risk for cardiovascular disease and stroke. The current healthcare system in India faces a major challenge owing to the increasing trend of Diabetes in both urban and rural areas. The rising burden of diabetes-related health costs in a country where most of the health expenditure is out of pocket expenses is also a concern.

Modifiable risk factors associated with the complications are unhealthy diet, physical inactivity, obesity, hypertension, poor medication compliance. Complications can be prevented or delayed by improving health literacy regarding these modifiable risk factors.

Awareness in rural population is poor with many misconceptions about the disease. Most of these patients are unaware about the various complications that occur in diabetes. Knowledge of Diabetes can play a crucial role in improving self-care practices and reducing the disease related complications by better care and early identification.
The necessity for greater awareness regarding prevention, diagnosis, risk factor control and disease management has been supported from previous KAP studies. KAP levels among people living with diabetes need to be investigated to aid in future development of programs and techniques for effective health education.

Methodology

This study is a part of a quasi-experimental study. It was done in the Primary Health Centre, Nemam belonging to Poonamallee block in the Thiruvallur district, Tamil Nadu. Type 2 Diabetes Mellitus patients who have been diagnosed to have the disease for at least 6 months and have been enrolled in the Non-Communicable Disease register at PHC, Nemam were included in the study. As 77 subjects fulfilled the inclusion criteria and were ready to participate, they were included in the study.

Written informed consent was obtained from all the participants. A structured questionnaire was developed to assess knowledge, attitude, practice and barriers for compliance to self-care among the type 2 DM patients.

KAP scoring: There were a total of 14 items to assess knowledge, 7 items to assess attitude and 13 items to assess practice. DM knowledge was scored by assigning one point for each correct response (total score=14). We considered a score of 10-14 as ‘Good Knowledge’, a score of 6-9 as ‘Moderate Knowledge’ and 0–5 as ‘Poor Knowledge’. Attitude responses were summarized and a score of 0–3 was considered ‘Negative Attitude’ and a score of 4-7 as ‘Positive Attitude’. Practice was assessed similarly, each question was given 1 point for correct practice and 0 point in case of incorrect practice. A score of 0-6 was considered as ‘Poor Practice’ and a score of 7–12 was considered as ‘Good Practice’.

Permission was sought from the concerned authorities to conduct the study at the Primary Health Centre.

Results

A total of 77 participants were included in the study. Among them, 42.3% were male. More than half of the patients (55.1%) were more than 55 years. Illiteracy was high (47.4%) in the study population. Occupation wise most of the study subjects were unemployed (32.6%). Only 21.8% of the participants had family history and 16 (20.5%) participants had Diabetes for more than 5 years.

According to the KAP scoring, only 5 (6.5%) had good knowledge and most (76.6%) of the participants had moderate knowledge. Majority (96.1%) of the participants had a negative attitude towards the disease and self-care practices. Similarly most of them (85.7%) reported poor self-care practices.

Knowledge Assessment: The mean knowledge score of the study population was 7.4 ± 2.14. The range obtained in this study was 2 to 11, with 14 being the maximum score. Among the 77 participants, 5 (6.5%) had good knowledge, 59 (76.6%) had moderate knowledge and 13(16.9%) had poor knowledge.

Majority of them were aware of the symptoms of DM, need for diet modification and symptoms of Hypoglycemia. Only 32.5% of the study subjects were aware of the complications of DM. Only a small proportion of participants aware of the need for regular foot care (16.9%), oral care (11.7%) and eye care (11.7%). Although awareness of foot care was low, 51.9% were aware of diabetic foot. Details are given in Table 1.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Knowledge assessment items n = 77</th>
<th>Correct response n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>What is DM?</td>
<td>59 (76.6%)</td>
</tr>
<tr>
<td>2.</td>
<td>Causes of DM</td>
<td>28 (36.4%)</td>
</tr>
<tr>
<td>3.</td>
<td>Risk factors of DM</td>
<td>34 (44.2%)</td>
</tr>
<tr>
<td>4.</td>
<td>Symptoms of DM</td>
<td>51 (66.2%)</td>
</tr>
<tr>
<td>5.</td>
<td>Complications of DM</td>
<td>25 (32.5%)</td>
</tr>
<tr>
<td>6.</td>
<td>DM treatment</td>
<td>71 (92.2%)</td>
</tr>
<tr>
<td>7.</td>
<td>How can DM be diagnosed?</td>
<td>77 (100%)</td>
</tr>
<tr>
<td>8.</td>
<td>Symptoms of hypoglycaemia</td>
<td>59 (76.6%)</td>
</tr>
<tr>
<td>9.</td>
<td>Effect of smoking on DM</td>
<td>38 (49.4%)</td>
</tr>
<tr>
<td>10.</td>
<td>Foot care in DM</td>
<td>13 (16.9%)</td>
</tr>
<tr>
<td>11.</td>
<td>Warning signs of diabetic foot</td>
<td>40 (51.9%)</td>
</tr>
<tr>
<td>12.</td>
<td>Diet control in DM</td>
<td>56 (72.7%)</td>
</tr>
<tr>
<td>13.</td>
<td>Oral care in DM</td>
<td>9 (11.7%)</td>
</tr>
<tr>
<td>14.</td>
<td>Eye care in DM</td>
<td>9 (11.7%)</td>
</tr>
</tbody>
</table>

Attitude Assessment: The mean attitude score was 1.7 ± 1.02. Out of 77 participants, 74 (96.1%) had negative attitude and only 3 (3.9%) had positive attitude towards self-care. More than half of the study participants had a
negative attitude towards diet modification (76.6%), regular check-up (89.6%), medication compliance (79.2%) and exercise (84.4%). Most of the participants had positive attitude towards monitoring weight (44.2%) and avoiding tobacco use and smoking (49.4%). Details are given in Table 2.

Table 2: Attitude among DM patients attending a rural health centre (n = 77)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Attitude</th>
<th>Positive n (%)</th>
<th>Negative n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Diabetics should watch their weight</td>
<td>34 (44.2%)</td>
<td>43 (55.8%)</td>
</tr>
<tr>
<td>2.</td>
<td>Diet modification is not required when taking OHA</td>
<td>18 (23.4%)</td>
<td>59 (76.6%)</td>
</tr>
<tr>
<td>3.</td>
<td>Is it important to check blood sugar regularly?</td>
<td>8 (10.4%)</td>
<td>69 (89.6%)</td>
</tr>
<tr>
<td>4.</td>
<td>Is it okay to stop medications without telling the doctor when the blood sugar is under control?</td>
<td>16 (20.8%)</td>
<td>61 (79.2%)</td>
</tr>
<tr>
<td>5.</td>
<td>Do you feel bothered to take medications daily</td>
<td>6 (7.8%)</td>
<td>71 (92.2%)</td>
</tr>
<tr>
<td>6.</td>
<td>Do you think smoking causes poor glycemic control?</td>
<td>38 (49.4%)</td>
<td>39 (50.6%)</td>
</tr>
<tr>
<td>7.</td>
<td>Do you think regular exercise can help control blood sugar?</td>
<td>12 (15.6%)</td>
<td>65 (84.4%)</td>
</tr>
</tbody>
</table>

Practice Assessment: Similar to the attitude, 11 participants reported good self-care practices (14.3%) and 66 (85.7%) reported poor practices. The mean score was 4.2 ± 1.98. Although attitude towards regular blood sugar check-up was poor, 88.3% reported monitoring their blood sugars regularly at the primary health centre. Very few exercised (15.6%) and monitored their weight (24.4%) regularly. Of the 77 individuals, 50 (64.9%) study subjects reported to have not forgotten to take medication in the last 2 weeks 53 (68.8%) participants reported to carrying medications while travelling. Details are given in Table 3.

Table 3: Practice assessment among DM patients attending a rural health centre (n = 77)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Practice</th>
<th>Good practice n(%)</th>
<th>Poor practice n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Regular blood sugar checkup</td>
<td>68 (88.3%)</td>
<td>9 (11.7%)</td>
</tr>
<tr>
<td>2.</td>
<td>Regular physical exercise</td>
<td>12 (15.6%)</td>
<td>65 (84.4%)</td>
</tr>
<tr>
<td>3.</td>
<td>Check body weight regularly</td>
<td>19 (24.4%)</td>
<td>58 (74.4%)</td>
</tr>
<tr>
<td>4.</td>
<td>Hypoglycemia management</td>
<td>59 (76.6%)</td>
<td>18 (23.4%)</td>
</tr>
<tr>
<td>5.</td>
<td>Regular eye checkup</td>
<td>25 (32.5%)</td>
<td>52 (67.5%)</td>
</tr>
<tr>
<td>6.</td>
<td>Regular dental checkup</td>
<td>3 (3.9%)</td>
<td>74 (96.1%)</td>
</tr>
<tr>
<td>7.</td>
<td>Self inspection of feet</td>
<td>10 (13%)</td>
<td>67 (87%)</td>
</tr>
<tr>
<td>8.</td>
<td>Use of footwear</td>
<td>40 (51.9%)</td>
<td>37 (48.1%)</td>
</tr>
<tr>
<td>9.</td>
<td>Diabetic diet</td>
<td>35 (44.9%)</td>
<td>42 (53.8%)</td>
</tr>
<tr>
<td>10.</td>
<td>Tobacco use</td>
<td>25 (32.5%)</td>
<td>52 (67.5%)</td>
</tr>
<tr>
<td>11.</td>
<td>Alcohol</td>
<td>16 (20.7%)</td>
<td>61 (79.3%)</td>
</tr>
<tr>
<td>12.</td>
<td>Compliance to treatment</td>
<td>50 (64.9%)</td>
<td>27 (35.1%)</td>
</tr>
<tr>
<td>13.</td>
<td>Carry medications while travelling</td>
<td>53 (68.8%)</td>
<td>25 (31.2%)</td>
</tr>
</tbody>
</table>

Barriers for self-care practices: Lack of awareness was reported as the most common barrier for foot care (83.1%), exercise (45.5%), oral care (89.6%) and eye care (35.1%). Lack of time was most common barrier for dietary modification (35.1%), blood sugar check-up (48.1%) and second common barrier for exercise (32.5%). Lack of healthcare facility was reported as a barrier for regular eye and blood sugar check-up.
The details are given in Figure 1 and Figure 2.

Figure 1: Barriers for foot care practice, exercise and diet among DM patients attending a rural health centre

Figure 2: Barriers for oral care, eye care and blood sugar checkup among DM patients

**Discussion**

Type 2 diabetes mellitus is a challenging non-communicable disease requiring judicious care and self-management. For this purpose there is a need to create awareness among the diabetic patients regarding various aspects of clinical care including the consumption of drugs, oral hygiene, foot care, periodical follow up etc. This study was carried out among 77 diabetic patients in the primary health center. Majority of the patients belonged to the age group of 56 – 75 years (47.4%) and were females (56.4%). The educational status of our study participants was 51.3% while majority of them (73.1%) were employed. The duration of type 2 diabetes mellitus in our study population was less than 5 years in 78.2% of the participants. In a study done by Fatema K et al, majority of the participants were females (58%) similar to our study. In addition about 37.2% participants were over 50 years of age, which is also similar to our study. 6 Similar findings were observed in a study done by Shah VN et al and similarly, in a study done by Alsous M et al, majority of the participants were beyond 40 years of age (25.8%) and females predominantly participated in this study (69.3%). 7, 8

In our study, we elaborately assessed the level of knowledge, attitude and practices towards diabetes and self-care. We observed that majority of the participants were aware of symptoms of diabetes and the need for diet modifications. However, only 32.5% of the participants were aware of complications of diabetes mellitus and
very negligible percentage of participants were aware of foot care (16.9%), oral care (11.7%) and eye care (11.7%). Similar findings were observed in the study by Shah VN et al.²

The assessment of attitude level among the study participants showed that majority of the participants had negative attitude towards diet modifications, regular checkups and compliance with medication and exercise. However, they had a positive attitude towards monitoring weight and avoiding tobacco and smoking. This reflects that the participant’s attitude towards care and self-management and diabetes was considerably poor. In a study done by Shah VN et al., 65% of the participants felt that they were responsible while approximately 39.07% of the participants felt that doctors were responsible for diabetic care and management. ⁷ In another study done by Alsous M et al 46.3% of the participants had positive attitude towards the diabetes care.⁸

With regards to the prevalence of self care practices among diabetes patients, majority of the participants had regular blood checkups and appropriate use of footwear. Similarly about 44.9% of the participants followed diabetic diet and 68.8% were compliant to treatment and carried medications even while travelling. In our study, we also assessed the barrier for self care practices among these patients on various parameters. It was observed that majority of the participants felt that lack of awareness was a key barrier for inadequate foot care (83.1%), exercises (45.5%) and diet (14.3%). Moreover, when we assessed the barriers for monitoring other complications, lack of awareness was reported as the important factor for poor oral care (89.6%) while lack of health facility was cited as an important reason for inadequate eye care (45.5%). With regards to periodical monitoring of blood sugar, lack of time was the most common reason cited for lack of compliance (48.1%). In a study done by Shah VN et al about 70.2% of the participants examined sugar level was periodically and 56% of the participants underwent foot care examination periodically, similar to our study. ⁷ However in a study done by Alsous M et al 37.7% of the participants did not practice periodical exercises, similar to our study.⁹

Self care of diabetes in essential component management of Type 2 Diabetes mellitus. Self care activities consist of a set of behavior which improves the diabetic status and prevents complications. These activities include following a regular and strict diet plan, regular exercises, self glucose monitoring, foot care and compliance to medications and checkups.⁹ ¹⁰

In order to achieve effective self care and management, it is important to educate the patients and their family members regarding the disease and the importance of non medical therapeutic activities like exercises and diet plans. Therefore in this context a detail assessment of the knowledge attitude and practices is necessary.

Our study demonstrated that although patients had adequate knowledge, when it comes to attitudes and practices, they were seen to be lacking in these parameters. Moreover the barriers to effective implementation of self care practices seemed to be increase in the lack of awareness. ¹¹

Considering the fact that self care practices play a significant impact in effective diabetes management, it is the important for the care providers to consider imparting adequate education to these patients on the self care aspects. It is important that they take time in evaluating the patient’s level of awareness and their false notions and perception, to make specific and realistic targets for effective diabetic control. The health care provider should make inclusive decision making with a good team of doctors, nutritionist, psychotherapist, podiatrist, and last but not least the patients and their immediate care provider. Each patient may be provided with a tailor made, customized regimen for diet and exercises which may result in effective implementation and practically achievable diabetic care goals. ¹² ¹³

Ethics Clearance: Ethical clearance was taken from Sri Ramachandra University Institutional Ethics Committee. (Ref: CSP-MED/12/APR/01/04)

Source of Funding: Self-funded

Conflicts of Interest: There are no conflicts of interest.

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Health Status of Assam: A District Level Analysis

Bhargab Das

MPhil Research Scholar, Dibrugarh University, Assam

ABSTRACT

Health is a state of complete physical, mental and social well being, not simply the absence of diseases or infirmity (WHO, 1948). On the other hand, health status is a concept with the help of which health can be measured. Health status in physical sense influencing factors like height, weight, nutrition, agility and flexibility or ability to move, sanitation and compliance with prescribed medications, treatment, activity etc. The present paper attempts to analyze the health status of the Rabhas, one of the most backward tribal communities of Assam. The necessary data to fulfill the objective of the present study have been collected through a structured household questionnaires prepared for the study. To assess the health status among Rabhas various standard health indicators like infant mortality rate, Maternal Mortality Rate, Crude Death Rate, Crude Birth Rate, Morbidity Prevalence Rate etc. are used. The results of the study reveal that status of health of the Rabhas is not satisfactory. The Infant Mortality Rate of the community is found as 47.17 per thousand live births which is higher than the state average and national average. The Maternal Mortality Rate of the community is also found much higher than the national average and state average. Therefore in order to improve the health status of the Rabhas the health infrastructure, delivery system, manpower, resources all has to be strengthen enough so that it can be utilized the community people in a proper way.

Keywords: Health Status, Rabhas, Goalpara.

Introduction

Health is a state of complete physical, mental and social well being, not simply the absence of diseases or infirmity (WHO, 1948). Health system includes all activities whose primary purpose is to promote, restore or maintain individuals physical, mental and social well being (WHO, 2000). On the other hand, health status is a concept with the help of which health can be measured. Health status in physical sense influencing factors like height, weight, nutrition, agility and flexibility or ability to move, sanitation and compliance with prescribed medications, treatment, activity etc. Some parameters of health status are sex ratio, density of population, life expectancy, mortality, morbidity, birth rate, nutrition and access to health care system1.

The health status of Assam is not satisfactory. The conventional health indicators put Assam in the band of poor-performing states along with the other such states of north and central India2. Assam has not been able to achieve the desired health outcomes with very high infant mortality rate and maternal mortality rate. Poor literacy rate, low per capita income and improper water and sanitation facilities etc. all have contributed to some extent in some form to the underdevelopment of the health sector3.

Profile of the Tribe: One of the scheduled tribes in the plain districts of Assam, the Rabhas belong to the Indo-Mongoloid group of people and have similarities with other members of Boro group such as Garo, Mech, Kachari and Hajong. The Rabhas are widely concentrated in the districts of Goalpara, Baksa, Kamrup, Udalguri and Kokrajhar of Assam. Besides Assam, they are also found in Meghalaya, Manipur, West Bengal, Bangladesh and Nepal. According to 2011 census the total Rabha population of Assam is 296,189 which constitute 0.95 percent of the total population and 7.63 percent of total ST population of the state. Among the districts, Goalpara...
has the highest number of Rabha population with 35.03 percent (103,757) of total Rabha population of Assam live there followed by Kamrup (R) and Udalguri districts with 30.73 percent (91,034) and 10.42 percent (30,873) of total Rabha population live there respectively (Census of India, 2011). According to the Report of Assam Mahila Samata Samiti (AMSS) the superstitious evil practice of witch hunting is very common among the Rabhas. Witch hunting is a form of gender violence, much ugly; less discussed and largely overlooked. Lack of education and lack of availability of access to a standard of health care facilities perpetuated the presence of witch hunting practices. Again a study of Assam Institute of Research for Tribal and SC reveals that the morbidity rate among the Rabhas is very high. Thus it is very essential and important to study the health status of the community in details.

Profile of the Study Area: The present study is conducted in the Goalpara district of Assam. Goalpara is one of the oldest districts of Assam which was originally created by the British in 1876. The total geographical area of the district is 1824 square kilometers. Presently the district shares the common boundaries with Dhubri district on the west; Kamrup district on the east; Brahmaputra River on the North and East Garo Hill district, Meghalaya on the south. The district has five revenue circles with eight development blocks. The revenue circles are Balijana, Dudhnoi, Lakhipur, Matia and Rangjuli. Goalpara district occupies 11 towns and 829 villages (District Census Handbook, Goalpara).

According to 2011 census the total population of the district was 1,008,183 of which 5, 13,292 (50.91 percent) were male and 4, 94,891 (49.09 percent) were female. Out of the total population 86 percent population live in rural areas and only 14 percent live in urban areas. The district has 45,094 SC population and 231,570 ST population. The population density of the district is 553 (census of India, 2011). The main communities living in the district are Boro, Rabha, Hajong, Garo and Miri. Among these communities Rabha is the most dominant one.

In 2016, the government of India named Goalpara district of Assam as one of the country’s 250 backward districts. It is one of the 11 districts of Assam currently receiving fund from the Backward Regions Grant Fund Programme.

Objective

1. To analyze the health status of the Rabhas of Goalpara district of Assam.

Methodology

The methodology to be followed in the study is outlined below.

Sampling Design: The samples for the study have been drawn by following multi-stage sampling technique using both random and purposive methods of sampling.

Selection of District: In the first stage we selected the appropriate district for the collection of the samples. For the present study Goalpara district of Assam has been selected purposively as the sample district as it contains the highest numbers of Rabha population of Assam. According to 2011 census, 35.03 percent of the total Rabha population of Assam live in Goalpara district.

Selection of Revenue Circle: The selected district has been further classified into 5 Revenue Circles. They are Matia, Rangjuli, Balijana, Lakhipur and Dudhnoi. From these 5 Revenue Circles Balijana, Matia and Dudhnoi have been selected purposively as sample Revenue Circles as these three Revenue Circles contain the highest number of Rabha villages.

Selection of Development Blocks: Balijana Revenue Circle has two development blocks namely Kharmuja and Balijana of which Balijana has been selected as it has more Rabha villages than Kharmuja. Again Matia Revenue Circle has two development blocks i.e. Matia and Krishnai of which Krishnai development block has been selected purposively as it contains more Rabha villages than Matia development block. Again from Dudhnoi Revenue Circle Kuchdhowa development block has been selected as it is the only development block of the revenue circle.

Selection of Villages: Next step involves the selection of the sample villages from each selected development block. Here we selected two Rabha villages from each development block randomly. Therefore a total of six Rabha villages are selected for our present study. Here a village containing more than 50 percent Rabha population is defined as Rabha village.

Selection of Households: Finally from each of the sample villages 20 percent of total Rabha households in each of the villages were selected randomly as the sample households for investigation. A total of 276 households were covered by the study.
### Table 1: Design of the Sampling

<table>
<thead>
<tr>
<th>District</th>
<th>Sample Revenue Circles</th>
<th>Sample Development Blocks</th>
<th>Name of the sample villages</th>
<th>Total Number of Households in Sample Villages</th>
<th>Number of Sample Households (20% of total households)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goalpara</td>
<td>Balijana</td>
<td>Balijana</td>
<td>Gendabari</td>
<td>234</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Saharia</td>
<td>315</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Matia</td>
<td>Krishnai</td>
<td>Kachumari</td>
<td>123</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rangdam</td>
<td>297</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Dudhnoi</td>
<td>Kuchdhowa</td>
<td>Nishangram</td>
<td>201</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rong Rong Para</td>
<td>224</td>
<td>44</td>
</tr>
</tbody>
</table>

**Survey Tools:** The necessary data to fulfill the objective of the present study have been collected through a structured household questionnaires prepared for the study. For the objective primary data relating to the health status of the sample households have been collected and analyzed by using simple statistical technique of percentage and presented in tables and diagrams. To assess the health status among Rabhas various standard health indicators like infant mortality rate, Maternal Mortality Rate, Crude Death Rate, Crude Birth Rate, Morbidity Prevalence Rate etc. are used.

**Results and Discussions**

The WHO defined health as “a state of complete physical, mental and social well being and merely the absence of disease or infirmity.” Poor health leads to capability deprivation and poverty. Again poverty leads to low standard of living, malnutrition and lack of basic amenities. So good health is very important for all round development of the people. Health indicators are quantifiable characteristics which describe the health status of a particular population. These indicators are basically used by governments to guide health policy. In this section an attempt has been made to analysis the achievements in health among the Rabhas with the help of different standard health indicators.

**Infant Mortality Rate:** The Infant Mortality Rate is a very important indicator that represents Human Development. It is also the most important component of mortality that can represent well being of human beings. It is used as a proxy to the life expectancy variable when data on life expectancy at birth is not available. According to SRS, the Infant Mortality Rate is the number of children dying before their first birthday. Mathematically, the Infant Mortality Rate can be defined as:

\[
\text{IMR} = \frac{D_0}{B} \times 1000
\]

Where, \( D_0 \) = Number of deaths within one year of any reference period

\( B \) = Total number of live births during the same reference period.

In the present study Infant Mortality Rate of the community is found as 47.17 per thousand live births which is higher than the state average of 44 and national average of 34 in 2016 as per the NITI Ayog data. Thus we can say that IMR of the Rabha tribe is much higher than the state and national average.

**Maternal Mortality Rate:** Maternal Mortality or death due to cause related to pregnancy and child birth, is another key health outcome indicator which has a wider capability implication. Maternal death is defined by WHO as “the death of women while pregnant or within 42 days of termination of pregnancy from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental cause.” Mathematically, MMR is defined as

\[
\text{MMR} = \frac{M_0}{B_0} \times 100000
\]

Where, \( M_0 \) = All maternal deaths occurring within a reference period.

\( B_0 \) = Total number of live births during the same reference period.

In the present study, 1 maternal death has been found during the period of 5 reference years and hence 0.2 maternal deaths per year. Thus the Maternal Mortality Rate of the community is found 943 per 100000 live births which is much higher than the national average of 130 and state average of 237 in 2014-16 as per NITI Ayog.
Crude Death Rate: Crude Death Rate is another important indicator of mortality. It can indicate the present health achievement of a population. It measures the number of deaths per 1000 population in a particular period of time. Mathematically, it is defined as

\[ CDR = \frac{D}{P} \times 1000 \]

Where, CDR = Crude Death Rate  
D = Total registered death during a calendar year. 
P = Total number of population in a specified year.

In the present study it is observed that a total 31 deaths took place during the reference period of 5 years and hence the average death is 6.2 per year. And the estimated Crude Death Rate of the sample population is 5.01 per thousand population which is lower than the state average of 7.01 and Indian average of 6.50 in 2015 (Source: Office of the Registrar General and Census Commissioner, India).

Crude Birth Rate (CBR): The Crude Birth Rate is the widely used measure of fertility. As the name implies it is the crude measure of public health. The Crude Birth Rate is the number of live births per year per 1000 midyear population. The mathematical formula for calculating CBR is

\[ CBR = \frac{B}{P} \times 1000 \]

Where, CBR = Crude Birth Rate 
P = Total midyear population in a particular area 
B = Total number of births in a particular area

In the present study data for live births is calculated for a period of last 5 years. So after calculating total number of live births for the last 5 years, the annual birth has been calculated. In the present study 106 live births are found and hence the average number of births per year is 21.2. Thus the estimated Crude Birth Rate for the sample population is 17.15 per thousand population which is lower than the state average of 20.8 and national average of 19.27 in 2015 (Source: Office of the Registrar General and Census Commissioner, India).

Growth of Rabha Population: In order to measure the population growth among the Rabhas we calculated the Natural Growth of Population. The Natural Growth of population takes into account only the birth rates and death rates. It does not take into account the population changes due to migration of people from one place to another place. Natural increase in population is defined as the difference between Crude Birth Rate and Crude Death Rate.

\[ \text{Natural Increase in Population} = CBR - CDR \]
\[ CBR = \text{Crude Birth Rate} \]
\[ CDR = \text{Crude Death Rate} \]

In the present study the Growth rate of the population is found to be 12.2 which is slightly lower than the national average of 12.77 and the state average of 13.7 in 2015.

Morbidity Prevalence Rate (MPR): Morbidity Prevalence Rate is an important health indicator. Morbidity affects the normal functioning of the human beings. Morbidity is a state of affair in which an individual is physically and mentally suffering. The MPR is the frequency with which a disease appears in a particular population.

\[ \text{Morbidity Rate} = \frac{\text{Number of ailing persons}}{\text{Total Population}} \times 1000 \]

The MPR can be studied in terms of acute disease and chronic disease. Ailments of less than 30 days duration are treated as acute and more than 30 days are treated as Chronic (NSSO 1998). Among the sample population, the Morbidity rate is found 97.89.

Mode of Treatment of Disease: It is important to study the mode of treatment in order to have idea of the health status of a particular community. A primitive backward society uses more traditionally known medicines and traditional way of treatment than modern drugs and modern technologies. The diseases are treated by Kabiraj or Bej in such societies. However, with development and advancement in science and technology and spread of education, people started visiting hospitals and doctors for treatment of diseases. It is found from field survey data that 94 respondents i.e. 34.18 percent of the sample respondents still depend on the Bej or Kabiraj for treatment of diseases. On the other hand, the remaining respondents i.e. 181 respondents (65.81 percent) use to visit doctors for the treatment of diseases. Thus we can say that a huge proportion of the respondents is still depended on traditional or primitive methods of treatment which is not a good sign.
Figure 1: Distribution of Respondents by Mode of Treatment

Conclusion

From the above discussion it is found that the status of health of the Rabhas is not satisfactory. The Infant Mortality Rate of the community is found as 47.17 per thousand live births which is higher than the state average and national average. The Maternal Mortality Rate of the community is also found much higher than the national average and state average. However, the estimated Crude Death Rate of the sample population is 5.01 per thousand population which is lower than the state average of 7.01 and Indian average of 6.50. In the present study the Growth rate of the population is found 12.2 which is slightly lower than the national average of 12.77 and the state average of 13.7 in 2015. It is found from field survey data that 34.18 percent of the sample respondents still depend on the Bej or Kabiraj for treatment of diseases. On the other hand, the remaining respondents i.e. 65.81 percent use to visit doctors for the treatment of diseases. Thus in order to improve the health status of the Rabhas the health infrastructure, delivery system, manpower, resources all has to be strengthen enough so that it can be utilized the community people in a proper way.

Ethical Clearance: It is a review article.

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Conflict of Interest: Nil.

REFERENCES


Acoustic Analysis of Infant Cry Using Multidimensional Voice Program—A Preliminary Study

Deepa N Devadiga¹, Remyasree T², Aiswarya Liz Varghese³, Ananthakrishna T⁴
¹Associate Professor, Department of Speech and Hearing, School of Allied Health Sciences, ²Post Graduate,
³Assistant Professor-Selection Grade, Department of Department of Audiology and Speech Language
Pathology, Kasturba Medical College, Mangalore, ⁴Assistant Professor-Selection Grade, Department of
Electronics and Communication Engineering, Manipal Institute of Technology, Manipal Academy of Higher
Education, Manipal, Karnataka, India

ABSTRACT

Crying is the only communication means that the baby has in the first month of life. It is expected that some aspects of the infant cry sound can be directly related to neurological deficits or damage, as well as to genetic anomalies and respiratory problems. Assessment of infant cry is a powerful screening tool to evaluate the neurological status of the newborn within its early biosocial context. However, till date it is not clear how acoustic analysis of cry using the Multi-Dimensional Voice Program (MDVP) will serve as a marker in differentiating the normal cry from the abnormal cry especially when birth cry is analysed for the purpose.

Keywords: Birth cry, Acoustic Analysis, MDVP, Normal and Abnormal Cry

Introduction

Crying is referred to as natural, alarm to alert the needs of the infant and motivating the listener to respond [¹]. The first cry of the new born is defined as the baby’s very first exhalations of the first breath within 20 seconds after birth [²]. During the first cry, metabolic acidosis occurs due to hypoxia during birth. The baby experiences a feeling of cold due to differences in temperature. This sudden extensive temperature difference terrifies the newborns, and thus takes a deep breath and during the following exhalation starts crying with all its strength [³].

It is postulated that crying originates in the nervous system, thereby reflecting the neural veracity, which may be useful in early identification of infants at risk for adverse developmental consequences. Hence, presence of an abnormal cry could be suggestive of any dysfunction or deficit of central or peripheral nervous system [⁴]. The preterm infant with excessive crying may reflect the occurrence of behavioural problem and the parenting stress even after few years which is in accordance with the previous studies [⁵, ⁶, ⁷].

Earlier studies were mainly based on the auditory analysis alone. The fundamental frequency has been found to be a discriminative feature in severe medical problems such as Sudden Infant Death Syndrome [⁸], hypoglycaemia/hyperglycaemia [⁹], brain damage [¹⁰], cleft palate [¹¹] and others.

Need of the Study: Assessment of infant cry is a powerful screening tool to evaluate the neurological status of the newborn within its early biosocial context. Although, there were methods to explore the infant cry using several other methods, till date it is not clear how acoustic analysis of cry using the Multidimensional voice program (MDVP), a commonly used software, will serve in differentiating the normal cry from the abnormal cry especially for the birth cry. Hence the present study is an attempt in this direction.

Aim of the Study

- To analyze the birth cry in normal and high risk infants using acoustic measures of voice

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**Objective of the Study**
- To profile and compare birth cry in normal and high risk infants using acoustic measures

**Method**

A cross sectional research design with convenient sampling procedure was adopted. The research protocol was approved by Institutional Ethical Committee. Informed consent was obtained.

A total of N=40 participants were grouped based on gestational age into two groups, normal infants as Group I and high risk infants as Group II.

**Group I:** Group I consisted of normal infants, with gestational age from 37-42 weeks with (n=25) [Males =10, Females=15].

**Group II:** Group II consisted of high risk infants, with (n=15) [Males = 7, Females=8].

**Inclusion Criteria**

**Group I**
- The infants born from 37-42 weeks of gestation period with no complications.

**Group II**
- The infants born before 37 weeks or after 42 weeks of gestation period
- Infants susceptible to events associated with birth and the adjustment to extra uterine survival based on the high risk register maintained at hospital.

**Exclusion Criteria**
- Infants born to mothers aged over 40 years and less than 16 years during delivery were excluded in Group I.

**Procedure**

**Questionnaire:** A questionnaire was developed in order to collect information pertaining to demographic details, prenatal, perinatal, and post natal histories.

**Data Recording:** The birth cry was recorded using the dynamic unidirectional microphone (UTP-30), at a frequency response of 100-15,000 Hz in the labour room (Normal Delivery) or Labour theatre (C section) < 30 seconds after birth. The microphone was connected to the lap top with PRAAT -5114 Software. The microphone was maintained at a distance of 10 cm during the recording. Each cry was recorded for 30 seconds. The recorded data were saved in wave format for further analysis.

**Data Analysis:** In the recorded data, the noise was controlled using Audacity software.

The following steps were carried out in order to reduce the background noise to a minimum level.
- Spike noise reduction
- If the sample considered was weak, it was amplified (here the new peak amplitude was maintained at ‘0’ level)
- Finally, the overall noise level was removed from the entire signal and all the signals units were combined

**Acoustic Analysis:** All the samples were transferred to MDVP software. The cry was analysed for selected acoustic parameters.

**Statistical Analysis:** The statistical analysis was performed using the SPSS version 15. Descriptive statistics was performed. Independent t test was done to compare the means between the two groups. A p value less than 0.05 was considered statistically significant.

**Result**

**Fundamental Frequency Related Measures:** The mean value obtained was found to be higher for Average Fundamental Frequency and Highest Fundamental Frequency among the normal infants as compared to high risk infants, except for the Lowest Fundamental Frequency which was higher in high risk infants. However there was no significant difference for Average Fundamental Frequency, t (38) = 0.267, p = 0.20, Highest Fundamental Frequency, t (38) = 0.801, p = 0.095 and for Lower Fundamental Frequency, t(38) = -0.175, p = 0.437 between normal and high risk infants.

**Frequency and Amplitude Perturbation Measures:** The mean value for Shimmer in dB was higher in high risk infants. There was significant difference observed for shimmer in dB, t (38) = -0.221, (p<0.05) between the normal and the high risk infants. The mean obtained for
Absolute Jitter was higher in normal infants as compared to the high risk infants. However there was no significant difference observed, t(38) = 0.699, p = 0.263 between normal and high risk infants.

The mean value of Shimmer percentage was higher in high risk infants compared to normal infants and the mean value obtained for Jitt was higher in normal as compared to the high risk infants. However, they were not statistically significant with jitter percent, t(38) = 0.535, p = 0.117 and Shimmer Percent, t(38) = -0.258, p = 0.482.

**Noise Related Measures:** The mean value of Noise to Harmonic Ratio was higher in high risk infants. However, No significance was observed for Noise to Harmonic Ratio, t(38) = -0.247, p = 0.944 between normal and high risk infants.

**Voice Break related and Sub- Harmonic Measures:**
The mean of the Degree of Voice Break and Degree of Voiceless was higher in normal infants compared to high risk infants. The mean value of Degree of Sub- Harmonic was higher in high risk infants. No significance was observed for Degree of Voice Break, t(38) = 1.609, p = 0.895, Degree of Voiceless, t(38) = 0.442, p = 0.420 and Degree of Sub- Harmonic, t(38) = -0.080, p = 0.611 between normal and high risk infants.

**Discussion**
The acoustic analysis was carried out using the most commonly used software, the Multidimensional Voice Profile (MDVP). MDVP is advanced software with which it is possible to analyse 33 quantitative voice parameters, which are subdivided under 8 groups. However, in the present study, selected parameters were analysed for the birth cry signal.

**Fundamental Frequency related parameters:** In the present study, the results revealed an overall increase in Average Fundamental Frequency, Highest Fundamental Frequency in the normal infants as compared to high risk infants. However, it was observed that mean values obtained for F0 particularly in preterm, respiratory distress and hyperbilirubinemia high risk infants was higher as compared to the F0 in normal infants which is in consensus with the previous investigations [12]. The F0 is as important parameter in the objective assessment of the cry signal, and it is defined by number of cycle per second vibration of the vocal fold. The fundamental frequency is influenced by the vibration mode of the vocal fold, the amount of sub glottal pressure and the co-ordination of the various intrinsic laryngeal muscles. Because of the anatomical difference of the vocal tract, newborn infants have higher fundamental frequency and resonances than adults. Previous reports indicate that the high risk infants tend to be physically smaller in size at birth when compared to normal infants and resulting in high pitch. A higher F0 is reported in infants diagnosed to have hyperbilirubenemia as compared to normal infants [13]. In the present study respiratory distress infant showed higher F0 as compared to normal infants. The results are consistent with the other studies which demonstrate that the birth cry of an Respiratory Distress Syndrome infant have the F0 of higher pitch than the normal full term infants [14]. The meconium aspirated infants have a reduced pitch in cry when compared to normal infants. In the present study, it was seen that F0 was lower in meconium aspirated syndrome as compared to normal infants. Meconium aspirated syndrome infants breathe the meconium content in the amniotic fluid which enters in to the lungs during the delivery and may prevent from the normal respiration. Those infants have weak cry because the reduced vital capacity leads to the lower pitch and loudness. Intra Uterine Growth Retardation is another condition associated with the risk for developing respiratory inhibition after birth [15]. The immature respiratory system leads to increased risk for hypoxia. Those infants have the restriction in the body growth from the uterus and have an overall reduction in the body size. The smaller vocal fold structures in those infants may produce low pitch when compared to full term infants, which is in agreement with the present study.

**Frequency and Amplitude Perturbation Measures:**
In the present study, Jitta was found to be lower in preterm when compared to normal infants. It was also observed to be lower in meconium aspirated syndrome, hyperbilirubenemia, and respiratory distress syndrome compared to the normal full term infants. This Jitta value depends on the stability of the fundamental frequency, as the F0 increases the Jitta values will reduce. So the reduced jitta value of the preterm infants indicating the higher F0, which is similar to the findings of the present study.

There was significant difference observed for Shimmer in dB (p<0.05) between two groups. Shimmer in dB expresses the average period to period variability of
the peak to peak amplitude. Usually these irregularities in the shimmer measures are associated with breathy or weak voice. Human larynx is not fully developed during birth, the cartilaginous and membranous portion of the vocal fold matures post natal [16]. New born have 60 to 75% of total length in the posterior chink of the glottis. This will result in an increase in the hoarseness of the voice when compared to adults. Hence, this ShdB was found to be higher in new born infants. Most of these high risk infants were born by caesarean and have the risk of the health complications. Several factors that lead to the caesarean delivery include pre-term, meconium aspiration, mother’s bleeding condition etc. If an infant is delivered as preterm, the respiratory system is not fully developed. Hence this immature airway makes it difficult for the infant to breath and that can leads to weak production of the cry [17]. So this could be one of the factors that contribute to the irregularity of the short term amplitude among high risk infants.

**Noise Related Measures:** The current study results revealed that high risk infants had slight increase in the Noise to Harmonic Ratio as compared to the normal infants although not statistically significant. The NHR values are an index of degree of hoarse voice. Hence, it is a good indicator of the breathiness of the cry units. The current result is at par with the literature that, preterm infants have a reduction of energy in the signal with larger spectral tilt over time, indicating the breathy voice in preterm infants compared to normal infants [18]. Hence, preterm infants are expected to have a higher NHR values as compared to normal infants.

**Voice Break related and Sub-Harmonic Parameters:** In the present study, all parameters were increased in normal infants as compared to high risk except for Degree of Sub-Harmonic which was found to be higher in high risk as compared to normal infants. Voice breaks measures indicate the ability to sustain the voice without any interruption, the Sub-Harmonic component estimates the irregularity of the vocal fold vibration. The high risk infants have more latency of the cry units compared to normal infants, hence the voice break measure was higher in normal than high risk infants. Pre term infants have an immature laryngeal system that leads to the irregularity in the vocal fold vibration resulting in increased sub harmonic. Hyperbilirubinemia infants were also found to have increased Degree of Sub Harmonics values as compared to normal infants, indicating that there is variability in the pitch of the cry signal. The Degree of Sub Harmonics value was increased in the preterm infants as compared to normal, indicating loose adduction and the escape of the air through the vocal folds, thereby leading to irregular vibration of the larynx.

**Conclusion**

It suggests that acoustic analysis which is non-invasive in nature can be used to characterize birth cry between normal and abnormal birth cry. However a large sample size is required to come to conclusive findings. Thus birth cry analysis could be used as a diagnostic marker in differentiating between normal and high risk babies and thereby can contribute to early disorder identification and prompt intervention.

**Conflict of Interest:** There is no conflict of Interest.

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**REFERENCES**


An Analysis of Access to Primary Health Care Services: A Study in Jorhat District of Assam

Sampurna Khound
PhD. Research Scholar, Omeo Kumar Das Institute of Social Change and Development, VIP Rd. Upper Hengrabari, Guwahati, Assam

ABSTRACT

The present study tries to find out the access to primary health care services. Primary health care services are very important for the health outcomes of the mother and that of the child and in ensuring that both maternal and child deaths are prevented. These types of services also positively contribute to improve the health status and also economic development. Study of these services is necessary in developing areas where infrastructure to deliver these services is minimal or lacking. This study has been done in two development block of Jorhat district. A cross sectional household survey was conducted for the sample of 242. Accessibility has been studies in three aspects like availability, affordability and acceptability. Study also tries to cover the disparities in accessibility in different socio-economic groups.

Keywords: Accessibility, Availability, Acceptability, Primary Health Care.

Introduction

Health is one of the vital indicators of quality of human life. So it is very essential that health services reached each and every corner of the country. Bhore committee in 1946 suggested a comprehensive health care service an integration of preventative, promotive and curative so that every individual able to received it. According to the recommendation of this committee, Government of India set up three-tier health care delivery system i.e. primary, Secondary and Tertiary. In the three-tier health care system primary care provided services at the village level, secondary care at a subdivision and district level and tertiary care at the regional level. Health has been declared a fundamental right in many countries. National governments all over the world are striving to expand and improve their health care services. The concept of primary health care came into light in 1978 following an international conference in Alma-Ata USSR which declared that primary health care was a key to attain health for all. India is a signatory to the Alma-Ata declaration of 1978 and was committed to attain the goal of “health for all by the year 2000 A.D., through the Universal provision of primary health use service (Government of India, 1983).

With physical existence of expanding, access to health care especially in rural areas is a crucial priority for government. In India a large proportion of people live below the poverty line in rural areas. In those areas since primary health care plays an important role, critical priority has been given to primary health care by government of India. But physical accessibility of public or private health care facility is a challenge in rural areas. The access to health care is therefore, rightly defined as the potential and actual entry of a group of population into the health and health care delivery system.18

The Institutes of Medicine defines access to health care as “…the timely use of personal health services to achieve the best possible outcomes” 7. Access to health care depends on availability, awareness, affordability and accessibility to health care services13. Along with availability of physical infrastructure, facilities and health workers, accessibility is important for good health.
outcome. The physical existence is a necessary but not a sufficient condition for accessibility. There are various factors which influence the people attitude towards access to health services such as knowledge about disease, awareness about medical facility and cost of the service\(^1\). In short, access to health care is a combination of affordability, availability and acceptability of the prevalent health care system\(^8\). In this study, access to primary health care facility has been looked into in the light of availability, affordability and acceptability of health care facility.

**Objectives and Methodology**

The sole objective of this paper is to examine the accessibility of primary health care facility.

**Data Source:** Both secondary and primary sources of information have been used while conducting the study. The primary data is collected through multi-stage sampling method with the help of a structured questionnaire which has been prepared keeping in mind the objectives of the study. The secondary data has been collected from different sources like the Directorate of Economics and Statistics, Directorate of Public Health, Planning Board, District Medical Offices, Journals, Books etc.

**Sampling Design:** A multi-stage sampling design has been drawn for selection of the sample. From the two sub-divisions in Jorhat district, in the first stage of sampling, two development blocks viz. Jorhat block and Titabor block have been purposively selected on the basis of having the highest concentration of rural population. i.e., In the second stage, two gaon panchayats have been purposively selected on the basis of concentration of highest rural population. In the third stage, from the two gaon panchayats, 25% of villages have been selected which add up to four villages. In the fourth stage, from these four villages, 10% of the households have been randomly selected which is shown in Table below.

**Table 1: Sample Households**

<table>
<thead>
<tr>
<th>Village</th>
<th>Total households</th>
<th>10% of the total households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nawsolia</td>
<td>1183</td>
<td></td>
</tr>
<tr>
<td>HallmileBell</td>
<td>457</td>
<td></td>
</tr>
<tr>
<td>No. 1 KakodungaHabi</td>
<td>344</td>
<td></td>
</tr>
<tr>
<td>No. 3 Block</td>
<td>442</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>242</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Directorate of Economics and Statistics, GoI

**Analytical Tool:** Tabulation has been done to present the collected information in a systematic way. The study has been presented using simple statistical tools like percentages, averages.

**Result and Discussion**

Access to health services is how people make use of or take advantage of the services being provided. However, access cannot be ensured only through expansion of the service, it should be affordable as well as acceptable also\(^1\). The physical access implies the distance to the service provider, affordability means that the service is economically accessible and acceptability implies that people have knowledge about the service and they ready to receive it.

Expanding access to primary health care is a critical priority of the government of India. Efforts towards it address numerous issues and much progress has been reported. The health care system in India, at present has a three tier structure to provide health care services to its people. The first tier know as primary tier, has been developed to provide health care services to the vast majority of rural people. The primary tier comprises three types of health care institutions -sub centre (SC), primary health centre (PHC) and community health centre (CHC). In Assam, at present 975 PHCs, 10 CHCs and 4604 SCs are working. In Jorhat district, seven Block PHCs, six CHCs, 27 mini PHCs and 144 SCs are working (Joint Director of Health Service, Jorhat). Various types of family welfare programmes, immunization programmes and family planning measures are being executed by these primary health care service providers. The Assam government has played a pro-active role in creating provisions of health care facilities for the past several decades to all those who are in need of these facilities and services.

**Availability of Primary Health Services:** Adequate and equitable distribution of health care facilities in rural areas is critical to human capital development. Adequate number of health institutions should be set up in the rural areas of a particular district so that the villagers need not travel long distances to seek medical facilities.

**Distance to the nearest SC/PHC/CHC:** Distance to the health care is an important determinant of health care availability.
Table 2: Distance to the nearest Primary Health Service

<table>
<thead>
<tr>
<th>Health Centre</th>
<th>Below 1 Km</th>
<th>1-3Km</th>
<th>3-8Km</th>
<th>Above 8Km</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>SC</td>
<td>115</td>
<td>47.52</td>
<td>127</td>
<td>52.48</td>
</tr>
<tr>
<td>PHC</td>
<td>85</td>
<td>35.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHC</td>
<td>85</td>
<td>35.12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Field survey

From the above Table (2), it is observed that 47.52 percent of the households have a SC at a distance of less than one km. While only 35.12 percent of the households are located within 3-5 km from the nearest PHC and CHC respectively. For majority of the households (68.88 per cent), the PHC and CHC are located at a distance of more than eight km. It is also reported that around 95 percent of people are situated at a walk able distance from the SC, a large proportion of people depend on rented vehicles and other public services to reach these facilities.

Affordability of Health Care Services: Affordability depends on various socio-economic variables, such as income of the household, occupation, family size and caste etc. Here an attempt has been made to analyse the relation between health expenditure and the above mentioned socio-economic variables. The following table has been constructed to depict the relation.

Table-3: Health Care Expenditure among Socio-economic Groups (in percentage)

<table>
<thead>
<tr>
<th>Selected Variable</th>
<th>Description</th>
<th>Nil</th>
<th>Below 10%</th>
<th>10-20%</th>
<th>20-30%</th>
<th>Above 30%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caste</td>
<td>General</td>
<td>16</td>
<td>30</td>
<td>28</td>
<td>22</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>OBC</td>
<td>15.08</td>
<td>18.25</td>
<td>39.68</td>
<td>14.29</td>
<td>12.69</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>SC</td>
<td>28.20</td>
<td>61.54</td>
<td>10.26</td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>29.42</td>
<td>52.94</td>
<td>11.76</td>
<td>5.88</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>40</td>
<td>40</td>
<td>20</td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Monthly Per Capita Consumption Expenditure (MPCE)</td>
<td>500 and bellow</td>
<td>38.89</td>
<td>35.18</td>
<td>20.37</td>
<td>5.56</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>501-1500</td>
<td>15.26</td>
<td>33.89</td>
<td>32.20</td>
<td>14.41</td>
<td>4.24</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>1501-2500</td>
<td>7.69</td>
<td>25</td>
<td>40.38</td>
<td>15.38</td>
<td>11.54</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>2501-3500</td>
<td>6.67</td>
<td>15.38</td>
<td>29.08</td>
<td>26.32</td>
<td>22.55</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Above3500</td>
<td>7.5</td>
<td>16.32</td>
<td>23.06</td>
<td>26.85</td>
<td>26.27</td>
<td>100</td>
</tr>
<tr>
<td>Size of Households</td>
<td>Up to 3</td>
<td>25.58</td>
<td>32.56</td>
<td>30.23</td>
<td>6.98</td>
<td>4.65</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>4-5</td>
<td>19.66</td>
<td>30.77</td>
<td>27.35</td>
<td>17.09</td>
<td>5.13</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>6-7</td>
<td>14.55</td>
<td>32.73</td>
<td>36.36</td>
<td>7.27</td>
<td>9.90</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>8 and above</td>
<td>3.70</td>
<td>25.93</td>
<td>33.33</td>
<td>18.52</td>
<td>18.52</td>
<td>100</td>
</tr>
<tr>
<td>Occupation</td>
<td>Government Service</td>
<td>10.53</td>
<td>21.05</td>
<td>44.74</td>
<td>23.68</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Private Service</td>
<td>36.84</td>
<td>10.53</td>
<td>21.05</td>
<td>15.79</td>
<td>15.79</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Business</td>
<td>16.25</td>
<td>30</td>
<td>31.25</td>
<td>15</td>
<td>7.5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Agriculture</td>
<td>22.41</td>
<td>44.83</td>
<td>32.76</td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Daily Wage Earner</td>
<td>21.28</td>
<td>40.43</td>
<td>38.29</td>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Field Survey

From Table 3, it is observed that among the social groups, the expenditure on health by the backward caste like the Scheduled Caste and Scheduled Tribe is comparatively low than the other caste. The monthly per capita consumption expenditure of the households show that the percentage share of health expenditure increases
as the monthly per capita consumption expenditure of the sample households increases. 26.27 percent of the households whose MPCE is above 3500, spent more than 30 percent of their non-food expenditure on health services. There is a positive relationship between the size of family and health expenditure. As the family size increases, expenditure on health also tends to increase. Occupation wise data shows that the agriculturists and daily wage earners are ready to spend only 10 to 20 percent of their income on health services.

**Health Care Acceptability:** Acceptability can be defined as willingness of a person to receive or buy a health service (Simon, 2007). The acceptability of any health care system/medical practice among a given population is determined by different elements. It is very crucial to understand the factors that influence the different choice that people make between different available health care systems as also their very acceptance/willingness to avail any medical practice. Here, acceptability is being looked into the process of making a choice for medical care by the different socio-economic groups.

**Choice of Provider:** A table has been constructed to show the choice of providers among different socio-economic groups.

<table>
<thead>
<tr>
<th>Selected Variable</th>
<th>Description</th>
<th>Public</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Caste</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>31.71</td>
<td>68.29</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>OBC</td>
<td>60.19</td>
<td>39.81</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>78.18</td>
<td>21.82</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>62.5</td>
<td>37.5</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td><strong>Monthly Per Capita</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption <strong>Expenditure</strong> (MPCE)</td>
<td>500 and bellow</td>
<td>90.91</td>
<td>9.09</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>501-1500</td>
<td>71.87</td>
<td>28.13</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>1501-2500</td>
<td>63.16</td>
<td>36.84</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>2501-3500</td>
<td>56.23</td>
<td>43.77</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Above 3500</td>
<td>27.27</td>
<td>72.73</td>
<td>100</td>
</tr>
<tr>
<td><strong>Size of Households</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 3</td>
<td>43.6</td>
<td>56.4</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>4-5</td>
<td>49.0</td>
<td>51.0</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>6-7</td>
<td>57.1</td>
<td>42.9</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>8 and above</td>
<td>68.2</td>
<td>31.8</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Govt. service</td>
<td>21.58</td>
<td>78.42</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Private service</td>
<td>50.0</td>
<td>50.0</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Business</td>
<td>63.13</td>
<td>36.87</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>73.09</td>
<td>26.91</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Daily wage earner</td>
<td>81.08</td>
<td>18.92</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Field Survey

The above Table 4 shows that with an increase in monthly per capita consumption expenditure, the preference for private health care providers increase. Among the social groups, a significantly higher proportion of the scheduled caste (78.18) is found to have opted government sources followed by the scheduled tribe at 75 percent. Occupation wise, it is found that people engaged in government services prefer to take advantage of the private service providers. On the other hand, people who are agriculturists and daily wage earners opt for government service providers as they cannot afford the costly services of the private health care service providers.

**Type of Institution:** Selection of institution depends on type of disease and distance to the facility centre. The sample households reported that the complex cases which cannot be cured in the rural health institutions are referred to a higher facility as most of the PHC and CHC are not in a position to deliver specialised health care services.
Table 5: Distribution of Morbid Persons seeking Treatment by type of Health Institutions

<table>
<thead>
<tr>
<th>Type of institutions</th>
<th>No. of households</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHC/CHC</td>
<td>38</td>
<td>13.38</td>
</tr>
<tr>
<td>District Hospital</td>
<td>136</td>
<td>47.89</td>
</tr>
<tr>
<td>Private Hospital</td>
<td>42</td>
<td>14.78</td>
</tr>
<tr>
<td>Private Clinic</td>
<td>68</td>
<td>23.94</td>
</tr>
<tr>
<td>Total</td>
<td>284</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Field Survey

It appears from the Table 5 that 47.89 percentages of households seek treatment from the district hospital. Likewise, 13.38 percent of the households seek treatment in the PHC and CHC, particularly those belonging to the Bekajan block as it is located at distance from the Jorhat town. However, treatment sought from the private hospitals is relatively lowers (14.79). 23.94 percent of the households visit private clinics for treatment.

Most of the maternal deaths are attributed to the lack of proper care at delivery. To improve the quality of human resources a major trust of all welfare programmes has been directed towards maternal health. In Jorhat district it seems to have been working good and almost all the mothers during 5 years in the survey area reported that their delivery took place in various health institutions. The ASHA workers are doing their job in a good manner which helps to improve the institutional delivery.

Opinion on Government Service: The respondents were enquired as to how much they are satisfied from the services provided by the PHC and CHCs. The respondents gave a mixed response. Most of the respondents reported that waiting room facility, availability of medicines, provision of operation theatres, ambulance facility and testing laboratory in primary health centres are rather poor. During the ensuing discussions, some major issues came to light. There is lack of basic facilities in the PHCs and sub-centres like the building, water and electricity, proper in-patient facility etc. Moreover, at many places, there is no laboratory facility and basic medicines are also not available. So, very often most of the tests are done in outside laboratories. Often they work in haste and fail to give a patient hearing to the problems of the patient. Lack of cleanliness and heavy rush are also reported as the two major reasons for low preference for government health services.

Conclusion

The primary focus of the present study has been to look into the accessibility of primary health care facilities. They are designed to function as important components of the overall economic and social development programmes. Investments have been made under the different government programmes to meet the demand of the rural people. Although majority of the patients belonging to the economically poor households prefer rural health institutions, those institutions have failed to become a choice for the economically well to do households as those who can incur higher health care expenditure often choose urban centric secondary health care services. Though the households at large are aware of the availability of service in the primary health centres but the motivation for utilisation of the services of the PHCs is very poor. It needs an effective and continuous strategy to develop the demand and motivation to avail the primary health services. The process of current evaluation should be strengthened to monitor the performance of the primary health centres. Further strengthening and capacity building of public health facility should be done regularly. Young doctors should be motivated to work in the rural area for some time to serve the people. Government should take steps for improvement so that people can choose a particular health facility rather than forced to go because of lack of money.

Ethical Clearance: There is no objection while collecting data.

Source of Funding: Self.

Conflict of Interest: No.

REFERENCES


15. Directorate of Economics and Statistics, GoI


Adaptive Signal Enhancement in Clinical Cardiac Care Systems Using Normalized Median LMS Variants

Asiya Sulthana¹, Md. Zia-Ur-Rahman²
¹Research Scholar, ²Professor, Department of Electronics and Communication Engineering, Koneru Lakshmaiah Education Foundation, Greend Fileds, Vaddeswaram, Guntur, A.P., India

ABSTRACT

In this paper, a new variant of elimination of adaptive artifact from Electrocardiography (ECG) signals is presented. ECG is a noninvasive method for indirect assessment of monitoring the stroke volume, cardiac output and other hemodynamic parameters. But this method is affected by various non-stationary artifacts such as sinusoidal artifacts (SA), respiration artifacts (RA), muscle artifacts (MA) and electrode artifacts (EA) while acquiring the ECG signal which leads to ambiguity in diagnosis. Hence these artifacts should be eliminated for accurate diagnosis. For filtering these artifacts, we proposed several hybride adaptive filtering techniques based on conventional Least Mean Square (LMS) algorithm. These are Normalized Median LMS (NMLMS), Sign Regressor NMLMS (SRNMLMS), Sign NMLMS (SNMLMS), Sign Sign NMLMS (SSNMLMS) are the hybride variants of LMS algorithm. Based on these adaptive algorithms, we developed several adaptive signal enhancement units (ASEUs) and performance is evaluated on the real ECG signal components obtained from MIT-BIT database. Among these techniques, SRNMLMS based ASEU performs better in the filtering process. The signal to noise ratio improvement (SNRI) for this algorithm is calculated as 21.6985 dBs, 7.9864 dBs, 7.8346 dBs and 10.6857 dBs respectively for SA, RA, MA and EA. Hence, the SRMLMS based ASEUs are more suitable in ECG signal filtering in real time health care sensing systems.

Keywords: Adaptive Filter, Hemodynamic parameters, Electrocardiography, signal enhancement, stroke volume.

Introduction

Electrocardiography (ECG) is a simple, inexpensive and noninvasive method to monitor the changes of electrical impedance in thorax which is due to the periodic changes of blood volume in aorta. An appropriate thorax model can be used to estimate Stroke Volume (SV), Cardiac Output (CO) and other hemodynamic parameters¹². In the ECG field Impedance Plethysmography³ methods are used to study the fluids flow in the cardiac area. Several comparative studies are carried out in the field among noninvasive ECG and invasive methods like thermodilution that shown promising results in favor of ECG⁴⁵. With the technology improvement wearable devices with ECG sensors are designed to facilitate recordings in long term and offer comfort to the patients⁶. Since the initiation of ECG there has been an increased in the improvement of technique reliability and cardiac parameters⁷⁸.

During the extraction the ECG signals are influenced by physiological and non-physiological artifacts. The tiny features of the desired signal components are masked by the artifacts and causes ambiguities during diagnosis. The major artifacts contaminated with the desired ECG components are Sinusoidal Artifacts (SA), Respiratory Artifacts (RA), Muscle Artifacts (MA) and Electrode Artifacts (EA). These artifacts should be removed to obtain high resolution ECG signal for estimating stroke volume and intensity. As the artifacts are not stationery in nature and hence, we can’t predict the characteristics of artifacts, so conventional filters with fixed coefficient are not preferable for filtering. So that adaptive filtering

Corresponding Author:
Asiya Sulthana
Research Scholar, Department of Electronics and Communication Engineering,
Koneru Lakshmaiah Education Foundation,
Greend Fileds, Vaddeswaram,
Guntur-522502, A.P., India
Email: asiyasulthana1984@gmail.com
techniques are preferable to update the filter weights in according to the statistical nature of the signal and noise component. In [11-12] conventional Least Mean Square (LMS) and Recursive Least Square (RLS) adaptive algorithms are used to enhance the ECG signal resolution. But the drawbacks of these algorithms are high steady state error, and impulsive noise. To resolve these drawbacks and to enhance the performance of artifact cancelation we developed several Adaptive signal enhancement units (ASEUs) based on some hybrid variants of LMS. With these hybrid algorithms we can also achieve less computation complexity. In [13-15] Rahman et al. proposed some adaptive noise cancellers to enhance the cardiac signal and brain activity using several variants of LMS. In this paper, we considered the same framework for the development of ECG signal filtering techniques.

The performance of ASEUs for ECG analysis in a typical health care sensing system can be improved by various hybrid techniques. Signal enhancement capability, convergence rate, and computational complexity are the interesting characteristics in any typical health care sensing system. The basic adaptive algorithm is Least Mean Square (LMS) algorithm. High steady state error and impulsive noise are the main drawbacks of LMS algorithm. To overcome these drawbacks, we proposed Median LMS (MLMS) algorithm. In this paper further to improve convergence rate, filtering capability and to reduce computational complexity we also implemented various sign versions of MLMS algorithms. The various variants of MLMS algorithms are Sign Regressor MLMS (SRMLMS) algorithm, Sign MLMS (SMLMS) algorithm and Sign Sign MLMS (SSMLMS) algorithm. The algorithms implementation is discussed in the next section. Based on the simulation results the SRMLMS based ASEUs perform well than remaining variants.

Enhancement of Electrocardiography signals using Hybrid Techniques: During the extraction, the ECG signal is influenced by several artifacts that cause ambiguity in the diagnosis. Hence the artifacts should be eliminated in order to estimate accurate hemodynamic parameters of ECG. Adaptive filtering techniques are used to remove the non-stationary artifacts. Figure 1 shows the typical block diagram ASEU. It consists of FIR filter and weight update mechanism. In this paper several signal processing techniques are proposed for developing various ASEUs.

![Figure 1: A typical adaptive signal enhancement unit](image)

Here we developed several strategies for weight update mechanism. First consider a conventional LMS based adaptive filter with tap length N. The input to the ASEU is raw ECG signal u(n), it contains desired signal Z(n) as well as noise components R(n). r(n) is reference signal correlated with R(n) generated by the reference generator is applied as input to the FIR filter. Let w(n) is the impulse response of the FIR filter, y(n) be the FIR filter output, d(n) be the error signal generated in the ASEU. The weight updating mechanism for an LMS based ASEU can be mathematically written as,

\[ w(n+1) = w(n) + \alpha u(n)d(n) \]  

Where, \( w(n) = [w_0(n) w_1(n) \ldots w_{N-1}(n)] \) is the nth tap weight vector, \( u(n) = [u(n) u(n-1) \ldots u(n-N+1)] \) is input sequence, \( d(n) = u(n)-w^T(n)r(n) \) and ‘\( \alpha \)’ represents a step-size.

**Median LMS Algorithm (MLMS):** The performance of the LMS algorithm and its derivatives is significantly degraded when it is subjected to input signals that are influenced by impulsive noise, sometimes this leads to instability. This problem can be overcome by using a nonlinear filter to smoothing the noisy gradient components. This modification leads to median LMS [16].

The weight updating mechanism for an MLMS based ASEU can be mathematically written as,

\[ w(n+1) = w(n) + \alpha.med_L [u(n)d(n), u(n-1)d(n-1) \ldots u(n-L)d(n-L)] \]  

This algorithm is normalized with reference to data vector results Normalized Median LMS algorithm (NMLMS) algorithm. In this algorithm the fixed step
size varies with respect to the input data samples, i.e., $a$ is replaced with $a(n)$. The weight update equation for NMLMS is given by,

$$w(n + 1) = w(n) + a(n).\text{med}_{l}[u(n)d(n), u(n-1)d(n-1) \ldots u(n-L)d(n-L)]$$

...(3)

Where, the step size parameter is written as,

$$a(n) = \frac{\alpha}{c + \|u(n)\|^2}$$

Sign variants of NMLMS: Here, we developed new algorithms that use signum [17] of either the error signal components, the input signal components, or both, have been derived from the various NMLMS based adaptive algorithms for simple implementation. Hence, computation time will be reduced particularly the time required for “multiply and accumulate” (MAC) operations [86]. The sign-based techniques result in the reduction of the computational complexity of the filter and, therefore, is suitable for biotelemetry applications. In this paper we developed three sign variants of NMLMS namely Sign Regressor NMLMS (SRNMLMS), Sign NMLMS (SNMLMS) and Sign Sign NMLMS (SSNMLMS). The weight updating mechanism for these three variants is as follows respectively.

$$w(n + 1) = w(n) + a(n).\text{med}_{l}[\text{Sign}\{d(n)\}u(n), \text{Sign}\{d(n-1)\}u(n-1) \ldots \text{Sign}\{d(n-L)\}u(n-L)]$$

...(4)

$$w(n + 1) = w(n) + a(n).\text{med}_{l}[\text{Sign}\{d(n)\}u(n), \text{Sign}\{d(n-1)\}u(n-1) \ldots \text{Sign}\{d(n-L)\}u(n-L)]$$

...(5)

$$w(n + 1) = w(n) + a(n).\text{med}_{l}[\text{Sign}\{d(n)\}u(n), \text{Sign}\{d(n-1)\}u(n-1) \ldots \text{Sign}\{d(n-L)\}u(n-L)]$$

...(6)

Where

$$\text{Sign}\{u(n)\} = \begin{cases} 1 : u(n) > 0 \\ 0 : u(n) = 0 \\ -1 : u(n) < 0 \end{cases}$$

...(7)

Simulation Results

To demonstrate that the proposed algorithms are truly effective in clinical situations, the method has been validated using various ECG recordings taken from the MIT-BIH data base. In our simulation experiment we have taken four ECG recordings (1,2,3,4, 5) from five different persons. These records are contaminated with SA, RA, MA and EA. Various SEUs for ECG enhancement is developed using the LMS, NMLMS, SRNMLMS, SNMLMS, SSNMLMS algorithms. In the evaluation procedure of the proposed techniques, we considered Signal to Noise Ratio Improvement (SNRI) for our experiments, averaged and compared with conventional LMS based Adaptive Signal Enhancement Unit (ASEU). Tables 1 give the characteristics of proposed implementations. Due to space limitation we have shown the experimental results only for two artifacts. The experimental results of artifact cancellation are shown in Figure 2, Figure 3, Figure 4, Figure 5 respectively for SA, RA, MA and EA.

Filtering of Sinusoidal Artifacts (SA) Using Adaptive Algorithms: In this experiment SA components are removed from input raw ECG. This is given as input to ASEU shown in Figure 1. The reference signal is generated from the reference generator which is correlated to SA. Based on error value the adaptive algorithm associated with the ASEU automatically updates the of FIR filter coefficients. The performances of these implementations are compared with reference to SNRI. These are averaged for four experiments for each artifact and are tabulated in Table 1. Based on these performance measures it may be concluded that SRNMLMS based ASEU performs better in SA filtering of ECG signals. Hence, this technique is recommendable for the implementation in real time health care monitoring devices.
Filtering of Respiration Artifact (RA) using Adaptive Algorithms: In this experiment RA components are removed from input raw ECG. This is given as input to ASEU shown in Figure 1. The reference signal is generated from the reference generator which is correlated to RA. Based on error value the adaptive algorithm associated with the ASEU automatically updates the of FIR filter coefficients. Figure 2 shows the simulation results for removal of RA. The performances of these implementations are compared with reference to SNRI and is shown in Tables 1. By comparing the performance measures among all the algorithms, it seems as SRNMLMS based ASEU is better with reference to the filtering ability. Hence, these realizations are well suited for real time implementations.

Filtering of Muscle Artifact (MA) using Adaptive Algorithms: In this experiment MA components are removed from input raw ECG. This is given as input to ASEU shown in Figure 1. The reference signal is generated from the reference generator which is correlated to MA. Based on error value the adaptive algorithm associated with the ASEU automatically updates the of FIR filter coefficients. Figure 3 shows the simulation results for removal of MA. The performances of these implementations are compared with reference to SNRI and tabulated in Table 1. By comparing the performance measures among all the algorithms, it seems as SRNMLMS based ASEU is found to be better. Hence, these realizations are well suited for real time implementations.

Filtering of Electrode Artifact (EA) using Adaptive Algorithms: In this experiment EA components are removed from input raw ECG. This is given as input to ASEU shown in Figure 1. The reference signal is generated from the reference generator which is correlated to EA. Based on error value the adaptive algorithm associated with the ASEU automatically updates the of FIR filter coefficients. The performances of these implementations are compared with reference to SNRI. These are averaged for four experiments for each artifact and are tabulated in Table 1. By comparing the performance measures among all the algorithms, it seems as SRNMLMS based ASEU is better with reference to SNRI. Hence, these realizations are well suited for real time implementations.

Figure 3: Typical ECG enhancement results of RA cancelation (a) ECG signal contaminated with RA, (b) ECG filtered with LMS algorithm, (c) ECG filtered with NMLMS algorithm, (d) ECG filtered with SRNMLMS algorithm, (e) ECG filtered with SNMLMS algorithm, (f) ECG filtered with SSNMLMS algorithm

Figure 4: Typical ECG enhancement results of MA cancelation (a) ECG signal contaminated with MA, (b) ECG filtered with LMS algorithm, (c) ECG filtered with NMLMS algorithm, (d) ECG filtered with SRNMLMS algorithm, (e) ECG filtered with SNMLMS algorithm, (f) ECG filtered with SSNMLMS algorithm

Figure 5: Typical ECG enhancement results of EA cancelation (a) ECG signal contaminated with EA, (b) ECG filtered with LMS algorithm, (c) ECG filtered with NMLMS algorithm, (d) ECG filtered with SRNMLMS algorithm, (e) ECG filtered with SNMLMS algorithm, (f) ECG filtered with SSNMLMS algorithm
Table 1: SNRI computations for various filtering techniques during ECG enhancement (all values in dBs).

<table>
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<th>Noise</th>
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Conclusion

In this paper several efficient adaptive signal enhancement techniques are developed for ECG signal enhancement. In order to achieve convergence speed and enhancement capability we are used various ASEUs based on LMS, NMLMS, SRNMLMS, SNLMS and SSNMLMS algorithms. These techniques are tested in real time to eliminate artifacts like SA, RA, MA and EA from desired ECG signals. The experimental results are shown in figures 2-5. From the experimental results we can conclude that SRMLMS based ASEU is better with reference to filtering ability and SNRI. Hence, these realizations are well suited for real time applications.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: My research article what we have written is completely self-depended which enrolls complete research depended on the prototype of each individual so it doesn’t match any other research proposals/research persons.

REFERENCES


A Health Status of Assam: A District Level Analysis

Bhargab Das
MPhil Research Scholar, Dibrugarh University, Assam

ABSTRACT

Health is a productive asset that influences economic development significantly and also a part of the basis of human capabilities and integral part of welfare. Health enhances the economic development by improving the human capital and reducing economic cost of illness. Good health augments labor productivity and helps in boosting economic growth. In this regard the present study attempts to analyze the scenario of health status across the districts of Assam. The scenario of health condition is shown in terms of ranking and group of districts with the help of composite health status index constructed by using Principal Component Analysis. The results of the study reveal that there is high degree of disparity among the different districts of Assam in terms of health status. In terms of health status Dibrugarh district tops the list followed by Sivsagar, Jorhat and Tinisukia districts. On the other hand, Dhubri and Kokrajhar districts got the bottom position in the list followed by Darrang, Goalpara, Barpeta and Karimganj districts.

Keywords: Health Status, PCA, Assam.

Introduction

Health has an important role in the development of an economy, good health deals with good income. As defined by WHO, it is “a state of complete physical mental, and social wellbeing, and not merely the absence of disease or infirmity.” Health may be defined as the ability to adopt and manage physical, mental and social challenges throughout life. In 1984, WHO revised the definition of health and define it as the extent to which an individual or group is able to realize aspirations and satisfy needs and to change or cope with the environment. Health is a resource for everyday life, not the objective of living; it is a positive concept emphasizing social and personal resources, as well as physical capacities1.

In this 21st century, the concept of health is an ability that opened the door for self assessments to become the main indicators to judge the performance of efforts aimed at improving human health. There are certain key factors that have been found to be influencing the health status of the people2. According to the WHO, the main determinants of health include the socio and economic environment, the physical environment and the person’s individual characteristics and behaviors.

According to WHO, health care facilities are hospitals, primary health care centers, isolation camps, burn patients units, feeding centers and others. In emergency situations health care facilities are often faced with an exceptionally high numbers of patients some of whom may require specific medical care. Therefore it includes health care centers, medical, nursing home, pharmacies and drug stores, medical laboratory research, hospitals and specialized care centers.

Good health augments labor productivity and helps in boosting economic growth. As per the World Development Report 1993, it identifies four channels through which health helps in boosting economic growth

- It reduces production losses caused by worker illness.
- It permits the use of natural resources that had been totally or nearly inaccessible because of disease.
- It increases the enrollment of children in school and makes them better able to learn.
- It frees for alternative uses resources that would otherwise have to be spent on treating illness (World Bank, 1993).

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Status of Health in India: The concept of health services was emerged and was evolved during the colonial rule. With expansion of colonial rule, the health services too expanded, getting organized into the Indian Medical Services by 1764. During the time of Government of India Act 1919, health became a provincial subject and health services have different character. In the year 1910 state finance most of the medical institutions which were around 75% and it moved to 92% in the year 1940 and it keeps on increasing. However, during the time of independence some of the health indicators were quite poor in India. Sir Joseph Bhore submitted the report on health survey and development in 1946, which was a landmark in the evolution of health services in India. The committee focuses on the medium and long term perspective for the development of the medical services. According to the committee, health services should be placed as close as possible to the people in order to ensure maximum benefit; and consciousness on health should be stimulated around the people with help of education.

In the post independence era, from the mid-1950s to early 1970s, effort to improve the human health, were treated at best. Many committees had been formed with the intention of providing health services to the people. The improving access to the essential health care services for the poor is a major issue to be looked on. The health status of the country has been increasing by time. Health status is a multidimensional concept, requiring multiple indicators and multiple methodologies for adequate measurements. For the country as a whole, latest available data indicates the following progress under NRHM in terms of key measurable health outcomes:

The Total Fertility Rate (TFR) has been reduced from 2.9 in 2005 to 2.5 in 2011, IMR from 58 in 2005 to 44 in 2011, Crude Birth Rate(1.9) (CBR) and the MMR was estimated at 178 during 2010-12 from 254 in 2005.

So, it is observed that there have been steady improvements in the core maternal and child health indicators at all India level. However, India being a diverse country, the pattern of progress of various State/Uts are different, which is something really interesting to explore.

Even though India has been achieved accelerated economic growth over the last two decades, it has rated poorly in human development indicators and health indicators. India compares scantily with developing countries like China, Sri Lanka and Bangladesh in many health indicators such as life expectancy at birth, infant and under-five mortality levels, etc. (GOI, 2005, 2008, 2010). In 2010, life expectancy at birth in India (65.13 years) is lower than that of China (73.27 years), Sri Lanka (74.72 years), Thailand (73.93 years), Nepal (68.39 years) and Bhutan (68.39 years). India’s position is even poor compared to these countries in terms of infant mortality rate, which is 48.6 in India as against 13.7 in China, 10.8 in Sri Lanka, 11.0 in Thailand, 38.6 in Bangladesh, 40.6 in Nepal and 43.6 in Bhutan for the year 2010 (World Bank Online Database). A similar picture is discernable if we compare India’s position with these developing countries in terms of other health indicators like maternal mortality rate, total fertility rate, birth rate, death rate, immunization, etc. The poor health condition is one of the major reasons for India’s poor rank in the UNDP Human Development Index. Out of the 187 countries, India ranked 134th in the latest UNDP Human Development Index for the year 2011, which is below the rank of the countries like Sri Lanka (97th), China (101st) and Thailand (103rd).

Status of Health in Assam: With the increasing health indicators there is an improving in the economic growth as a whole. For looking on the status of health in Assam there is a wide range of indicators. We will mainly look at the few health indicators namely crude birth rate, crude death rate, infant mortality rate, ante natal care, and Immunization. For Assam CBR and CDR condition is better in urban areas but it is below the national average in rural areas. Whereas the condition in IMR is below the nation average in both the rural and urban areas.
Table 2: Birth rates, Death Rates and Infant Mortality rates in Assam, 2011

<table>
<thead>
<tr>
<th></th>
<th>CBR</th>
<th></th>
<th>IMR</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Rural</td>
<td>Urban</td>
<td>Total</td>
</tr>
<tr>
<td>Assam</td>
<td>22.8</td>
<td>24.0</td>
<td>15.5</td>
<td>8.0</td>
</tr>
<tr>
<td>India</td>
<td>21.8</td>
<td>23.3</td>
<td>17.6</td>
<td>7.1</td>
</tr>
</tbody>
</table>

Source: Bulletin on Rural Health Statistics in India, 2011.

The fact evident from the table that the country as a whole and the state, the health condition of the rural areas is in miserable condition compare to the urban areas. With this view rural health care should be an area of special priority of any government in a country or state.

Objective

To analyze the scenario of health status across the districts of Assam.

Methodology

Data Source: The present study is entirely based on secondary sources data which are collected from the following sources—

1. Statistical Handbook of Assam.
2. Annual Health Survey (AHS),
4. Sample registration system,

Method: The study has taken only undivided 23 districts of Assam instead of 33 districts due to the unavailability of data on health status for the newly formed districts of Assam. In this study the development of the health sector is measured through health status. Here development of health sector is measured in terms of improvement in various health status indicators such as Infant Mortality Rate, Institutional Delivery, Morbidity Rate, Immunization Rate and Ante Natal Care.

To construct the health status index, the variables that are used as a percentage are

1. Infant Mortality Rate (the Infant Mortality Rate is the number of children dying before their first birthday per 1000 live births) \( (Y_1) \),
2. Morbidity Rate (Percentage of persons suffering from any type of acute illness) \( (Y_2) \),
3. Ante Natal Care (Percentage of mothers who had get ante natal check up in the first trimester) \( (Y_3) \),
4. Institutional Delivery (Percentage of delivery at institutions) \( (Y_4) \),
5. Immunization (Percentage of children aged 12-23 months fully immunized with BCG, Measles, three doses of polio and DPT) \( (Y_5) \),

Here the reciprocal of Infant Mortality Rate and Morbidity Rate are considered for calculation to make the variable unidirectional.

The scenario of health condition is shown in terms of ranking and group of districts with the help of composite health status index constructed by using Principal Component Analysis.

PCA is a useful technique for transforming a large number of variables in a data set into a smaller and more coherent set of uncorrelated factors, the Principal Components. PCA is a multivariate statistical technique used to reduce the number of variables in a data set into a smaller number of ‘dimensions’. The PCA is a more sophisticated tool than the HDI which can tackle the linear aggregation problem faced in the UNDP’s HDI. In mathematical terms, from an initial set of \( n \) correlated variables, PCA creates uncorrelated indices or components, where each component is a linear weighted combination of the initial variables. For example, from a set of variables \( X_1 \) through to \( X_n \).

\[
P_{C1} = a_{11}X_1 + a_{12}X_2 + \ldots + a_{1n}X_n
\]

\[
P_{Cm} = a_{m1}X_1 + a_{m2}X_2 + \ldots + a_{mn}X_n
\]

Where \( a_{mn} \) represents the weight for the \( m \)th principal component and the \( n \)th variable.

The variance \( (\lambda) \) for each principal component is given by the Eigen value of the corresponding eigenvector (Huang, 1974). The components are ordered.
so that the first component (PC1) explains the largest possible amount of variation in the original data, subject to the constraint that the sum of the squared weights ($a_{11}^2 + a_{12}^2 + \ldots + a_{1n}^2$) is equal to one. The second component (PC2) is completely uncorrelated with the first component, and explains additional but less variation than the first component, subject to the same constraint. Subsequently, components are uncorrelated with previous components; therefore, each component captures an additional dimension in the data, while explaining smaller and smaller proportions of the variation of the original variables. The higher the degree of correlation among the original variables in the data, the fewer components required to capture common information.

After the construction of the health status indices, the districts were categorized on the basis of the average value criteria. On the basis of average value criteria districts were divided into two categories—

1. Sound Group: This group includes the district having index values higher than the state average.
2. Lagging Group: This group includes the districts having index value lower than the state average.

Results and Discussion

Health Status Index and Status of the Districts: The composite index of the health status is prepared through the econometric tool Principal Component Analysis (PCA) by using the variables like Infant Mortality Rate, Morbidity Rate, Immunization, Institutional Delivery and Ante natal care for the year 2011-12. The first component is serving as the principal component because its Eigen value is more than 1 and it explains 47.40 5% of the total variances. The equation of the health status index is constructed by statistical method of linear aggregation of the original indicators such that

$$Z = W_1X_1 + W_2X_2 + W_3X_3 + \ldots \ldots + W_nX_n$$

The status of the district is shown through their comparative position in health status by ranking with the help of the values of the composite indices.

<table>
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<th>Districts</th>
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<th>Rank</th>
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</tr>
<tr>
<td>Darrang</td>
<td>-1.15842</td>
<td>21</td>
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</tbody>
</table>

Source: Calculating through using PCA from the data of Annual Health Survey 2011-12

From the above table we can see that there are disparities or inequalities among the different districts of Assam in terms of health status. Dibrugarh district tops the list followed by Sivsagar, Jorhat and Tinsukia districts. On the other hand, Dhubri and Kokrajhar districts got the bottom position in the list followed by Darrang, Goalpara, Barpeta and Karimganj districts. The above table reveals that out of 23 districts 11 districts have index values more than the state average. On the other hand, the remaining 12 districts index values lower than the state average.

Grouping of Districts in Terms of Health Status: There are so many researchers have used PCA and constructed health status index and grouped the states into sound group and lagging group by using ‘Average Value Criteria’ while they found disparities in health status among the different states of India.
Table 4: Grouping of Districts Based on Index Values

<table>
<thead>
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<th>Health Status Index</th>
<th>Sound Group</th>
<th>Lagging Group</th>
</tr>
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</table>

From the above table we can see that there are huge disparities among the different districts of Assam in terms of health status. Out of 23 districts only 11 districts including Dibrugarh, Sibsagar, Jorhat, Tinsukia, Golaghat, Kamrup, Dhemaji, Nalbari, Cachar, Lakhimpur and Sonitpur have health status index values higher than the state average and fall in the category of sound group. On the other hand, 12 districts including Kokrajhar, Darrang, Dhubri, Karimganj, Morigaon, Nagaon, Karbi Anglong, Goalpara, North Cachar Hill, Hailakandi, Bongaigaon and Barpeta have health status index values lower than the state average and fall in the category of lagging group.

**Conclusion**

Health is a productive asset that influences economic development significantly and also a part of the basis of human capabilities and integral part of welfare. Health enhances the economic development by improving the human capital and reducing economic cost of illness. The above study reveals that there is high degree of disparity among the different districts of Assam in terms of health status. In terms of health status Dibrugarh district tops the list followed by Sibsagar, Jorhat and Tinsukia districts. On the other hand, Dhubri and Kokrajhar districts got the bottom position in the list followed by Darrang, Goalpara, Barpeta and Karimganj districts. Out of 23 districts only 11 districts have health status index values higher than the state average and fall in the category of sound group. On the other hand, 12 districts have health status index values lower than the state average and fall in the category of lagging group.

**Ethical Clearance:** It is a review article.

**Source of Funding:** Self.

**Conflict of Interest:** Nil.

**REFERENCES**


A Review of the Perception of Healthcare Quality among Patients and Employees

Bijo Mathew¹, Raja Narayanan¹, Amit Mittal¹
¹Chitkara Business School, Chitkara University, Punjab, India

ABSTRACT
As the healthcare is a service industry, patients come to hospital to avail various healthcare services while searching for quality within the services they avail. The term service is any activity or benefit that one party can offer to another that is essentially intangible and does not result in ownership of anything. Due to its intangibility and heterogeneity, healthcare quality requires a multidimensional definition which encompasses various stakeholder needs and expectation. This study reviews existing models in healthcare services and attempts add new relevant dimensions which may be proven empirically.

Keywords: Healthcare; service quality; perception of patients, satisfaction

Introduction
Quality has become an essential part of our daily living. Customers are constantly seeking goods and services of high quality. This demand for quality has led organisations to regard quality as a strategic objective to sustain in the aggressive market. Mosadeghrad¹ (2013) discussed the definitions of quality from different perspectives. Quality has varying definitions because of its subjective nature and intangibility. Parasuraman et al.², (1985) defined Quality as “meeting and/or exceeding customers’ expectations”. Another definition of Quality by Flood (1993, p.226) is “meeting customers’ (agreed) requirements, formal and informal, at the low cost, first time and every time”. The Indian healthcare sector is at a critical juncture and needs special attention, which also includes other allied areas such as hospital management, OTC drug consumption (Sehgal and Mittal³, 2019), healthcare tourism and so on. Due to its intangibility and heterogeneity, healthcare quality requires a multidimensional definition which encompasses various stakeholder needs and expectation (Mosadeghrad⁴, 2013). Healthcare quality is defined by Donabedian⁵ (1980, p.5) as “the application of medical science and technology in a manner that maximises its benefits to health without correspondingly increasing the risk”. Another definition of healthcare quality by Leebov⁶ et al. (2003, p.4) says “doing the right things right and making continuous improvements, obtaining the best possible clinical outcome, satisfying all customers, retaining talented staff and maintaining sound financial performance”.

Patients and Employee Perception—Discussion
Crossing the quality Chasm report describes in order to achieve the healthcare quality, hospital to meet six attributes of healthcare system such as safe, effective, timely, efficient, equitable and patient-centered. Willems & Ingerfurth⁷ (2016) explored the difference in perception of hospital quality between the patient and the employee based on different variables in Germany. The various dimensions indicated in the paper were hygiene quality, process quality and information quality. Due to a significant difference in background, there was a contrasting perception gap about the hospital quality among different stakeholders. The study shows that for the hospital quality, employee score is consistently lower than the patient and heterogeneous in their evaluations. Abuosi⁸ (2015) conducted study on the perception between the outpatients and healthcare providers regarding the quality of care in Ghana. This research was performed on the basis of the gap model of service quality by Parasuraman et.al⁹ (1985), using different dimensions of care quality, namely financial access, adequacy of resources and services, fairness of care, effectiveness of care, interpersonal aspects of care, technical aspects of care and overall care. This research demonstrated that there is an overall significant difference in perception between patients and healthcare...

Corresponding Author:
Raja Narayanan
Chitkara Business School,
Chitkara University, Punjab, India
Phone: 8870900537
Email: raja.narayanan@chitkara.edu.in
providers regarding the quality of care. However, this research was restricted only to outpatients, and perceptions of quality of care for inpatients may vary significantly owing to distinct expectations of care. The relationship between service quality and patient satisfaction has been illustrated by Shabbir et al16 (2016), lead showing positive correlation between the healthcare service quality and the patient satisfaction. Patient satisfaction was also evaluated by examining the difference between the quality of service perceived and expected. Positive inclination of the patient will frame abilities were measured as significant for improving knowledge about the cancer therapy with good technical relieving and life-prolonging therapy. Among the most important finding from this study was the nurses’ knowledge about the cancer therapy with good technical abilities were measured as significant for improving patient satisfaction and create a feeling of safety and security. Tornwall & Wilhelmsson12 (2010) investigated that satisfaction of patients were high with the standards and quality of nursing care. These results are also comparable to those studied by Riccio13 (2001) that patients are usually satisfied with nursing care quality and standards. Fascinatingly, patients are progressively satisfied with the communication skills and interdisciplinary collaboration among the nurses and workers. Henoch et al14. (2012) examined in their research regarding the association of the opinions of the lung cancer patients and their family members regarding various dimensions of the quality of care provided. The significant finding from this research is that both patients and family members reported that they received low quality care. The study found that there was a difference in the importance of different aspects of care between the ratings of patients and their family members, where family members rated the importance of nursing care items instead of patients. Fung, & Mercer15 (2009) explored patient perception on the process of consultation and the treatment outcomes for measuring the quality of physician care. Interestingly, for a comfortable environment that facilitated the patient’s ability to speak freely with their doctors, human skills such as laughing, being courteous and subjective welcome was considered significant. Zhao et al16. (2009) conducted a research among 221 nurses and 383 patients in 18 non ICU nursing units in Chinese hospitals. The study was limited only to nursing category and limited number of variables used to study the perception gap. Likewise, Lee & Yom17 (2007) discovered patients to be more satisfied with nursing care than their nurses. Such a distinction has emerged in the literature on the opinions of the nurses and patients. While nurses value the personal aspects of care, their patients value greater nursing skills and abilities. Padma et al18. (2009) explored different service quality dimensions from patient and attendants (patient’s family and friends) perspectives in Indian Hospitals. Service quality is defined as the evaluation of service encounters by the customers resulting from a comparison of customer expectations with perception of actual service performance (Lewis19, 1989). The authors discussed about the different models of service quality like SERVQUAL model by Parasuraman et al20. (1985, 1988) and Gronroos’ (1984, 1990) model. There are three components of service quality in Gronroos’ model21 (1984, 1990) such as functional quality, technical quality and image of the service provider. Technical quality relates to therapy given, infrastructure etc., and functional quality relates to how the service is delivered such as service friendliness, staff, timely delivery, etc. The patients who are satisfied remain faithful and are willing to pay more for the improved services. (Padma et. al22., 2009). From a customer point of view, an experience is a holistic phenomenon that encompasses all the interactions that occur from needs recognition to need fulfillments (Verhoef et al23., 2009). The authors identified 22 main categories and 51 subcategories of quality dimensions that are sorted under direct interactions (Staff attitudes and behaviours, personalisation, communications, competence, availability of persons, staff efficiency, staff reliability relationship with staff and relationship with other patients); indirect interactions (procedures and processes, facilities and premises, accessibility, timeliness, speed, external communication, medical outcome. Polsa et al24., (2010) conducted a study on how the cultural features may influence the service quality perception in one of the hospital in China. The research demonstrates that the cultural values of Chinese patients and their evaluation of the health service are linked and further analyzes point to the impact of cultural values on perceptions of service quality. Badri et. al25., (2007) discussed about the different models of service quality (with one, two, three and four constructs) and the healthcare satisfaction for discharge patients and tested these service quality models in those discharge patients in government hospitals in UAE. The final suggested model of the writers’ is based on the three constructs – process and administration, quality of care, and information. The model involves eight main dimensions that include empathy and personal attention, facilities and tangibility,
competency, professionalism, availability, administration rules and regulations, transition to home, and involvement and information. This study explains that all these dimensions in healthcare quality are important towards patient satisfaction. Naidu (2007) discussed about the various factors affecting the quality of healthcare and satisfaction of patients. The author identified various dimensions that can affect the patient satisfaction such as access, caring, healthcare output, communication and tangibles. These factors are strongly linked to aspects of general service quality such as responsiveness, reliability, assurance, empathy and tangibles. This paper discovered patient satisfaction and quality of healthcare to be fundamental in improving efficiency and image of healthcare services. This article also discussed about the understanding the staff perception of patient priorities and perceptions. Silvestro (2005) addressed that understanding perceptions of employees concerning patient expectations and perceptions helps to define gaps and to take action through training to close gaps. Mwachofi et al. (2009) explored about the socioeconomic and organizational factor influencing perception of quality and patient safety among nurses in hospitals in Saudi Arabia. The factors which enhance the patient safety and the probability that nurse use their own facility include; ability to communicate suggestions, fewer noticeable mistakes, information technology training and support, and a confidential error reporting system. The factors influencing patient satisfaction were discussed by Alhashem et al. (2009). For measuring quality of health services, the authors used patient satisfaction as an important indicator. The writers used Ware et al. (1978) model-based questionnaire, are split into six care aspects such as accessibility, technical, interpersonal, availability, comfort, convenience and overall. Evidence from multiple research has shown that healthcare providers suggestions help planners and policy makers identify health system bottlenecks; enhance the utilisation and sustainability of health care services in the general population (Songstad, et al., 2012). In fact getting the opinions of healthcare providers on health services is a realistic instrument for assessing and improving the health system.

**Proposed Model**

The model proposed for this study is shown in the Figure 1 and is mainly derived from the gaps model of the service quality of Parasuraman et al. (1985) as well as based on the theory of principal-agent paradigm (Eisenhardt, 1989; Jensen & Meckling, 1976). One criticism of the SERVQUAL model was that it concentrated only on the service’s functional aspects and not on the technical aspects (Padma, et al., 2009). Hence the proposed model is modified by incorporating more variables of healthcare service quality dimensions which are identified from the existing literatures.

Figure 1: Proposed Model

![Proposed Model](image_url)

**Figure 1: Derived from the conceptual framework of Parasuraman et al, 1985 and principal-agent paradigm (Eisenhardt, 1989; Jensen & Meckling, 1976)**
Availability of Data and Materials: The datasets generated during the research are available from the corresponding author on reasonable request.

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Authors Contributions: BM collected all reviews and scrutinized and framed in to artical format

RN carried out the design of the study alignment and drafted the manuscript. AM design and coordination and helped to draft the manuscript BM, RN and AM read and approved the final manuscript.

Competing Interests Statement: (✓) We declare that we have no significant competing financial, professional, or personal interests that might have influenced the performance or presentation of the work described in this manuscript.

Ethical Clearance: N/A (Review article)

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Experience of Sore Nipple and the Remedies Used among Postnatal Mothers

Janet Prameela D’Souza¹, Shobha Kamath², Elsa Sanatombi Devi³
¹MSc Nursing, Assistant Professor, ²MSc Nursing, Lecturer, ³PhD Nursing, Professor, Manipal College of Nursing Manipal, MAHE, Manipal

ABSTRACT

Objective: To assess the experience of postnatal mothers regarding sore nipples, to explore the remedies adopted for sore nipple symptom relief and to compare the experience of primipara and multipara mothers regarding sore nipples.

Method: An explorative survey design was adopted and 200 postnatal mothers were selected by purposive sampling technique. The data were collected by administering demographic proforma, semi structured questionnaire on experience of sore nipple and remedies adopted for the management of sore nipple.

Results and Conclusion: The study findings revealed that, 120 (60%) mothers developed sore nipple problem within one week. Pain persisted for more than one week for 120 (60%) mothers. Majority of the mothers, 180 (90%) used remedial measures for the relief of pain. Most of the primi para mothers, 160 (80%) expressed it as “very severe” “horrible” and “intolerable” pain compared to multipara mothers. The study concluded that despite of having sore nipple, all the mothers continued breast feeding, so that baby will not be deprived of its nutrition.

Keywords: Experience, sore nipple, remedies, postnatal mothers, breast feeding

Introduction

Mother’s milk is an ideal and exclusive food for the infant for initial six months. Breast feeding meets the total nutritional needs of the infant.¹ Feeding the baby is a wonderful experience for the mother, but in some cases, mothers’ may face difficulties in feeding their newborns due to several reasons. Sore nipple is a very common problem encountered by the mothers during the initial weeks following delivery. This problem produces lot of discomfort to the mother, which makes her unable to feed her baby and finally the baby will suffer by not getting adequate nutrition. There is a high incidence of trauma to the nipple during the first four weeks of postnatal period. A descriptive survey study was conducted among postnatal mothers attending OBG private practice physician’s office in South Texas. Survey questionnaires were administered to them and it was found that about 42.7% mothers had sore nipple problems within four weeks. Many a times sore nipple lead to interruption and complete cessation of exclusive breastfeeding due to severe pain involved with it.²

Sore nipple which commonly causes pain, frequently arise from the baby due to improper latching. There will be too much pressure put on the nipple when adequate areola is not latched onto as well as improper release of suction when feeding ends. When breast pumps are not used correctly or some form of topical measures can also aggravate this condition.³ Infection can also lead to sore nipple and there will be severe pain when baby bites on the nipples. A study result conducted in Matuail reported problem of sore nipple among 1.75% postnatal mothers.⁴

Across sectional study was conducted among a cohort of mothers in northeast Brazil to find the prevalence and factors responsible for sore nipple. About 1,243 mother-child dyads were assessed at maternity ward and 30 days after delivery. The prevalence of cracked nipples
was 32% in the first 30 days postpartum. The factors responsible were poor breastfeeding technique, breast engorgement, caesarean section and use of a feeding bottle. Researchers concluded that the prevalence of sore nipple was very high among the postnatal mothers and postnatal characteristics were responsible for this condition. A study explored the incidence of nipple pain, associated factors and its impact on exclusive breastfeeding. About 1,649 postnatal mothers during their one week follow-up visit were included in the study. Nipple pain incidence was 9.6% on day seven. Primiparity, inappropriate positioning and latching, tongue tie etc., were the predisposing factors.

With this background information and the research gap identified, the researchers thought of conducting a survey to explore the experience of sore nipple and the remedies adopted for pain relief among post-natal mothers. The purpose of the study is to identify the various remedies used to relieve symptoms of sore nipple so that these can be utilized by the postnatal mothers if there is development of sore nipple. The knowledge obtained can be utilized by frontline health care professionals for teaching the postnatal mothers regarding the same.

Material and Method

Research approach and study design: Quantitative approach and an explorative survey design was adopted for the study.

Target population: The population consisted of all primipara and multipara mothers attending immunization clinics of a tertiary care hospital of Udupi district.

Sampling: All primipara and multipara mothers experienced sore nipple problem were selected by purposive sampling technique. The sample size obtained was 200.

Selection Criteria: The inclusion criteria for the selection of sample were all mothers visiting immunization clinic till 6 months after the delivery, experienced sore nipple problem and willing to participate in the study. Mothers who did not experience sore nipple problem, had complications during postnatal period like breast abscess were excluded from the study.

Tools used:
- Demographic proforma
- Semi structured questionnaire on experience of nipple sore
- Semi structured questionnaire on remedies adopted for the management of nipple sore

All the tools had 100% agreement by the validators in terms of accuracy, relevance and appropriateness. The reliability of the tool was established by administering the tool to 20 postnatal mothers attending the immunization clinic. Inter-rater reliability method was adopted to find out the internal consistency and the score was $r = 0.85$.

Procedure: Permission was obtained from Institutional Research Committee. This study fit into the guidelines and the procedures followed were in accordance with the Helsinki Declaration of 1975. Ethical clearance was obtained from IEC, Kasturba Hospital, Manipal (IEC 741/2016). Participant information sheet was explained to individual participant and consent was obtained from the eligible participants. Anonymity and confidentiality was assured. Tool on demographic proforma and semi structured questionnaires were administered to find the experience of nipple sore and remedies adopted for the management of sore nipple.

Findings: The data was compiled and analyzed using SPSS 20 version. Descriptive statistics was used for sample characteristics.

Table 1: Frequency and percentage distribution of postnatal mothers with sore nipple $n = 200$

<table>
<thead>
<tr>
<th>Demographic variable</th>
<th>Frequency (f)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
<td>$27.7 \pm 3.62$</td>
<td></td>
</tr>
<tr>
<td>Number of deliveries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primipara</td>
<td>115</td>
<td>57.5</td>
</tr>
<tr>
<td>Multipara</td>
<td>85</td>
<td>42.5</td>
</tr>
<tr>
<td>Onset of sore nipple</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within 1 week</td>
<td>120</td>
<td>60</td>
</tr>
<tr>
<td>After 1 week</td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>Duration of sore nipple</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\leq 1$ week</td>
<td>75</td>
<td>37.5</td>
</tr>
<tr>
<td>$&gt;1$ week</td>
<td>125</td>
<td>62.5</td>
</tr>
<tr>
<td>Remedies adopted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>170</td>
<td>85</td>
</tr>
<tr>
<td>No</td>
<td>30</td>
<td>15</td>
</tr>
</tbody>
</table>

As per the results shown in table 1, the mean age of the mothers was $27.7 \pm 3.62$ years and most of them 115 (57.5%) were primipara. The study results revealed that
about 120 (60%) mothers developed sore nipple problem within one week. Pain was persistent for more than one week among 125 (62.5%) mothers. Majority 170 (85%) of the mothers used remedial measures for pain relief.

Fig. 1: Pie diagram showing percentage distribution of remedies used for sore nipple pain relief

The data presented in the Figure 1 shows that, majority of the mothers used Lanolin cream 70 (41.17%) and about 40 (=23.52%) of them used breast milk as remedial measure to get relief from sore nipple. About 20 (11.76%) of them used ghee, 15 (8.82%) coconut oil, 10 (5.88%) of them used nipple shield. About 10 (5.88%) of the mothers used more than one remedy for the treatment of sore nipple. Only 5 (2.94%) mothers used other measures like ayurvedic paste and analgesic tablet for pain relief.

Most of the mothers described pain as “very severe”, “very difficult to tolerate”, horrible pain. Most of the primi para mothers expressed it as “horrible pain” compared to multipara mothers. Despite of having sore nipple, all the mothers continued breast feeding. The study concluded that despite having sore nipple, mothers have continued feeding the babies, bearing all the pain, and trying various measures to relieve pain, so that baby will not be deprived of its basic nutrition.

Discussion

This study has revealed that about 60% postnatal mothers developed sore nipple problem within one week and these findings are similar with the findings of the study conducted by Mallikarjuna HB et al where they found that maximal onset of breastfeeding problem was significant in the first two weeks of neonatal period and breast feeding problems are common even among predominantly breastfeeding rural community. Suresh H et al reported that before discharge nearly 89% of mother newborn dyads had one or more breastfeeding problems including sore nipple (30.3%). Reordan et al concluded that 96% mothers had experienced sore nipple problem during first week of lactation. Buck et al argued that 79% of the women experienced nipple pain within one week, more than half of the women experienced discomfort beyond 3 weeks and 20% of women continued to have pain beyond 8 weeks.

The results of this study about the remedies adopted reveals that about 70 (41.17%) mothers used Lanolin cream and about 40 (23.52%) of them applied breast milk as remedial measure to get relief from sore nipple. These findings are congruent with the study findings conducted by Buck ML where 91% of women used topical treatment on their nipples during the first week and 94% continued breast feeding. Mohammadzadeh et al compared the effect of breast milk and lanolin cream among sore nipple mothers and application of breast milk was found to be more effective than lanolin cream, whereas Neto et al contradicted these findings where they found that lanolin cream application was better than breast milk application.

In this study, most of the mothers described pain as “very severe”, “very difficult to tolerate”, and “horrible pain”. Most of the primi para mothers expressed it as “horrible pain” compared to multipara mothers. Zeimer et al in his report concluded that majority of the mothers rated the pain as moderate to intense. Some articles reports that mothers will experience sore nipple in a variety of forms such as nipple pain ranged from minor, temporary soreness to absolute agony sometimes resulted reluctantly in premature weaning. Several women said that they dreaded the baby waking up and needing another feed. Some said that they didn’t want to resent the baby for hurting them and “considered giving up”.

Despite of having sore nipple, all the mothers continued breast feeding, bearing all the pain, and trying various measures to relieve pain, so that baby will not be deprived of its basic nutrition. This study explored experiences of the postnatal mothers during breastfeeding with regards to very common problem i.e., sore nipple and the different remedies used for the pain relief. Most of the time postnatal mothers may not express these problems with anyone. They will accept it as part of their postnatal period. When it is unbearable, they may
express it to close relatives or may seek medical help. By obtaining the information from mothers, researchers can impart this information to other postnatal mothers who may experience the same problem. The nurse can help the mothers by preparing them during the prenatal period only, so that the mental trauma experienced by them will be less.

The study was conducted for small representative group of whole population in selected setting, hence the results could not be generalized.

Conclusion

Sore nipple is a very common condition where postnatal mothers will have different experiences and opinions. Some women may experience it and some may not experience it at all. Some may have a brief feelings of discomfort. For some mothers it may be a common reason for the avoidance of termination of breastfeeding. Nurses need to have a working knowledge about the causes and treatments for nipple sore so that they can address this issue at right time and need to take corrective measures, so that mothers discomfort will be reduced, they will be at ease and the infant’s get right nutrition at right time leading to proper growth and development of healthy infant.

Conflict of Interest: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Source of Funding: Self

Ethical Clearance: Permission was obtained from Institutional Research Committee. This study fit into the guidelines and the procedures followed were in accordance with the Helsinki Declaration of 1975. Ethical clearance was obtained from IEC, Kasturba Hospital, Manipal (IEC 741/2016). Participant information sheet was explained to individual participant and consent was obtained from the eligible participants. Anonymity and confidentiality was assured. Permission was obtained from Institutional Research Committee. This study fit into the guidelines and the procedures followed were in accordance with the Helsinki Declaration of 1975. Ethical clearance was obtained from IEC, Kasturba Hospital, Manipal (IEC 741/2016). Participant information sheet was explained to individual participant and consent was obtained from the eligible participants. Anonymity and confidentiality was assured.

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Prevalence of Insomnia, and Sleep Hygiene Techniques Practiced among Elderly Residing in Selected Old Age Homes of Udupi and Dakshina Kannada District, Karnataka

Laxminarayan Iyer¹, Renjulal Yesodharan², Asha K Nayak²
¹Former Postgraduate Student, ²Assistant Professor, Department of Psychiatric Nursing, Manipal College of Nursing Manipal, Manipal Academy of Higher Education, Manipal

ABSTRACT

Insomnia is viewed as both a symptom and a disorder which affects a large set of population. Poor sleep may increase many medical problems like pain, diabetes mellitus, and psychiatric conditions like depression, dementia, and anxiety disorder.

Objectives: To determine the prevalence of insomnia and sleep hygiene activities practiced by elderly in selected old age homes.

Materials and Method: A total number of 181 elderly were participated in the study. A non-probability convenient sampling technique was incorporated for the selection of participants. Informed written consent was obtained after explaining about the study. Demographic proforma and insomnia severity index scale were used to collect the data.

Result: Among males, the mean Insomnia severity score was 12.59 ± 5.045 (95% CI 11.46-13.72%) whereas in females 10.26 ± 6.20 (95% CI 09.05-11.48%). Out of 181 participants 122 (67.4 %) had scores at or above the cut off score which indicated insomnia. With regard to sleep hygiene practiced by the elderly, 71.3% of the elderly used to get exposed to sunlight in the late afternoon and 75.1% used to take hot water bath two hours before bed time.

Conclusion: Insomnia was common among elderly residing at old age homes. Elderly should have the knowledge, ability to recognize the symptoms of insomnia, factors contributing to it and proper practice of sleep hygiene activities.

Keywords: Insomnia, sleep hygiene activities, elderly, old age homes

Introduction

Insomnia is viewed as both a symptom and a disorder which affects a large set of population. The International classification of Disease-10 (ICD-10) gave guidelines to diagnose nonorganic insomnia by screening the individual for difficulty falling asleep or maintaining sleep. This criteria is also applicable when the individual has poor quality of sleep. These disturbances should occur at least three times in a week for a month and cause marked distress with normal activities of daily living. The individual may have preoccupations with the sleeplessness and excessive concern over the consequences of sleeplessness. The new version of ICD-11 released in June 2018, insomnia is classified under separate chapter sleep wake disorder. The major transformation noted in the new version is insomnia is listed outside the mental behavioural and neurological disorders with new definition for the clinical accuracy. According to ICD 11, ⁰Insomnia disorders are characterized by the complaint of persistent difficulty with sleep initiation, duration, consolidation,
or quality that occurs despite adequate opportunity and circumstances for sleep, and results in some form of daytime impairment. Daytime symptoms typically include fatigue, decreased mood or irritability, general malaise, and cognitive impairment. Individuals who report sleep related symptoms in the absence of daytime impairment are not regarded as having an insomnia disorder.

Old age is a part of human life cycle in which the elderly people are dependent on their family and children. In modern society elderly are thought to be less advantageous and face a lot of social problems as they are retired. Limited regenerative abilities, lack of social autonomy, unloved and being neglected by their family and friends pose them as a threat to live in the society. The global share of older people aged 60 years or above was 9.2 % in 1990 and it increased to 11.7 % in 2013. It is expected that the elderly population in the world might reach 21.1 % by 2050. In 1901, India had 12 million elderly population aged above 60 years, which was increased to 71 million in 2001 (Population Projection for India and states, 2006). By 2021, 10.7% of the total population will be elderly. A rapid increase in the number of old age population will give rise to various social, economic and health issues and problems. Traditionally, the family members has been the primary source of support and care for the elderly in India. The changes and the transition happened in the families and the structure of family forced the family members to shift the elderly to old age homes. Most of the times the present generation treated the elderly as a burden and in the absence of familial support, most of them prefer to stay in old-age homes. They are more vulnerable to health-related problems including disorders of sleep.

Poor sleep may increase many medical problems like pain, diabetes mellitus, and psychiatric conditions like depression, dementia, & anxiety disorder. Many medical conditions such as epiglottic cyst can also present like sleep problems in elderly. Insomnia is a major health issue that is observed in the elderly. Rao et al., (2012) conducted a cross-sectional study and found out that 13.04% of, elderly residing in old age home had insomnia and 50% of them had parasomnias.

### Prevalence of insomnia among elderly:
A study conducted by Bhattacharya in 2013 revealed that gender, age, psychiatric disorders among several others are risk factors for insomnia. The stress of modern urban life is the factors responsible for an increase in the prevalence of insomnia.

A study conducted by Panda S et al among 1050 healthy attendants/relatives of patients attending a tertiary care hospital in south India revealed that majority of them were between 35.1 ± 8.7 years of age. Insomnia was reported among 18.6% of the patients with 18% for initiation of sleep, 18% for maintenance and 7.9% with early morning awakening. Hypertension was noted in 42.6% of the subjects.

### Objectives of the Study
The objectives of the study were to determine the prevalence of insomnia and sleep hygiene activities practiced by elderly in selected old age homes

### Method
A quantitative approach with an exploratory survey design was used in the study. A non-probability purposive sampling technique was incorporated for the selection of participants. The primary outcome variable is insomnia and other variables includes factors contributing to insomnia, sleep hygiene activities practiced and socio demographic variables. The participants were elderly who were aged between 60 and 80 years, residing in selected old age homes of Udupi and Dakshina Kannada District. A total number of 181 elderly were participated in the study. Oral and written consent were taken from the participants and it is consistent with the guidelines issued by Institutional Ethics Committee of Kasturba Hospital and Kasturba Medical College (KMC IEC 53/2015).

### Materials
The data was collected through one to one basis by structured interview. The study encompasses data collection from the elderly using socio-demographic proforma and Insomnia Severity Index, sleep hygiene activities practiced and assessment proforma for factors contributing to insomnia. The validated tools were pretested and the items were comprehend and no difficulties present. The reliability of the tool on assessment proforma for factors contributing to insomnia and scale for sleep hygiene practiced were 0.96 and 1.00 respectively. The participants gave information on demographic data, severity of insomnia and sleep hygiene habits within one months preceding the inquiry. The Insomnia Severity Index was designed to assess nature, severity and impact of insomnia. The
dimensions evaluated are: severity of sleep onset, sleep maintenance, and early morning awakening problems, sleep dissatisfaction, interference of sleep difficulties with daytime functioning, noticeability of sleep problems by others, and distress caused by the sleep difficulties.

**Demographic Characteristics:** Among 181 participants, 69 were males and 112 were females. Out of all the participants 53% of the participants were between 60 to 70 years. There were 56.4% female participants and about 60.8% were married.

**Statistical Analysis:** Multiple logistic regression analysis was used to calculate the odds ratios for the socio-demographic and clinical variables as a potential correlates of insomnia, after controlling for the effects of other variables.

**Result**

**Insomnia among elderly:** Insomnia among elderly was assessed using Insomnia Severity Index. Insomnia is further classified into sub threshold, moderate and severe based on the obtained score. Out of 181 participants, the minimum score obtained was zero and the maximum score obtained was 21. The mean insomnia severity score was 11.28 ± 5.827 (95% CI 10.43-12.14%). In males, the mean Insomnia severity score was 12.59 ± 5.045 (95% CI 11.46-13.72%) whereas in females 10.26 ± 6.20 (95% CI 09.05-11.48%). To find out the prevalence, a cut of score of 10 was set by the researchers based on the findings of a previous study. The set cut off score has 86.1% sensitivity and 87.7% specificity for detecting insomnia cases in the community sample (9) it often remains unrecognized and untreated. Brief and valid instruments are needed both for screening and outcome assessment. This study examined psychometric indices of the Insomnia Severity Index (ISI). Out of 181 participants 122 (67.4 %) had scores at or above the cut off score which indicated insomnia. Meanwhile the insomnia severity scores are categorized into three types namely: no clinically significant insomnia (0-7), sub-threshold insomnia (8-14), clinical insomnia moderate (15-21) and clinical insomnia severe (22-28).

**Table 1: Frequency and percentage distribution of insomnia based on the classification of Insomnia Severity Index and cut off score**

<table>
<thead>
<tr>
<th>Severity of Insomnia</th>
<th>Score</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on classification by Insomnia Severity Index (ISI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Clinically Significant Insomnia</td>
<td>0-07</td>
<td>47</td>
<td>25.97</td>
</tr>
<tr>
<td>Sub-threshold Insomnia</td>
<td>08-14</td>
<td>72</td>
<td>39.78</td>
</tr>
<tr>
<td>Clinical Insomnia (Moderate)</td>
<td>15-21</td>
<td>62</td>
<td>34.25</td>
</tr>
<tr>
<td>Clinical Insomnia (Severe)</td>
<td>22-28</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Based on Cut off score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below cut off score (No significant Insomnia)</td>
<td>00-09</td>
<td>59</td>
<td>32.60</td>
</tr>
<tr>
<td>Above cut off score (Insomnia)</td>
<td>10-28</td>
<td>122</td>
<td>67.40</td>
</tr>
</tbody>
</table>

Around 12 participants (8.95%) were having sub-threshold insomnia but not grouped under the category of insomnia based on cutoff score due to the scores less than ten. So the overall prevalence of insomnia among the elderly ranges from 67.40% to 74.03 %. A gender wise analysis showed that among 69 male participants, 20 (29%) had cutoff score less than ten and 49 (71%) had cut off score more than ten. When comparing the data with their male counterparts, 73 (65.18%) of females had cut off score more than ten indicating clinically significant insomnia. The difference in the mean insomnia severity scores of male and female also indicate a statistically significant difference of 2.543 (t=2.909, p=0.004) (95% CI 0.82 to 4.27).

The socio-demographic and clinical correlates of insomnia are identified using multiple logistic regression analysis. The socio demographic and clinical correlates of insomnia are mentioned in the table 2.
Table 2: Insomnia and factors contributing to insomnia among elderly with odds ratio and confidence interval

<table>
<thead>
<tr>
<th>Variable</th>
<th>Insomnia</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Odds Ratio</td>
<td>Confidence Interval</td>
<td>p value</td>
</tr>
<tr>
<td>Consumption of Coffee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>39</td>
<td>19</td>
<td>0.99</td>
<td>0.51-1.92</td>
<td>1.00</td>
</tr>
<tr>
<td>No</td>
<td>83</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption of Tea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>89</td>
<td>46</td>
<td>0.76</td>
<td>0.37-1.59</td>
<td>0.59</td>
</tr>
<tr>
<td>No</td>
<td>33</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption of Milk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>28</td>
<td>13</td>
<td>1.054</td>
<td>0.47- 2.43</td>
<td>1.00</td>
</tr>
<tr>
<td>No</td>
<td>94</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption of Fruit Juices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4</td>
<td>4</td>
<td>0.46</td>
<td>0.8-2.61</td>
<td>0.44</td>
</tr>
<tr>
<td>No</td>
<td>118</td>
<td>55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day Napping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>104</td>
<td>49</td>
<td>1.18</td>
<td>0.51-2.74</td>
<td>0.83</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Over the past one month 31 (17.18%) participants were taking Benzodiazepine for insomnia

**Discussion**

**Prevalence of Insomnia:** The present study reveals that out of 181 participants, 122 (67.4%) had insomnia. A study conducted at Ladakh also revealed that the prevalence rate of Insomnia was 15.2%. Altitude of residence and knee pain was significantly correlated with insomnia severity. It was also supported by the study conducted in Bangaluru where the older people had severe insomnia. Prevalence of Insomnia was 13.04% and there was no significant association with selected baseline variables

Table 3: Sleep hygiene activities practiced by elderly n = 181

<table>
<thead>
<tr>
<th>Sleep Hygiene Practiced</th>
<th>Practiced</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Follows regular bed timings</td>
<td>Frequency</td>
<td>Percentage</td>
<td>Frequency</td>
<td>Percentage</td>
<td></td>
</tr>
<tr>
<td>Gets up from the bed at the same time every day</td>
<td>70</td>
<td>38.7</td>
<td>111</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>Does yoga and meditation every day</td>
<td>121</td>
<td>66.9</td>
<td>60</td>
<td>33.1</td>
<td></td>
</tr>
<tr>
<td>Does breathing exercises regularly in the evening</td>
<td>52</td>
<td>28.7</td>
<td>129</td>
<td>71.3</td>
<td></td>
</tr>
<tr>
<td>Avoids fluids just before bed time</td>
<td>54</td>
<td>29.8</td>
<td>127</td>
<td>70.2</td>
<td></td>
</tr>
<tr>
<td>Avoids eating full stomach before going to bed</td>
<td>61</td>
<td>33.7</td>
<td>120</td>
<td>66.3</td>
<td></td>
</tr>
<tr>
<td>Avoids coffee or alcohol 4-6 hours before bed time</td>
<td>88</td>
<td>48.6</td>
<td>93</td>
<td>51.4</td>
<td></td>
</tr>
<tr>
<td>Relaxes by listening music and walking</td>
<td>64</td>
<td>35.4</td>
<td>117</td>
<td>64.6</td>
<td></td>
</tr>
<tr>
<td>Neatly arranges the bedroom before going to bed</td>
<td>129</td>
<td>71.3</td>
<td>52</td>
<td>28.7</td>
<td></td>
</tr>
<tr>
<td>Gets exposed to sunlight especially in the late afternoon</td>
<td>64</td>
<td>35.4</td>
<td>117</td>
<td>64.6</td>
<td></td>
</tr>
<tr>
<td>Keeps the bedroom dark</td>
<td>129</td>
<td>71.3</td>
<td>52</td>
<td>28.7</td>
<td></td>
</tr>
</tbody>
</table>
The data presented in the table 3 shows that majority of elderly that is 75.1% were keeping their bedroom clam before going to bed, 71.3% of them kept their bedroom dark, 71.3% of elderly neatly arranged their bedroom before going to bed, 70.7% of elderly had avoided the consumption of coffee or alcohol 4-6 hours before bedtime, 66.9% of elderly are getting up from bed at same time every day, 61.9% of them avoiding day time sleep, 59.7% of elderly are using bed only for sleep. 48.6% of them avoided eating full stomach, 38.7% of elderly are following regular bed time, 35.4% of elderly are getting exposed to sunlight and 35.4% of them are relaxing by listening to music.

A cross sectional survey conducted among 70 elderly in a community area of NewDelhi revealed that increase in the level of stress was associated with poor sleep quality10

The results are contradictory to the study conducted by Bani, Hosanpur among 100 elderly in Iran where 70% of them woke up frequently at night, 5% got exposed to sunlight, 41% used the bed only for sleep, 37% kept bedroom dark, and 5% used to drink milk with honey11.

Conclusion

Insomnia was common among elderly residing at old age homes. Elderly should have the knowledge, ability to recognize the symptoms of insomnia, factors contributing to it and proper practice of sleep hygiene activities.

Conflict of Interest: Neither this manuscript nor one with substantially similar content under my/our authorship has been published or is being considered for publication elsewhere. Also we declare that there is no conflict of interest among the contributors

Source of Funding: We have not received any financial support or sponsorship

Ethical Clearance: The administrative permission was obtained from the Dean, Manipal College of Nursing Manipal. Permission was also obtained from the administrators of various old age homes in Udupi and Dakshina Kannada district to conduct the study. Ethical clearance was obtained from Institutional Ethics committee of Kasturba Medical College, Manipal and informed consent was obtained from the participants

REFERENCES


Maternal Risk Factors and Demographic Profile of Neonates Presenting with Persistent Pulmonary Hypertension in a Tertiary Care Hospital, Odisha

Santosh Kumar Panda1, Manas Kumar Nayak2, Soumini Rath1, Nirmal Kumar Mohakud2, Subhra Snigdha Panda1

1Assistant Professor, 2Associate Professor, Paediatrics, 3Assistant Professor, Microbiology, KIMS Medical College and Hospital, Bhubaneswar

ABSTRACT

Objective: To determine maternal risk factors and demographic profile of neonates presenting with persistent pulmonary hypertension in a tertiary care hospital, Odisha

Method: It was a hospital based study, conducted from June 2015 to December 2017 in Kalinga Institute of medical colleges and hospitals, Bhubaneswar, Odisha. All babies with gestational age > 34 weeks having respiratory distress and profound hypoxia were included in the study after confirmation of PPHN by Echocardiography.

Results: In our study population majority babies with PPHN were male (73%) and 90% babies were delivered by LSCS. Late preterm babies constituted 21% of total PPHN cases. Hyaline membrane disease (30%) and meconium aspiration syndrome (26%) were leading cause of PPHN in neonates.

Conclusion: PPHN is a serious and often fatal condition, associated with a high mortality (29%). Late preterm neonates constituted 21% of total population and 90% of PPHN neonates were born by LSCS. Hyaline membrane disease is the leading cause of PPHN suggesting a change in the demographic profile.

Keywords: Persistent pulmonary hypertension, meconium aspiration syndrome, hyaline membrane disease

Introduction

Neonatal respiratory failure affects 2% of all live births and is responsible for more than one third of all neonatal deaths. Persistent pulmonary hypertension (PPHN) of newborn is frequent complication of respiratory disease in neonates and is characterised by marked pulmonary hypertension resulting from elevated pulmonary vascular resistance (PVR) and altered pulmonary vasoreactivity, leading to right to left extrapulmonary shunting of blood across foramen ovale and ductus arteriosus, if it is patent. Incidence is 1 in 500 – 1500 live birth and mortality rate ranges from 4 -33%.

Corresponding Author:
Dr Manas Kumar Nayak
Associate Professor, Paediatrics,
KIMS Medical College and Hospital, Bhubaneswar
Phone: 9583963680
Email: drmanas_76@yahoo.co.in

The pulmonary circulation in foetus is characterised by high vascular resistance and low blood flow, but after delivery of the baby lower vascular resistance is necessary for pulmonary gas exchange. In the normal transition at birth from foetal to neonatal circulation, pulmonary vascular resistance falls due to 8 -10 fold increase in pulmonary blood flow and the right to left shunting that occurs in the foetus through ductus arteriosus and foramen ovale, ceases after after birth. Several stimuli, including drainage and absorption of foetal lung liquid, rhythmic distension of the lung, increased PO2 and altered production of several vasoactive agents, including nitric oxide (NO), are known to contribute pulmonary vasodilatation at birth. The increase in NO production accounts for nearly 50% of the abrupt fall in pulmonary vascular resistance at birth in foetal lambs. NO mediates vasodilatation by stimulating soluble guanylate cyclase- induced cyclic guanosine monophosphate (cGMP) production.
is down regulated by phosphodiasterase 5 activity which is abundantly expressed in lung tissue during foetal life.7

PPHN is a clinical syndrome that is clinically associated with diverse neonatal cardiopulmonary diseases like birth asphyxia, sepsis, meconium aspiration syndrome, hyaline membrane disease or it can be idiopathic or primary.8 PPHN demographic profile can be broadly classified into three groups based on pathophysiology9 i.e.

Abnormally constricted pulmonary vasculature caused by parenchymal diseases:
- Meconium aspiration syndrome
- Respiratory distress syndrome
- Pneumonia

Hypoplastic pulmonary vasculature:
- Congenital diaphragmatic hernia
- Lung hypoplasia

Normal parenchyma with remodelled pulmonary vasculature:
- Idiopathic PPHN
- Congenital heart diseases
- Hypoxic ischaemic encephalopathy
- Others

A lot of studies were done all over the world about management and outcome of neonates with PPHN, but few studies were available in India regarding the demographic profile and risk factors of babies developing PPHN. Management and outcome of babies presenting with PPHN depends primarily on demographic profile. Hence we conducted the study “To determine maternal risk factors and demographic profile of neonates presenting with persistent pulmonary hypertension in a tertiary care hospital”

**Study Population:** All inborn and outborn neonates with gestational age more than 34 weeks admitted in NICU having respiratory distress and profound hypoxia were included in the study after confirmation of PPHN by echocardiography. PPHN was confirmed when a neonate with a echocardiographically confirmed structurally normal heart had:
- Severe hypoxemia, usually a PaO2 37.5 -45 mm Hg in an Fio2 of 1.0 and IPPV if necessary
- Evidence of right to left or bidirectional hemodynamic shunting at ductus arteriosus (Usually a Pao2 in postductal blood 7.5 – 15 mm of Hg lower than simultaneous preductal Pao2) or at patent foramen ovale
- Tricuspid regurgitation jet pressure of > 40 mm of Hg

**Exclusive Criteria:** Neonates with structural congenital heart disease and multiple congenital anomalies were excluded from the study.

**Sample Size:** Considering PPHN mortality (p) 31% in previous study by Roofthooft et al (9) and allowable error in p 10%, the calculated sample size was 890. Considering allowable error in p 50%, the calculated sample size was 35.

The sample size was calculated as per formula= \(4pq/L^2\)

\[ p = \text{positive character, } q=1-p, L= \text{allowable error in } p \]

Considering our study was an exploratory study, we had prospectively recruited the cases during the study period. In our study sample size was 84.

**Results**

There were sixty three male babies (73%) and twenty one female babies (27%) in this study and male: female ratio is 3:1. In our study eighteen neonates were preterm, sixty four babies were term and two babies were post term. Out of eighty four babies, sixty four neonates had birth weight more than 2.5 kg, sixteen babies had birth weight between 1.5-2.5 kg and only two neonates had birth weight less than 1.5 kg. Mean birth weight was 2.71 kg. Vaginal delivery occurred in eight (10%) cases and caesarean section in seventy six (90%) cases. Of the neonates enrolled in the study, 12% were in born and

**Method**

This was a prospective observational study conducted between June 2015 to December 2017 in Kalinga Institute of medical colleges and hospitals, Bhubaneswar, Odisha. There were total 1854 cases admitted into the NICU. Eighty four cases were diagnosed to have PPHN and were enrolled in the study. About 4.5% of babies admitted in the neonatal intensive care unit(NICU) were diagnosed as PPHN.
88% were out born. Out of eighty four babies, forty five (57%) babies were admitted within first 24 hours of life and total eighty (95%) babies were admitted within first 72 hours of life. Most of the babies developed respiratory distress immediately after birth. Being a tertiary referral centre, majority of admission were referral cases.

**Maternal risk Factors:** Eight babies (10%) had maternal history of premature rupture of membrane, two neonates had maternal pyrexia and meconium stained amniotic fluid in 26 (30%) cases. Maternal PIH was associated in eight babies. Meconium stained liquor was the commonest risk factor.

### Table 1: Comparison between preterm and term Neonates:

<table>
<thead>
<tr>
<th></th>
<th>Preterm</th>
<th>Term</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>18</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>Birth Wt.</td>
<td>1.9 (1.67-3.09)</td>
<td>2.9 (2.81-3.09)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Surfactant</td>
<td>16</td>
<td>32</td>
<td>0.0025</td>
</tr>
<tr>
<td>HMD</td>
<td>13</td>
<td>13</td>
<td>0.0002</td>
</tr>
<tr>
<td>MAS</td>
<td>1</td>
<td>21</td>
<td>0.032</td>
</tr>
<tr>
<td>HFOV</td>
<td>11</td>
<td>36</td>
<td>0.78</td>
</tr>
<tr>
<td>Mod. PPHN</td>
<td>2</td>
<td>15</td>
<td>0.508</td>
</tr>
<tr>
<td>Severe PPHN</td>
<td>7</td>
<td>23</td>
<td>0.78</td>
</tr>
<tr>
<td>No. Mortality</td>
<td>4</td>
<td>7</td>
<td>0.28</td>
</tr>
</tbody>
</table>

We found HMD was the most common cause of PPHN in preterm babies (p = 0.0002) and MAS was more common among term babies (p=0.032). Surfactant was significantly more used in preterm PPHN (P=0.0025), explained by more prevalence of HMD (P=0.0002). There was no significant difference in incidence of moderate-severe disease, requirement of HFOV, mortality among preterm and term babies.

The primary respiratory diagnoses were based on chest x ray. There were 22 (26%) cases of meconium aspiration syndrome, 25 (30%) cases of hyaline membrane disease (HMD), 8 (9%) cases of idiopathic pulmonary hypertension, 9 (11%) cases of pneumonia, 14 (17%) cases of congenital diaphragmatic hernia (CDH) and 6 (7%) cases of pulmonary hypoplasia included in our study as shown in figure-1. Hyaline membrane disease (HMD) and meconium aspiration syndrome were the most common causes of PPHN in neonates.

**Case distribution, based on severity of disease:** Oxygen Index(OI) was used to know the disease trends, severity, timing of initiation of NO. In our study population 30 neonates (35%) had severe disease (OI>25), 17 neonates (21%) had moderate disease (OI=15-25), and 37 neonates (44%) had mild disease (OI<15).

### Table 2: Distribution of severe PPHN(OI >25) in different etiology

<table>
<thead>
<tr>
<th></th>
<th>Number of Severe PPHN</th>
<th>Total Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMD</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>MAS</td>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td>CDH</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Primary PPHN</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Hypoplasia</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>2</td>
<td>9</td>
</tr>
</tbody>
</table>

The table-2 showed number of cases of severe PPHN (with OI>25) among different groups. In our study population among primary PPHN, only one neonate belonged to severe disease. About 57% cases (n=8) of CDH had severe disease. Distribution of cases, based on severity would affect the ultimate outcome of the baby.

**Discussion**

In this prospective observational study, we investigated the aetiology of PPHN in a large cohort of ventilated infants, in a level three neonatal intensive care unit. In our study 76(90%) neonates were delivered by LSCS and 8 (10%) neonates were delivered by NVD. Liston et al¹⁰ showed neonatal outcomes following caesarean delivery had two- to threefold increase in risk of neonatal respiratory conditions (p = 0.01). In a study by Elliot et al¹¹, the incidence of PPHN among elective LSCS was 0.39% and it was five times more compared to vaginal delivery. In a study by Hernandez et al¹² the risk for PPHN was seven times higher after caesarean section deliveries than after vaginal deliveries.
Table 3: Comparison of our demographic data with Hernandez et al and Elema et al.

<table>
<thead>
<tr>
<th></th>
<th>Our study N = 84</th>
<th>Hernandez et al12 (n = 377)</th>
<th>Elema al13 (n = 143)</th>
<th>M.A.Bakheet et al14 (n = 54)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;37 wk</td>
<td>18(22%)</td>
<td>60(16%)</td>
<td>52(36%)</td>
<td></td>
</tr>
<tr>
<td>&gt;37 wk</td>
<td>66(78%)</td>
<td>317(84%)</td>
<td>91(64%)</td>
<td></td>
</tr>
<tr>
<td>SEX</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>63(73%)</td>
<td>239(63%)</td>
<td>86(61%)</td>
<td>31 (57%)</td>
</tr>
<tr>
<td>Female</td>
<td>21(27%)</td>
<td>138(37%)</td>
<td>57(39%)</td>
<td>23(43%)</td>
</tr>
<tr>
<td>BWT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;2.5 kg</td>
<td>18(22%)</td>
<td>29(8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;2.5 kg</td>
<td>66(78%)</td>
<td>348(92%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOD:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NVD</td>
<td>8(10%)</td>
<td>146(38%)</td>
<td>19(35%)</td>
<td></td>
</tr>
<tr>
<td>LSCS</td>
<td>76(90%)</td>
<td>231(62%)</td>
<td>35 (65%)</td>
<td></td>
</tr>
<tr>
<td>Apgar &lt;5 at 5 min</td>
<td>14(16%)</td>
<td>80(21%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In our study, eight babies (10%) had maternal history of PPROM, two neonates had maternal pyrexia, which are known risk factors of early onset sepsis leading to lung parenchyma lesions. However Hernandez et al did not find increased incidence of PPHN in the presence of maternal fever, urinary, vaginal and respiratory infections, or use of antibiotics late in pregnancy.

Table 4: Comparison of maternal history with Hernandez et al12

<table>
<thead>
<tr>
<th>Maternal h/o</th>
<th>Our study (n = 84)</th>
<th>Hernandez et.al (n = 377)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal age</td>
<td>24-28yr (57%)</td>
<td>24-28(53%)</td>
</tr>
<tr>
<td>PIH</td>
<td>8(9%)</td>
<td>48(12%)</td>
</tr>
<tr>
<td>MSL</td>
<td>26(30%)</td>
<td>179(47%)</td>
</tr>
<tr>
<td>Antenatal CDH</td>
<td>7(50%)</td>
<td></td>
</tr>
<tr>
<td>Drug ingestion</td>
<td>0</td>
<td>14(37%)</td>
</tr>
<tr>
<td>Maternal fever</td>
<td>3(4%)</td>
<td>53(14%)</td>
</tr>
</tbody>
</table>

In our study population, 30% cases had HMD and 26% had MAS. In Stack et al15 study, 43% of study group had RDS as the cause of respiratory failure in both near term and term neonates. In both Walsh Sukys et al5 and INONS study, meconium aspiration syndrome was the leading cause of severe respiratory failure and not respiratory distress syndrome, in both term and near-term neonates. The primary respiratory diagnosis in Walsh Sukys et al study was meconium aspiration syndrome (41%), idiopathic pulmonary hypertension (17%), pneumonia (14%), respiratory distress syndrome (13%), pneumonia (14%), CDH (10%), and pulmonary hypoplasia (4%). In INONS study MAS(42%) was the most common underlying diagnosis of PPHN, followed by primary PPHN(27%) and other diagnoses included RDS(17%), pneumonia or sepsis, pulmonary vasoconstriction from asphyxia, and pulmonary hypoplasia secondary to congenital diaphragmatic hernia (CDH) or oligohydramnios requiring NO.

The incidence of lung diseases associated with PPHN has changed over the last decade. The overall incidence of MAS has declined, coinciding with a decrease in the number of post term pregnancies worldwide. In contrast, RDS in preterm neonates, delivered by elective or indicated caesarean section at 34 to 37 weeks of gestation has become a more frequent cause of PPHN. In our study 21% neonates were preterm and needed surfactant as part of management of PPHN (P=0.0025), explained by higher prevalence of HMD (P=0.0002). These recent trends reflect the changing demographics of neonates who have PPHN, with important implications for their management and long-term outcome.

In our study, out of 84 cases, 14 (16%) neonates had diaphragmatic hernia. The high incidence of CDH is probably because of our NICU is the tertiary level three unit with a perinatal centre with a lot of intrauterine referrals. Daskhinamurti et al16 classified the pathophysiological mechanisms, of PPHN under three groups i.e. maladaptation, maldevelopment and underdevelopment.
Table 5: Comparison of disease distribution (based on pathology) with Elemat et al

<table>
<thead>
<tr>
<th></th>
<th>Our study (n = 84)</th>
<th>Elemat et al</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maladaptation/</td>
<td>64(76%)</td>
<td>108(75.5%)</td>
</tr>
<tr>
<td>Maldevelopment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underdevelopment</td>
<td>20(24%)</td>
<td>35(24.5%)</td>
</tr>
</tbody>
</table>

**Conclusion**

- PPHN is a serious and often fatal condition, associated with a high mortality (29%).
- Late preterm neonates constituted 21% of total population in contrast to similar studies.
- Ninety percentage of PPHN neonates were born by LSCS, suggesting caesarean delivery may be associated with increased respiratory distress syndrome and PPHN.
- Hyaline membrane Disease was the leading cause of PPHN suggesting a change in the demographic profile.

**Conflict of Interest:** The authors declare that there is no conflict of interests regarding the publication of this paper.

**Source of Funding:** None

**Ethical Clearance:** Since it is a prospective observational study of babies admitted in NICU without any interventional work and without any disclosure of patient’s identity, thus having no ethical issues; ethical clearance was not considered.

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Awareness of Cancer and its Symptoms among the Rural Population

Kalyan Ram S¹, Muthulakshmi Muthiah²
¹M.B.B.S, Final Year; ²Assistant Professor, Department of Community Medicine, Saveetha Medical College, Thandalam, Chennai

ABSTRACT

Background: Awareness and perception of cancer and its symptoms are low in rural population.

Objectives: To assess the level of awareness among rural people regarding cancer symptoms, the various treatment modalities available as well as preventive measures. To assess the difference in awareness levels with respect to sociodemographic variables.

Materials and Methodology: A community based cross sectional study was conducted from January 2018-October 2018 with the help of a self designed questionnaire. The subjects were chosen by non probability sampling technique. The sample size was 204. Collected data was entered into a spreadsheet and analysed with the help of Chi-Square test.

Results: Among the male population 65.26% and among females 69.72% had adequate knowledge about cancer. 80.46% of adequate knowledge was seen below 30 years and 58.12% was seen among 30 and above age group people. Among those who were educated above high school level, 79.87% had adequate knowledge about cancer and those who were educated below high school level, 34.55% had adequate knowledge about cancer. 68.62% of Hindus had adequate knowledge and 56.25% of non-Hindus had adequate knowledge about cancer.

Conclusion: The awareness was considered to be inadequate. Various health programmes and rural campaigns are to be undertaken to improve the knowledge about cancer.

Keywords: Neoplasm, cancer, India, rural, risk factor, awareness, knowledge, treatment, prevention, prognosis, warning signs.

Introduction

Non-communicable diseases are a group that are non-infectious and usually include cancers and lifestyle diseases such as diabetes, hypertension, obesity[1]. Mortality due to non-communicable diseases increase from 57% in 1990 to 65% in 2010. Cardio-vascular diseases account for the major fraction of these deaths followed closely by cancer.

Cancer is a blanket term covering a wide range of diseases that are characterized by excessive proliferation of the cells much higher than the normal limits[2]. These cells invade adjacent areas of the body and spread via lymphatics or blood vessels to distant places in the body. This is called metastasis. Cancer is a prime cause of mortality in almost all countries of the world[3]. Over the past years, the incidence of cancer has increased and scientists have predicted the incidence to rise further to approximately 26M new cases and 17M deaths by 2030[4]. Most deaths due to cancer are attributed to lack of awareness of early cancer symptoms which leads to delay in diagnosis, ultimately leading to poor prognosis[5].

According to the WHO, the main risk factors of cancers are age, alcohol, tobacco, smoking, obesity, radiation[6].

Corresponding Author:
Kalyan Ram S
M.B.B.S, Final Year,
Saveetha Medical College, Saveetha Nagar, Thandalam, Chennai-602105
Not all cancers are malignant or dangerous. Some benign tumors do exist such as lipoma. Such tumors are limited only to a single site, do not invade the bloodstream and they do not metastasize. These are generally very harmless tumors and do not cause much symptoms or agony to the patient. These tumors have an excellent prognosis even when detected later.

The characteristic symptoms of cancer are persistent coarseness, nagging cough, increase in wart or mole, unexplained loss of weight or appetite, spontaneous bleeding from any site, excessive bleeding during menstrual periods and increase in size of swellings.

The global cancer burden is estimated to 18.1M cases and 9.6M deaths in 2018\(^7\). 1 in 5 men and 1 in 6 women develop cancer during their lifetime, and 1 in 8 men and 1 in 11 women die from the disease. The five year prevalence of cancer is estimated to be 43.8M.

In India the prevalence of cancer is calculated to be 2.25M and the deaths due to cancer in India amounts to 7,84,821. In men, most-common cancers are of the oral cavity, lung, stomach and colorectal carcinoma. In women the most common cancers are breast, cervix, stomach and oral cancer\(^8\) The incidence of cancer is rising steeply due to deterioration of lifestyle habits.

And Objectives of the Research Project

The aim of the study is to identify the level of awareness of cancer symptoms and knowledge about the diagnostic methods of cancer. The study also aims to establish the relation between socio-demographic variables such as age, religion, etc. and the level of awareness.

Methodology and Research Design

It is a community based, cross-sectional study conducted in the rural area of Thirumazhisai district, located near Chennai, Tamil Nadu, over a period of 6 months. Adults above the age of 18 were included in this study. Population below 18 years of age and those who did not wish to give informed consent were not included in the study.

Tool: The data was collected in the form of a validated self-structured questionnaire after referring to various literature pertaining to the symptoms, investigations and treatment modalities related to cancer. Questions were designed to determine the knowledge about the common cancers in their region, risk factors, signs and symptoms, treatment modalities, prognosis and source of information.

Sample Size: For calculating the sample size, the formula \(Z_{\alpha/2} \sqrt{P(1-P)}/l^2\) was used. From the research article the prevalence of knowledge was found to be 15% and substituting this value in the formula we arrived at a sample size of 204.

Procedure: Approval was obtained from the ethics committee regarding the study. The data was collected from the general population above 18 years through personal interview method. Out the total 27 questions, 16 were selected for evaluation. Each question was given a score of one and the total knowledge score was calculated based on the answers given by the participants willing to take part in the study. Participants having more than 50% of total score were classified as having adequate knowledge and the rest as having inadequate knowledge. Then chi square and odd’s ratio was done to find out the association between demographic factors and knowledge levels prevalent in the community.

Informed consent was obtained before data collection.

Sampling Technique: Non probability sampling method.

Statistical Analysis: All data will be analyzed using Statistical Package for the Social Sciences (SPSS), version 22. Descriptive statistics were calculated based on frequency and proportions. Analytical statistics was performed employing the Chi square test was used to find statistical significance. \(p<0.05\) was considered to be statistical significance\(^9\).

Analysis
### Statistical Analysis

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Demographic Detail</th>
<th>Frequency</th>
<th>Adequate Knowledge</th>
<th>% of Adequate Knowledge</th>
<th>Odds ratio</th>
<th>Chi-Square</th>
<th>p- value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Below 30</td>
<td>87</td>
<td>70</td>
<td>80.46%</td>
<td>2.967</td>
<td>11.378</td>
<td>0.000743*</td>
</tr>
<tr>
<td></td>
<td>Above 30</td>
<td>117</td>
<td>68</td>
<td>58.12%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>95</td>
<td>62</td>
<td>65.26%</td>
<td>0.815</td>
<td>0.461</td>
<td>0.496</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>109</td>
<td>76</td>
<td>69.72%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Education Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High School and Above</td>
<td>149</td>
<td>119</td>
<td>79.87%</td>
<td>7.5157895</td>
<td>37.7</td>
<td>0.00001*</td>
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<tr>
<td></td>
<td>Below High School</td>
<td>55</td>
<td>19</td>
<td>34.55%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Religion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hindus</td>
<td>188</td>
<td>129</td>
<td>68.62%</td>
<td>1.700565</td>
<td>1.0304</td>
<td>0.31006</td>
</tr>
<tr>
<td></td>
<td>Non-Hindus</td>
<td>16</td>
<td>9</td>
<td>56.25%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:

* - p- value < 0.05 is statistically significant at 95% Confidence Intervals.

Out of the 204 study participants, males were 46.57% and females were 53.43%. 42.56% were below 30 years and 57.35% were above 30. Among this study population 73.04% were educated above high school and 26.96% were educated below high school level. Among the participants 96.12% were Hindus and 7.84% were non-Hindus.

Among the male population 65.26% and among females 69.72% had adequate knowledge about cancer. 80.46% of adequate knowledge was seen below 30 years and 58.12% was seen among 30 and above age group people. Among those who were educated above high school level, 79.87% had adequate knowledge about cancer and those who were educated below high school level, 34.55% had adequate knowledge about cancer. 68.62% of Hindus had adequate knowledge and 56.25% of non-Hindus had adequate knowledge about cancer.

After the analysis, we arrive at the findings, that there is no significant difference in knowledge levels between males and females and between Hindus and non-Hindus. There is a significant difference in knowledge levels between the two different age groups and between the education status.

### Discussion

In the study undertaken it was found that all of the participants(204) who consented to take part in the study, had a general awareness of the prevalence of cancer. A majority of the population(66.12%) understood it to be a dreadful fatal disease where there is uncontrolled, rapid proliferation of cells. They also had adequate knowledge about the general symptoms and risk factors associated with malignancy.

Almost all the participants(89.7%) concurred that smoking is a major risk factor for development of cancer. And among them, a good number (59%) were able to correlate smoking as a leading cause of lung cancer. Similarly majority of the study population (57.35%) were well informed that drinking any form of alcohol contributed to cancer pathogenesis, although they were unable to link it to a specific type of cancer. Surprisingly, a huge section of the respondents (67.65%) agreed that chewing of paan and betelnut significantly contributes as a trigger and accelerated the progression of cancer.

About one-third of the participants were aware of the not so commonly talked about risk-factors such as occupation(30.88), radiation(35.78%) and dietary(30.39%) relation to cancer etiology. Those who were aware, had little knowledge that diet also plays a significant role in the onset and development of the disease. However they could not pin point to any specific kind of diet which are suspected as a leading factor for cancer. Comparing this to a study conducted by Sarang Pedgaonkar et.al[10], which employed 525 individuals as the study subjects, it was found that majority(44.77%)
of subjects identified cancer as a dangerous, incurable disease with a very high mortality rate. Almost all (85.7%) of the people identified tobacco and smoking as the main risk factor followed by alcohol (73.7%). A low fraction of the subjects (17.22%) identified old age also as a risk factor. In another study conducted in the rural population of Wardha district by Rufina Binoy et al., it was found that people rightly identified smoking as a leading factor for lung cancer (23.46%) and oral cancer (22.44%). Very low (10.20%) associated smoking with cervical cancer.

Sparing a miniscule part of the population (0.49%), everyone possessed adequate knowledge about the warning signs of cancer. They believed that the most common warning sign is bleeding from any orifice of the body, seconded by presence of lumps or swellings that are visible externally. Knowledge about other warning signs such as change in bowel or bladder habits or persistent change in voice or hoarseness was present to a lesser degree. In a study conducted by Sarang Pedgaonkar et al., 109 (20.8%) thought that weight loss was the initial symptom, while 153 (29.1%) thought that a swelling in the axilla or groin was the initial symptom. On the contrary, 272 (51.8%) did not know the symptoms of cancer.

More than half of the study population (56.86%) believes that cancer prognosis improves greatly if detected early and are well informed of the various investigations for diagnosis. 40.2% believe that cancer is curable. There is an increasing trend in the positive outlook towards cancer patients. They are no longer cast out of their families as enough light has been thrown on the fact that cancer is a non-infectious disease and not transmitted form person to person.

In this study it was found out that the sources of information varied widely. A majority of the study participants (47.55%) cited friends and family as their source, while only few participants (7.35%) cited doctors as their source of information. Other sources of information were Television (23.53%), internet (2.45%) and Newspaper and Magazines (19.12%). Comparing to the study conducted by Sarang Pedgaonkar et al., the most common source of information of cancer was neighbours (34.45%) followed by media (24.79%) and friends (24.58%). Only 7.14% of the study population heard information directly from the doctors. The percentage of population who had never heard about cancer was only 9.33%. Also comparing to another study by Yogesh S. Kumar, 154 (84.6%) had an awareness of cancer and most of them (85.1%) could name a few cancers. The main source of information was friends and relatives (46.10%) followed by media (32.47%) and physicians (21.43%).

The study population was fully aware of the various options of treatment such as chemotherapy and radiation and only 2.45% were under the impression that cancer is not treatable. They were also aware of surgery as a treatment option. In a study conducted by Rai et al. in a hospital in Varanasi, among cancer patients 63.3% of patients with breast cancer and 41.1% of the patients with cervical cancer considered cancer as curable.

In a study conducted by Yogesh S. Kumar, many participants perceived cancer as curable (66.23%) and preventable (54.84%). The most important preventive method was found to be early diagnosis (59.3%). Only 35.06% had heard about cancer screening.

In a study conducted by Vidhubala among the urban population of Chennai, it was concluded that a majority of the respondents (83.5%) were aware that cancer is not contagious. And 79.5% concurred that it can be cured.

In the present study, age group less than 30 were found to have more awareness regarding cancer compared to age group > 30 years. This may be due to higher strive for education among the younger age group. Hence cancer awareness activities and initiatives should focus more on the older age group. This would narrow down the knowledge gap.

Nowadays, cancer is no longer believed to be a terminal disease and the general attitude of the public towards cancer management has vastly improved. This can be attributed to the sea of information present in the internet and digital media. In the city due to the technological boom and increase in the quality of life among all sections of the general population, there is unrestricted access to this goldmine of knowledge. Even lower sections of the population are able to afford internet services. There has also been zealous initiatives by the government for rural development and this has paved the way for provision of electricity and increased connectivity to the rural areas. This has slowly enabled the rural folks to gather knowledge from TV shows. Much emphasis has been placed on ‘Education for all’, especially for the girl population which is slowly starting to be followed in the villages. This has tremendously
increased the awareness among people. Doctors have greatly reduced the burden related to the misconceptions of cancer by providing scientifically backed-up facts and figures to disprove the countless myths and falsities portrayed by the general uninformed public.

**Conclusion**

This data may be considered as a preliminary step to assess the magnitude of awareness regarding cancer—its treatment and symptoms among the general population. This could be used to set a precedent for future cancer awareness campaigns. The differences in knowledge levels among the different sociodemographic variables would help in identifying target groups. This would increase the efficiency of the programme and would bridge the gap in knowledge. Curriculum based approach right from schools and colleges would help in increasing the awareness among the youth.

**Ethical Clearance:** Obtained from Saveetha Medical College- Institutional Ethics Committee

**Source of Funding:** Self

**Conflict of Interest:** Nil

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14. Vidhubala Elangovan, Swaminathan Rajaraman, Barsha Basumalik, et.al, Awareness and Perception About Cancer Among the Public in Chennai, India; J Global Oncology: 2017;3(5); 469-479
Prevalence and Antibiotic Resistance Profile of Coagulase Negative Staphylococci Causing True Bacteraemia in a Tertiary Care Hospital

Nipa Singh1, Srotaswini Hota2, Subhra snigdha Panda1, Dipti Pattnaik3, Ashok Praharaj3, Jagadananda Jena4

1Assistant Professor, 26th Semester MBBS Student, 3Professor, 4Professor and HOD, Kalinga Institute of Medical Sciences, Bhubaneswar

ABSTRACT

Background: As Coagulase negative Staphylococci (CoNS) are frequent contaminants of blood cultures, it is necessary to determine if CoNS in blood culture is due to clinically significant infection.

Aims: This study aims to determine the prevalence of true bacteraemia due to CoNS in our institution as well as the antibiotic resistance profile of these CoNS isolates.

Material and Method: A prospective study was done for a period of 7 months. True or significant CoNS bacteraemia was determined by a modified clinical and microbiological criteria.

Results: CoNS were isolated from 144 (16.6%) of the total 866 blood cultures. CoNS species were considered true pathogens in 38 (26.4%) cases. The most common species isolated was Staphylococcus haemolyticus, 15 (39.5%) followed by Staphylococcus epidermidis, 7 (18.4%). Highest sensitivity was to Vancomycin (100%) followed by Tigecycline (94.7%). Methicillin resistant CoNS (MR CoNS) was seen in 24 (65%) among the 38 CoNS isolates causing true bacteraemia. There is an overall high prevalence of resistance to non beta lactam antibiotics among MR CoNS as compared to MS CoNS with the difference being statistically significant for ciprofloxacin (64.1% vs 18.1%, P < 0.001), erythromycin (76.4% vs 45.4%, P= 0.034) and rifampicin (48.7% vs 13.6%, P=0.039).

Conclusion: It is necessary to determine if CoNS bacteraemia is to be treated to prevent unnecessary expenditure and increasing antimicrobial resistance.

Keywords: Coagulase negative staphylococci, bacteraemia, contaminants, antimicrobial resistance.

Introduction

Blood cultures are the one of the most important tests aiding in the diagnosis of serious infections. However, false positivity is a limitation which arises when contamination of blood cultures occur.[1,2]

Coagulase Negative Staphylococci (CoNS) are one among a group of organisms which can act both as a pathogen and a contaminant. The emergence of CoNS as a cause of bacteraemia may be attributed to increase in use of prosthetic devices and central venous catheters in hospitalized patients and increase in the number of immunocompromised patients.[3]

Coagulase Negative Staphylococci are the third most common cause of blood stream infection and are the most frequent cause of nosocomial blood stream infection.[4,5,6] Staphylococcus epidermidis is the most common among the CoNS species to be isolated from bacteraemia cases. Other species isolated are S. haemolyticus, S. lugdunensis, S. schleiferi, S. warneri, S. hominis, S. simulans and S. saccharolyticus.[7]

Treating contaminants as true bacteraemia results in additional laboratory tests, longer hospitalization and unnecessary antibiotic use (particularly of
vancomycin). Similarly, failure to recognize and treat true bacteraemia can lead to increased morbidity and mortality. Various studies have estimated the rate of true bacteraemia due to CoNS to range from 10 to 30% of the total CoNS isolated from blood culture samples.[8]

This study aims to estimate the prevalence and antibiotic resistance profile of CoNS isolates which cause true bacteraemia in our institution using an algorithm which combines both clinical and laboratory parameters.

**Material and Method**

This is a hospital based prospective study, conducted in a 1750 bedded tertiary care hospital for a period of seven months, i.e 1st July 2018 to 31st January 2019.

The study was carried out on Coagulase Negative Staphylococci (CoNS) isolates from blood cultures of patients who were admitted to our hospital during the period of study. CoNS isolates from the same patient were considered as a separate episode if CoNS was detected more than 8 days after the initial episode. CoNS isolates from outdoor patients were excluded. (The study was approved by the Institutional Ethics Committee prior to starting the study).

A total of 866 out of 6102 blood cultures were found to be positive. CoNS was isolated from 144 blood cultures.

Blood cultures received from indoor patients were incubated in an automated blood culture system (BacT/Alert 3D, Biomerieux) for a maximum of 5 days or earlier if the system indicated that the culture was positive. The positive blood culture samples were inoculated onto blood agar and Mac Conkey agar. The culture plates were incubated overnight at 37°C. After presumptive identification of CoNS by routine bacteriological methods, the identification and antibiotic susceptibility profile of the isolate was confirmed by VITEK 2 compact System (Biomerieux) by using identification card and antibiotic susceptibility cards by VITEK 2 technology (GP 21342 card for identification and AST –P 628 for antibiotic susceptibility).[9] The antibiotic susceptibility of the isolate was tested against the antibiotics as per CLSI guidelines. Information regarding cefoxitin resistance was generated by the system along with the susceptibility to the antibiotics mentioned above.[10]

The isolates identified as Coagulase Negative Staphylococci(CoNS) were included in the study.

True or significant CoNS bacteraemia was determined by a modified clinical and microbiological criteria derived from that described by Beekmann et al and also used by Singh et al.[8,11]This criteria has been chosen as it exhibits a combined sensitivity of 62% and specificity of 91% for determining the clinical significance of CoNS bacteraemia.[12]

According to this criteria, CoNS was considered a significant cause of bacteraemia if

i. The same CoNS strain was isolated two or more times from another blood culture sample of the patient within 5 days OR

ii. At least two of the three clinical parameters was positive (In case only one blood culture sample yielded growth of CoNS)

- Body temperature ≥38°C or <36°C, TLC >12,000/µL or <2,000/µL plus ≥10% bands or systolic blood pressure <90 mm Hg.

The clinical findings were taken into consideration for the patient if only one blood culture bottle grew CoNS isolate.

Relevant demographic and clinical data of the patient was recorded.

**Statistics:** The statistical analysis was done using Stata 15.1, StataCorp, Texas, USA.

**Findings**

Blood culture positivity was seen in 866 (14.2%) out of 6102 blood cultures. Coagulase negative staphylococci (CoNS) were isolated from blood culture of 144 patients, comprising 16.6% of the total (866) blood culture isolates. CoNS species were considered to cause true bacteraemia in 38 (26.4%) out of the 144 cases of CoNS isolated from blood. Of the 38 isolates of CoNS causing true bacteraemia, 27 (71%) were isolated from two blood cultures within a span of 5 days, the rest 11 (29%) were isolated from one blood sample and were considered to be true pathogens on the basis of clinical criteria. The vast majority 106 (73.6%) were considered contaminants.

The highest number of CoNS isolates, 48 (33.3%) was isolated from 61-70 years age The number of CoNS isolates causing true bacteraemia was highest in the age group of 61-70 years. (Table 1) Out of the 38 patients with significant CoNS isolates, 25 (65.8%) were males and 18 (47.4%) were from intensive care units.
Table 1: Age wise distribution of the total CoNS isolates and CoNS causing true bacteraemia

<table>
<thead>
<tr>
<th>Age group (in yrs)</th>
<th>No.of CoNS isolates (%)</th>
<th>No.of CoNS causing true bacteraemia (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>5 (3.5)</td>
<td>2 (5.3)</td>
</tr>
<tr>
<td>11-20</td>
<td>9 (6.3)</td>
<td>3 (7.8)</td>
</tr>
<tr>
<td>21-30</td>
<td>13 (9)</td>
<td>6 (15.9)</td>
</tr>
<tr>
<td>31-40</td>
<td>18 (12.5)</td>
<td>3 (7.9)</td>
</tr>
<tr>
<td>41-50</td>
<td>23 (16)</td>
<td>5 (13.1)</td>
</tr>
<tr>
<td>51-60</td>
<td>17 (11.8)</td>
<td>5 (13.1)</td>
</tr>
<tr>
<td>61-70</td>
<td>48 (33.3)</td>
<td>11 (29)</td>
</tr>
<tr>
<td>&gt; 70</td>
<td>11 (7.6)</td>
<td>3 (7.9)</td>
</tr>
<tr>
<td>Total</td>
<td>144</td>
<td>38</td>
</tr>
</tbody>
</table>

Of the total 38 isolates of CoNS causing true bacteraemia, the most common species isolated was *Staphylococcus haemolyticus*, 18(47.4%) and majority were from ICUs (8, 44.4%).

Table 2: Species distribution of CoNS isolates which cause true bacteraemia in ICUs and different wards

<table>
<thead>
<tr>
<th>Wards</th>
<th><em>S. haemolyticus</em> N = 18(%)</th>
<th><em>S. epidermidis</em> N = 7(%)</th>
<th><em>S. hominis</em> N = 5(%)</th>
<th><em>S. saprophyticus</em> N = 4(%)</th>
<th>Others N = 4(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICUs</td>
<td>8 (44.4)</td>
<td>1 (14.2)</td>
<td>2 (40)</td>
<td>2 (50)</td>
<td>2 (50)</td>
</tr>
<tr>
<td>Medicine</td>
<td>5 (27.7)</td>
<td>3 (42.8)</td>
<td>1 (20)</td>
<td>1 (25)</td>
<td>0</td>
</tr>
<tr>
<td>Paediatrics</td>
<td>2 (11.1)</td>
<td>2 (28.6)</td>
<td>1 (20)</td>
<td>0</td>
<td>1 (25)</td>
</tr>
<tr>
<td>Surgery</td>
<td>1 (5.6)</td>
<td>1 (14.3)</td>
<td>1 (20)</td>
<td>1 (25)</td>
<td>0</td>
</tr>
<tr>
<td>Orthopaedics</td>
<td>1 (5.6)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (25)</td>
</tr>
<tr>
<td>Others</td>
<td>1 (5.6)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Increased body temperature, time to positivity ≤ 48 hrs and duration of hospitalisation >48 hrs was associated with 85% of cases of CoNS causing significant bacteraemia.

Table 3: Risk factors among patients infected with CoNS causing true bacteraemia

<table>
<thead>
<tr>
<th>Criteria/risk factor</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body temperature (≥ 38°C or &lt; 36°C)</td>
<td>32(85)</td>
</tr>
<tr>
<td>TLC (&gt;12,000/µL or &lt; 2,000/µL)</td>
<td>29(75)</td>
</tr>
<tr>
<td>Hypotension (systolic BP &lt; 90mmHg)</td>
<td>17(45)</td>
</tr>
<tr>
<td>Intravascular catheters</td>
<td>25(65)</td>
</tr>
<tr>
<td>Underlying immunosuppression</td>
<td>23(60)</td>
</tr>
<tr>
<td>Duration of hospitalisation (&gt;48 hrs)</td>
<td>32(85)</td>
</tr>
<tr>
<td>Time for positive culture test</td>
<td></td>
</tr>
<tr>
<td>≤ 48 hrs</td>
<td>32(85)</td>
</tr>
<tr>
<td>≥ 48 hrs</td>
<td>6(15)</td>
</tr>
</tbody>
</table>

CoNS isolates causing significant bacteraemia were highly sensitive to Vancomycin (100%) followed by Tigecycline (95%). Resistance was highest in Penicillin (100%), followed by Erythromycin (71%).

Increased body temperature, time to positivity ≤ 48 hrs and duration of hospitalisation >48 hrs was associated with 85% of cases of CoNS causing significant bacteraemia.

Table 3: Risk factors among patients infected with CoNS causing true bacteraemia

Methicillin resistant CoNS (MR CoNS) was seen in 24(63%) out of the 38 CoNS isolates which are true pathogens. There was an overall high prevalence of
resistance to non beta lactam antibiotics among MR CoNS as compared to MS CoNS with the difference being statistically significant for ciprofloxacin (64.1% vs 18.1%, P < 0.001), erythromycin (76.4% vs 45.4%, P = 0.034) and rifampicin (48.7% vs 13.6%, P = 0.039).

Table 4: Resistance profile of methicillin sensitive CoNS and methicillin resistant CoNS (among CoNS causing true bacteraemia) to non β lactam antibiotics

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>MS CoNS n (%)</th>
<th>MR CoNS n (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gentamicin(10µg)</td>
<td>4 (21.4)</td>
<td>6 (25.6)</td>
<td>1</td>
</tr>
<tr>
<td>Ciprofloxacin (5µg)</td>
<td>3 (18.1)</td>
<td>20 (64.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Clindamycin (2µg)</td>
<td>8 (59.1)</td>
<td>18 (76.9)</td>
<td>0.2964</td>
</tr>
<tr>
<td>Erythromycin (15µg)</td>
<td>8 (45.4)</td>
<td>22 (76.4)</td>
<td>0.0337</td>
</tr>
<tr>
<td>Cotrimoxazole (25µg)</td>
<td>3 (18.1)</td>
<td>13 (56.4)</td>
<td>0.0877</td>
</tr>
<tr>
<td>Rifampicin (5µg)</td>
<td>2 (13.6)</td>
<td>12 (48.7)</td>
<td>0.0392</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

To determine if CoNS isolated is of significance, the repeated isolation of CoNS from blood cultures and clinical parameters should be considered.

According to this study, the percentage of blood culture positivity is 14.2% as compared to 9.7% and 19.5% in various other studies.[13,14] In Indian studies, the rates of positivity varies from 31.2% to 16.7%.[15,16] CoNS constituted 16.6% of all the blood culture isolates as against the findings of other workers which estimates the rate to be 7.1% and 31%.[7,11] In our study, CoNS were considered true pathogens in 26.4% cases, comparable to the findings of other studies where the rates were 24.1%, 26.7% and 27% but in contrast to the findings of Souvenir et al where the rate was 10-12%.[17,18,19,20] CoNS were identified as contaminants in 73.6% cases compared to 76.74% in another study.[21]

The majority of CoNS in this study were isolated from patients in the 61-70 years age group in intensive care units (Table 1,2) whereas Sidhu et al isolated the same from 31-75 years age group and from intensive care units.[17]

*Staphylococcus haemolyticus* (47.4%) formed the majority among all the species of coagulase negative staphylococcus (causing true bacteraemia). This is in concordance with previous studies from India.[11,22] In our study, majority of *S. haemolyticus* and *S.epidermidis* were isolated from ICUs (44%) and medicine wards (42.8%) whereas in the study by Singh et al the majority of *S. haemolyticus* and *S.epidermidis* were isolated from medicine (80%) and paediatric wards (70%) respectively.[11]

Body temperature, time to positivity and duration of hospitalisation was associated with 85% of cases of significant CoNS correlating with the findings of Sidhu et al.[17]

In this study, maximum resistance was observed to Penicillin (100%), followed by Erythromycin (71%), Cotrimoxazole (63.2%) and Ciprofloxacin (57.9%). This can be compared with the findings of Chavan SP et al where the resistance to penicillin was 92.25% and to cotrimoxazole was 73%. Another study by Mohan et al illustrates resistance to Erythromycin to be 64.6% and 66.2% to ciprofloxacin.[24]

Highest sensitivity was to Vancomycin (100%) followed by Tigecycline (95%), Daptomycin (92.5%), Teicoplanin (87.5%) and Linezolid (85%) in our study, similar to other studies.[23,25]

Methicillin resistant CoNS (MRCoNS) was seen among 63% of significant CoNS isolates. In different studies the prevalence of MRCoNS is 87.5%, 68.6% and 67.5% and 35%.[25,26,27,28]

There is an overall high prevalence of resistance to non beta lactam antibiotics among MR CoNS as compared to MS CoNS with the difference being statistically significant for ciprofloxacin (64.1% vs 18.1%, P < 0.001), erythromycin (76.4% vs 45.4%, P = 0.034) and rifampicin (48.7% vs 13.6%, P = 0.039), similar to the findings of Singh et al.[11]

Administration of anti pyretics or steroids and vasopressors may have interfered with our observation of body temperature and blood pressure and led to under-reporting of CoNS bacteraemia which are the limitations of this study.

Although blood culture contamination cannot be totally eliminated, proper collection of blood by trained health care worker will go a long way in reducing the rate of blood culture contamination due to CoNS.[29]
Conflict of Interest: None

Source of Funding: The study was initiated as part of the ICMR STS project and then continued for a period of 8 months.

Ethical Clearance: Obtained

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Availability of Manpower Facilities in the Health Sector of Assam

Raju Saikia
Research scholar, Department of Economics, Gauhati University

ABSTRACT

Role of Manpower is the important factor in the health care facilities. Human resources in the health sector is considered to be the heart of the health system. The availability of human resources positively affects the quality of public health services and has a direct impact on health outcomes. The paper is based on the secondary data were qualitative and descriptive method are used. The paper tries to examine the status of Manpower Facilities in Assam wherein 85.6% of people live in rural areas. It attempts to analyze the status of health workers in rural health care facilities after the implementation of NRHM in 2005.

Keywords: Manpower, Health, Assam

Introduction

The Human resources health define as the stock of all individuals engaged in the promotion, protection or improvement of Population Health” (WHO, 2000), are “the heart of the Health System” Looking on the health system of a country the Human resources play a pivotal role in delivering healthcare services: they determine “what services will be offered; when, where, and to what extent they will be utilized; and as a result, what impact the services will have on the health status of the people” 1, hence the efficient functioning of the health system depends on having the adequate human resources with appropriate skill mix and equitable distribution. It is well recognized that availability of human resources positively affects the quality and efficiency of public health services and has a direct and positive effect on health outcome 9.

The knowledge about lack of Manpower facilities was taken into consideration in 2004 by the Joint Learning Initiative (JLI)- a network of global health leaders. The JLI’s report on human resources for health highlights that India has about 11.3 health manpower facilities (Doctors, Nurses and Midwives) per 10,000 people in 1998, and was regarded as the low health manpower density countries. The world health Organization Report 2006 estimated that the health manpower in India has a critical shortage and placed India at 57 countries (ranked at 52). The India’s Health sector has also been suffered Misdistribution of the healthy workers. The health workers are unevenly distributed across the state. The Economically backward states, such as, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh, and the Northeastern States have lower density and less educated Health workers 4. Having glimpse on the above context paper tries to examine the status of Manpower Facilities in Assam wherein 85.6% of people live in rural areas. It attempts to analyze the status of health workers in rural health care facilities after the implementation of NRHM in 2005.

Data Sources and Methodology: This paper is based on both qualitative and quantitative method were the data has been taken from secondary sources-

(a) Bulletin on Rural Health Statistics 2011,
(b) National Health Profile 2011 (both published by the Health and Family Welfare, Government of India),
(c) Population Census2011 published by Registrar General, Government of India, and
Human Resource System in Rural India: The rural health resource system is comparatively critical in the rural areas as the distribution of health Manpower is overwhelmingly skewed in favor of the urban areas. Only about 40.8% of all health workers are in the rural areas, where about 70% of the population resides. The percentage of health Manpower residing in the rural areas by cadres is: 39.6% for doctors, 43% for AYUSH doctors, 39.6% for Nurses and Midwives, 20.4% for dentists, and 45% for pharmacists. (Fan, 2016).

The health care infrastructure in rural areas has been developed as a three tier system and is based on the population norms. The Sub-Centre (SC) is the most peripheral and first contact point between the primary health care system and the community. Each Sub-Centre is required to be manned by at least one Auxiliary Nurse Midwife (ANM)/Female Health Worker and one Male Health Worker. Primary Health Centre (PHC) is the first contact point between village community and the Medical Officer. A PHC is to be manned by a Medical Officer supported by 14 paramedical and other staff. Under National Rural Health Mission (NRHM), there is a provision for two additional Staff Nurses at PHCs on contract basis. It acts as a referral unit for 6 Sub Centres and has 4 - 6 beds for patients. Community Health Centre (CHC) serves as a referral centre for 4 PHCs and also provides facilities for obstetric care and specialist consultations. A CHC is required to be manned by four Medical Specialists i.e. Surgeon, Physician, Gynecologist and Pediatrician supported by 21 paramedical and other staff. It has 30 in-door beds with one OT, X-ray, Labor Room and Laboratory facilities.

Table 1: Population covered under SC, PHC & CHC

<table>
<thead>
<tr>
<th>Centre</th>
<th>Population Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plain Area</td>
</tr>
<tr>
<td>Sub Centre</td>
<td>5000</td>
</tr>
<tr>
<td>Primary health centre</td>
<td>300000</td>
</tr>
<tr>
<td>Community health centre</td>
<td>120000</td>
</tr>
</tbody>
</table>

Rural Health Care system in Assam: Health is an important component for the economic development. Good health is prerequisite for the well being of the people as well as augments labour productivity and stimulates economic growth. The national commission on Macroeconomics and health opines argues that ‘health is a creator and prerequisite of development” (WHO, 2001). Assam is the state were 85.6 % of people live in the rural areas as compare to the urban counterparts. The health workers are the heart of the health systems. Their availability is an important factor for the efficient functioning of the health care system. It is evident from the table that less than two-thirds of the PHCs in India have been functioning with only one doctor.

Table 2: Status of Manpower in PHCs and CHCs (as on March 2011)

<table>
<thead>
<tr>
<th>Percentage of PHCs</th>
<th>Assam</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>With 2 doctors</td>
<td>46.16</td>
<td>25.89</td>
</tr>
<tr>
<td>With 1 doctors</td>
<td>32.09</td>
<td>62.18</td>
</tr>
<tr>
<td>With lady doctors</td>
<td>36.99</td>
<td>20.86</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average rural population covered</th>
<th>Assam</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors at PHCs</td>
<td>17200</td>
<td>31641</td>
</tr>
<tr>
<td>Total Specialist at CHCs</td>
<td>123984</td>
<td>120128</td>
</tr>
<tr>
<td>Radiographer at CHCs</td>
<td>439025</td>
<td>375096</td>
</tr>
<tr>
<td>Pharmacist at PHCs and CHCs</td>
<td>21221</td>
<td>33768</td>
</tr>
<tr>
<td>Nurse at PHCs and CHCs</td>
<td>9416</td>
<td>12749</td>
</tr>
<tr>
<td>Health worker (F)/ANM at SCs and PHCs</td>
<td>3070</td>
<td>4008</td>
</tr>
<tr>
<td>Health Worker (M) at SCs</td>
<td>11224</td>
<td>15955</td>
</tr>
<tr>
<td>Health Assistant (F) at PHCs</td>
<td>59249</td>
<td>52369</td>
</tr>
<tr>
<td>Heath Assistant (M) at PHCs</td>
<td>NA</td>
<td>53328</td>
</tr>
</tbody>
</table>

Source: Bulletin on Rural Health Statistics in India, 2011.
From table 2 it is seen that percentage of PHCs with 2 doctors is higher in Assam than in all India level whereas percentage of PHCs with 1 doctor is less in Assam but it is high in India. It is seen that the percentage of doctors is less in PHCs were the average population covered is 17200 in Assam and in All India level it is 31641.

Table 3: Shortfall in Health workers (as on March 2011)

<table>
<thead>
<tr>
<th>States</th>
<th>Health worker (M) at SCs</th>
<th>Health Assistant (F)/LHV at PHCs</th>
<th>Total Specialist at CHCs</th>
<th>Radiographer at CHCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assam</td>
<td>2218 (44.18)</td>
<td>486 (51.81)</td>
<td>216 (50.00)</td>
<td>47 (43.52)</td>
</tr>
<tr>
<td>India</td>
<td>95909 (64.75)</td>
<td>9036 (37.83)</td>
<td>12301 (63.95)</td>
<td>2593 (53.92)</td>
</tr>
</tbody>
</table>

Source: Bulletin on Rural Health Statistics in India, 2011

One of the major problems confronting the rural healthcare sector of the region is shortage of health workers. Table 3 reports that India suffers shortage of 64.75 percent male Health workers, 37.8 percent female health assistants, 63.95 percent specialist and 53.92 Radiographers. Assam has also suffered from the shortage from one or other form of health workers. The state has largely faced the lack of male health workers, the large shortfall in male health workers and health assistants is a serious concern, which may result in poor male participant in family welfare and other health programmes and overburdening of the female health workers/ANMs, which further results in underperformance of the health workers.

The another reason for the shortage of health workers, is that the health care system in India is overwhelmed by large scale absenteeism and low level of participation in providing health care services among the existing health workers, especially in the rural areas. The acute shortage of health workers and large scale absenteeism among the existing health workers results in underutilization or non-utilization of the available health care infrastructure and facilities and therefore, affects access to adequate health care services. Therefore, a prior focus should be given to ensure availability of health workers in different health centers.

Conclusion

We found that there has been significant improvement on the rural health care facilities in the region, especially in case of the health centers after the implementation of NRHM in 2005. looking on to the existing population coverage norms in one or the other types of health centers they are still lacking behind with the manpower facilities. More importantly the region suffers from shortage of well trained health workers; be it specialist, male health assistant or Nurses. Even though there are various sanctioned post for the health workers, many of them are lying vacant, resulting in underutilization of facilities available in the existing health centre. Given these bottlenecks it can be said that the health care services in the rural areas of the state is not of high quality a rigorous effort should be given to strengthen the rural healthcare facilities in the region besides, the available health centers should be adequately staffed with well trained health workers.

Ethical Clearance: It is a review article.

Source of Funding: Self.

Conflict of Interest: Nil.

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Screening Urinary Methylmalonic Acid by Thin Layer Chromatography in Children with Suspected Inborn Errors of Metabolism

Saritha Kamath U1, Nalini Bhaskaranand2, Anjali Rao3
1Associate Professor, Department of Medical Laboratory Technology, Manipal College of Health Professions, Manipal, 2Former Professor, Department of Paediatrics, 3Former Professor, Department of Biochemistry, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India

ABSTRACT

Introduction: Inborn errors of metabolism (IEM) are a group of disorders due to deficiency of the enzyme. The symptoms are due to the accumulation of toxic substances or deficiency of products. Organic aciduria is a group of IEM which is due to errors in the metabolism of branched chain amino acids and lysine. Studies showed that methylmalonic aciduria (MMA), glutaric aciduria, branched chain aminoacidurias are more common organicaciduria. Many methods are used for detection of methylmalonic acid some of them are not affordable by developing countries.

Objective: To study the role of thin layer chromatography in detection of methylmalonic aciduria in children with suspected inborn errors of metabolism.

Method: Untimed urine samples were collected from 385 children with clinically suspected inborn errors of metabolism and analyzed for MMA by colour reaction and thin layer chromatography (TLC). Bromocresol green and Ortho dianisidine were the dye used for spotting MMA on TLC.

Result: Among 385 children who presented with developmental delay, seizures, hypotonia were worked up for underlying inborn errors of metabolism. Of them 52 children showed positive result for MMA by thin layer chromatography.

Discussion: Significant number of children showed positive result for MMA by thin layer chromatography hence the method may be useful for screening methylmalonic aciduria. Further studies required to confirm the diagnosis.

Keywords: Methyl malonic aciduria, thin layer chromatography, organic aciduria.

Introduction

Organic aciduria or organic acidemia is a rare group of inborn errors of metabolism mainly involving metabolism of branched chain amino acids and lysine(1). Due to rapid methodological advances in the field of laboratory diagnosis many diagnostic tools were introduced. Methylmalonic aciduria is the common organicaciduria detected in most of the studies worldwide(2)-(7). Techniques used to detect organic aciduria include different types of chromatographic methods such as thin layer chromatography, high performance liquid chromatography, gas chromatography mass spectrometry, tandem mass spectrometry, enzyme assay, tissue culture and molecular diagnostics (1),(8)-(11). In developing
countries advanced methods are not affordable hence many instances simple urine metabolic screening tests and clinical symptoms are utilized for diagnosis. Urine metabolic screening tests which includes simple colour reactions and thin layer chromatography are useful and gives valuable information about organicaciduria such as maple syrup urine disorder, homocystinuria etc. We planned to study urinary MMA in children with clinical symptoms suggestive of inborn errors of metabolism. The diagnostic tests included for the present study was colour reaction and thin layer chromatography for detecting urinary MMA.

**Materials and Method**

A total of 385 children with clinical symptoms suggestive of IEM were worked up for urinary MMA by colour reaction and TLC. Out of this 11 cases showed positive for MMA by colour reaction and 52 showed positive screening results for methyl malonic aciduria by TLC. The age wise distribution of MMA positive cases both by colour reaction and TLC are as follow

<table>
<thead>
<tr>
<th>Elevated MMA</th>
<th>0-1 month</th>
<th>1-6 months</th>
<th>6-12 months</th>
<th>12-48 months</th>
<th>&gt;48 months</th>
<th>Positive results (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMA test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11/385 (2.9%)</td>
</tr>
</tbody>
</table>

Elevated MMA in urine by TLC: n = 52

<table>
<thead>
<tr>
<th>Elevated MMA</th>
<th>0-1 month</th>
<th>1-6 months</th>
<th>6-12 months</th>
<th>12-48 months</th>
<th>&gt;48 months</th>
<th>Positive results (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMA 5</td>
<td>5</td>
<td>5</td>
<td>17</td>
<td>12</td>
<td>13</td>
<td>52/385 (13.5%)</td>
</tr>
</tbody>
</table>

**Discussion**

Many studies have found that organic aciduria is comparatively common among disorders of inherited metabolism and methyl malonic aciduria is the commonest organic aciduria. We utilized simple colour reactions and thin layer chromatography in our study with which we could detect MMA in 52 cases. This shows that simple cost effective thin layer chromatography may be useful to initiate therapy to the affected children. TLC can be done in the laboratories with very minimal facility hence can be used as a basic screening tests in the centers when no other methods are available. MMA occurs either due to the enzyme deficiency or vitamin deficiency. Vitamin B12 deficiency is common in developing countries and affects all age groups. Moderate deficiency of vitamin B12 in children may cause neurological problems. Methylmalonic acid is the early indicator of this deficiency. It can be treated and neurological damage may be prevented if detected early.

**Conclusion**

Our study showed that simple cost effective, noninvasive urinary screening test with organic acid thin layer chromatography (TLC) gives valuable information and may be used in basic screening panel. However this has to be compared with confirmatory tests such as GCMS or MSMS which requires funding.

**Ethical Clearance:** Taken from Institutional Ethical committee, Kasturba Hospital, MAHE, Manipal

**Source of Funding:** Self

**Conflict of Interest:** There is no conflict of interest.
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Lifestyle Practices and Glycemic Control among Type 2 Diabetic Patients in North Kerala

N. V. Fatimathu Zuhara¹, A. Thahira Banu², Najma Chokli³
¹Assistant Professor, Department of Home Science, KAHM Unity Women’s College, Kerala, India; ²Assistant Professor, Department of Home Science, Gandhigram Rural Institute (Deemed to be University), Tamil Nadu, India; ³Assistant Professor, Department of Home Science, KAHM Unity Women’s College, Kerala, India

ABSTRACT

In India, high prevalence of diabetes was reported in Kerala. The present study was conducted in North Kerala to explore the glycemic status and lifestyle practices of the diabetic patients. Around 179 diabetics were randomly selected. Information about their personal profile, diet, activity and awareness on diabetes was collected using a pre tested interview schedule. Fasting and post prandial blood sugar values of all the patients and HbA1c level of randomly selected 49 patients were recorded. The collected data was statistically analyzed. The mean age of the diabetics was 54.81 ± 10.42 years. Around 98.9% of them were non vegetarians. The mean Food Consumption Score was 75.75 ± 15.3. 86 percent of the diabetics consumed white rice based diet and 34.6% practiced no lifestyle modification. More than half of the diabetics were not aware of diabetes and its management. Most of them were sedentary workers. There was significant association between gender and exercise (p<0.05). The mean value of HbA1c was 9.74 ± 1.8%. The blood sugar levels were positively correlated with FCS. Uncontrolled blood sugar and poor lifestyle practices along with inadequate knowledge on diabetes and its control was observed. Effective education on diabetes management is the hour of need for the diabetics.

Keywords: Diabetes, Lifestyle, Diet, exercise, glycemic control.

Introduction

Diabetes is a non communicable disease affecting both the quality and longevity of the life of people. The prevalence of diabetes in adults has increased to 8.5% in 2014. It is the seventh leading cause of death in 2016. The percentage of deaths due to high blood glucose levels is higher in low and middle income countries. [1] In India, 8.8% of people in the age of 20-79 years possess diabetes in which a great majority of them have poor control of the disease. [2] This in turn lead to heart diseases, stroke, vision impairment, kidney diseases and nerve damage. In order to achieve good glycemic control, lifelong management of diet and physical activity is to be maintained as the heart of treatment along with medication. [3] In Kerala, the Indian state with high prevalence of diabetes, only 40% of the diabetics had optimum glycemic control. [4] There were very less studies reported on the lifestyle management practices of type 2 diabetics in Kerala. Thus, a population based study was conducted to study the lifestyle practices and glycemic status of type 2 diabetics living in North Kerala.

Materials & Method

A cross sectional study was conducted in the two villages randomly selected from the Kondotty taluk located in the northern part of Kerala. One ward from each selected village was further chosen for the study. Type 2 diabetics in the age group of 25 to 75 years, residing in the selected wards for the last three consecutive months were randomly selected. Thus, 179 adults who were diagnosed as type 2 diabetics and willing to participate were included in the study. Fasting Blood Sugar (FBS) level ≥126mg/dl and/or on treatment for type 2 diabetes was the criteria for diagnosis. [5] Informed written consent was obtained from each participant. Pregnant women, severely ill and or bedridden patients were excluded.
Patient profile and lifestyle behaviours: An interview schedule was developed to obtain information on the socio economic characteristics, details of disease and treatment, food frequency, dietary modifications, physical activity, exercise and awareness on diabetes and its management. The data was collected from each participant through a house to house survey using the pre tested interview schedule. From the food frequency pattern, Food Consumption Score (FCS) was calculated using FAO-WFP guidelines. The content of macronutrients was calculated with the help of Dietcal software (Profound Tech solutions, New Delhi).

Blood tests for the determination of glycemic control: Blood sugar values such as Fasting Blood Sugar (FBS) and Post Prandial Blood Sugar (PPBS) levels of all the diabetics were recorded using a Glucometer (Simple – One touch) or from their current or previous month’s lab reports. Blood samples of the randomly selected 49 patients were analyzed for their HbA1C level. The blood sugar values of each patient was further grouped under the three categories of glycemic control based on ICMR guidelines.

<table>
<thead>
<tr>
<th>Blood sugar</th>
<th>Good (FBS mg/dl)</th>
<th>Satisfactory (111–125)</th>
<th>Poor (&gt;125)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBS (mg/dl)</td>
<td>80–110</td>
<td>111–125</td>
<td>&gt;125</td>
</tr>
<tr>
<td>PPBS (mg/dl)</td>
<td>120–140</td>
<td>141–180</td>
<td>&gt;180</td>
</tr>
<tr>
<td>HbA1C</td>
<td>&lt;6</td>
<td>6–7</td>
<td>&gt;7</td>
</tr>
</tbody>
</table>

Statistical Analysis: The data was analyzed in IBM SPSS 23.0 version. Descriptive analysis was done to find out the means and standard deviation. Chi Square test was carried out to find the association between gender and the variables studied. Pearson’s correlation of coefficient was calculated to determine variables correlated with blood sugar values. These tests were done at 95% confidence level and p<0.05 was considered as statistically significant.

Findings

Baseline Characteristics: Among the 179 diabetics, there were 83 males and 96 females. Their mean age was 54.81 ± 10.42 years. Around 82.7% were Muslims while the rest were Hindus. Majority of them (80.4%) had education below higher secondary level and 61.5% of them were unemployed. 68.7 percent and 30.2% of diabetics belonged to the middle class and upper lower class families respectively.

Profile and treatment of diabetics: Out of the 179 diabetics, the duration of diabetes in 103 patients was 4 years and above. Nearly one fifth of the diabetics had less than one-year duration of disease. Majority of the patients followed allopathy treatment. Few diabetics took no treatment including diet therapy (Table 1).

Table 1: Duration and type of treatment among diabetics

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Category</th>
<th>Male (83)</th>
<th>Female (96)</th>
<th>Total (N = 179)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of treatment</td>
<td>0 to 1</td>
<td>11 (13.3)</td>
<td>16 (16.7)</td>
<td>27 (15.1)</td>
<td>0.370</td>
</tr>
<tr>
<td></td>
<td>1 to 4</td>
<td>17 (20.5)</td>
<td>26 (27.1)</td>
<td>43 (24.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 to 7</td>
<td>18 (21.7)</td>
<td>12 (12.5)</td>
<td>30 (16.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 to 10</td>
<td>2 (2.4)</td>
<td>5 (5.2)</td>
<td>7 (3.9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 &amp; above</td>
<td>32 (38.6)</td>
<td>31 (32.3)</td>
<td>63 (35.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No treatment</td>
<td>3 (3.6)</td>
<td>6 (6.3)</td>
<td>9 (5.0)</td>
<td></td>
</tr>
<tr>
<td>Type of treatment</td>
<td>Allopathy</td>
<td>76 (91.6)</td>
<td>81 (84.4)</td>
<td>157 (87.7)</td>
<td>0.152</td>
</tr>
<tr>
<td></td>
<td>Ayurveda</td>
<td>2 (2.4)</td>
<td>0 (0.0)</td>
<td>2 (1.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Homeopathy</td>
<td>1 (1.2)</td>
<td>5 (5.2)</td>
<td>6 (3.4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diet therapy alone</td>
<td>1 (1.2)</td>
<td>4 (4.2)</td>
<td>5 (2.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>3 (3.6)</td>
<td>6 (6.3)</td>
<td>9 (5.0)</td>
<td></td>
</tr>
</tbody>
</table>

Diabetes management among diabetics: As a part of management of diabetes, 65.4% of the patients practiced lifestyle modifications. 63 percent of the diabetics reported as following dietary modifications and nearly 14% of them practiced exercise (Table 2). Nearly half of the diabetics practiced dietary modifications along with medicines. Around 6% of the diabetics revealed that sugarless tea was their only dietary change practiced.
Table 2: Lifestyle practices among diabetics

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Category</th>
<th>Male (83)</th>
<th>Female (96)</th>
<th>Total (n = 179)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifestyle practices</td>
<td>Dietary changes alone</td>
<td>41 (49.4)</td>
<td>51 (53.1)</td>
<td>92 (51.4)</td>
<td>0.053</td>
</tr>
<tr>
<td></td>
<td>Exercise alone</td>
<td>4 (4.8)</td>
<td>0 (0.0)</td>
<td>4 (2.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dietary changes &amp; exercise</td>
<td>13 (15.7)</td>
<td>8 (8.3)</td>
<td>21 (11.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>25 (30.1)</td>
<td>37 (38.5)</td>
<td>62 (34.6)</td>
<td></td>
</tr>
<tr>
<td>Meals modified</td>
<td>Breakfast</td>
<td>1 (1.2)</td>
<td>0 (0.0)</td>
<td>1 (0.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lunch</td>
<td>1 (1.2)</td>
<td>4 (4.2)</td>
<td>5 (2.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dinner</td>
<td>48 (57.8)</td>
<td>50 (52.1)</td>
<td>98 (54.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All meals</td>
<td>1 (1.2)</td>
<td>1 (1.0)</td>
<td>2 (1.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>32 (38.6)</td>
<td>41 (42.7)</td>
<td>73 (40.8)</td>
<td></td>
</tr>
</tbody>
</table>

The mean FCS of the diabetic population studied was 75.75 ± 15.3. Nearly 99% of the diabetics were non vegetarians. Most of them consumed three meals in a day. 86 percent of the diabetics had rice based diet in all the three meals in a day. 48 percent of the diabetics consumed reduced quantity of food during dinner. Only a few diabetics applied changes in food selection and cooking methods (Figure 1). Most of the diabetics consumed sweets without any restriction (Figure 2).
Daily consumption of white rice was reported by 83.2% of the diabetics. Fish intake was more than thrice a week in 88.9% of the diabetics. Also, at least once in a week, 77.7% of the diabetics consumed chicken, 61.4% had meat and 65.4% included egg in their diet. 71.5 percent of the diabetics consumed fried foods daily. Bakery foods were consumed daily and more than thrice a week by 30.7% and 22.9% of the diabetics respectively. Daily consumption of fruits was reported by 44.1% of the diabetics while 46% included leafy vegetables at least once in a week. 95.5% of the diabetics used coconut oil in their daily diet. The daily intake of energy, protein and total fat of the diabetics was higher than their daily requirement while the intake of fiber was lesser (Table 3).

Table 3: Mean daily nutrient intake of diabetics

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Male (83)</th>
<th>Female (96)</th>
<th>Total (N=179)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal/d)</td>
<td>2745.87 ± 285.4</td>
<td>2397.19 ± 476.9</td>
<td>2588.97 ± 412.7</td>
</tr>
<tr>
<td>Carbohydrate (g/d)</td>
<td>383.88 ± 60.1</td>
<td>357.66 ± 78.1</td>
<td>372.08 ± 68.1</td>
</tr>
<tr>
<td>Protein (g/d)</td>
<td>80.49 ± 11.0</td>
<td>68.19 ± 16.4</td>
<td>74.95 ± 14.7</td>
</tr>
<tr>
<td>Total fat (g)</td>
<td>92.15 ± 11.6</td>
<td>72.82 ± 19.3</td>
<td>83.44 ± 18.0</td>
</tr>
<tr>
<td>Visible fat (g)</td>
<td>58.82 ± 7.1</td>
<td>49.11 ± 10.2</td>
<td>54.45 ± 9.7</td>
</tr>
<tr>
<td>Invisible fat (g)</td>
<td>33.33 ± 6.6</td>
<td>23.71 ± 12.5</td>
<td>29.0 ± 10.6</td>
</tr>
<tr>
<td>% carbohydrate</td>
<td>55.8 ± 4.6</td>
<td>59.52 ± 4.7</td>
<td>57.48 ± 4.9</td>
</tr>
<tr>
<td>% protein</td>
<td>11.73 ± 1.2</td>
<td>11.30 ± 1.0</td>
<td>11.54 ± 1.1</td>
</tr>
<tr>
<td>% fat</td>
<td>30.32 ± 3.3</td>
<td>27.49 ± 5.1</td>
<td>29.05 ± 4.3</td>
</tr>
<tr>
<td>Total dietary fiber (g)</td>
<td>27.30 ± 3.5</td>
<td>25.19 ± 5.5</td>
<td>26.2 ± 4.47</td>
</tr>
</tbody>
</table>

More than 40% of the diabetics recorded poor satisfaction on their own dietary practices. 96.6 percent of the diabetics had never consulted a dietitian. 12.3 percent stated walking as their exercise while 1.7 percent reported practicing yoga. The duration of walking was around 10-15 minutes. Exercise was strongly associated with gender (p = 0.019) with higher percentage of males practicing exercise (Figure 3).

Figure 3: Activity pattern of diabetics

Glycemic control among diabetics: Only around half of the diabetics used to monitor blood sugar level regularly. Majority (80%) of the diabetics had poor control of blood sugar (Table 4). The mean values of FBS and PPBS of the diabetics were 155.245 ± 37.5mg/dl and 242.66 ± 53.5mg/dl respectively. The mean HbA1c values of 49 diabetics (22 males and 27 females) was 9.74 ± 1.8%. Even though poor control of FBS and PPBS was found higher among male diabetics, glycemic control was not significantly associated with gender (p>0.05).
There was positive correlation between FBS, PPBS, HbA1C and Food Consumption Score. FBS was also positively correlated with the frequency of intake of poultry, meat and milk products and negatively correlated with the age of patients and age of onset of diabetes.

### Table 4: Control of blood sugar in diabetics

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Category</th>
<th>Male (83)</th>
<th>Female (96)</th>
<th>Total (N = 179)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBS</td>
<td>80-110mg/dl</td>
<td>6 (7.2)</td>
<td>9 (9.4)</td>
<td>15 (8.4)</td>
<td>0.356</td>
</tr>
<tr>
<td></td>
<td>111-125mg/dl</td>
<td>7 (8.4)</td>
<td>14 (14.6)</td>
<td>21 (11.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;125mg/dl</td>
<td>70 (84.3)</td>
<td>73 (76.0)</td>
<td>143 (79.9)</td>
<td></td>
</tr>
<tr>
<td>PPBS</td>
<td>120-140mg/dl</td>
<td>1 (1.2)</td>
<td>1 (1.0)</td>
<td>2 (1.1)</td>
<td>0.216</td>
</tr>
<tr>
<td></td>
<td>141-180mg/dl</td>
<td>3 (3.6)</td>
<td>10 (10.4)</td>
<td>13 (7.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;180mg/dl</td>
<td>79 (95.2)</td>
<td>85 (88.5)</td>
<td>164 (91.6)</td>
<td></td>
</tr>
<tr>
<td>HbA1C*</td>
<td>6-7</td>
<td>1 (4.5)</td>
<td>0 (0.0)</td>
<td>1 (2.0)</td>
<td>0.263</td>
</tr>
<tr>
<td></td>
<td>&gt;7</td>
<td>21 (95.5)</td>
<td>27 (100)</td>
<td>48 (98.0)</td>
<td></td>
</tr>
</tbody>
</table>

*only for 49 diabetics

**Awareness among the diabetics:** More than half of the diabetics (55.8%) agreed that they had poor knowledge of diabetes. None of the diabetic was aware about the concept of glycemic index of foods. A great majority of the patients believed that unhealthy food habits lead to diabetes.

**Discussion**

In the present study, most of the diabetics were in the age group of 45 to 60 years as documented in earlier studies. Similar to the previous findings, majority of the patients had secondary school education. The duration of diabetes in more than one third of the patients was 10 years and above. As indicated in the earlier study, a great percentage of patients followed allopathy treatment. Few patients took no treatment at all.

High values of FCS among the diabetics indicated wide variety of foods in their diet. A vast majority of the patients were non vegetarians as documented in the previous studies in Kerala. More than one third of the patients practiced no dietary modification to manage diabetes. An earlier study reported that around 13.7% of the diabetics never followed a healthy diet in any day of the week.

Among those practicing dietary modifications, the dietary changes were poor and inconsistent. Poor dietary practices among diabetics was earlier reported by several other studies. Lesser intake of food during dinner was the major dietary modification done. Most of them consumed rice based diet as documented in the previous study. Changes in the selection and preparation of foods were also less. Larger portion size was observed among the patients which further increased the intake of macro nutrients beyond their requirements. Same findings were reported in the earlier studies. But, the percentage of energy from carbohydrate, protein and fat were within the normal range as prescribed by ICMR, 2018.

Most of the diabetics consumed fried foods daily. Higher intake of fat and fried foods by diabetics was documented in the previous studies. The quantity and frequency of fish and meat intake were found to be high. Also, frequent inclusion of coconut in their diet further enhanced the fat and calorie intake. High intake of fat and carbohydrate foods was reported among the diabetics in the previous studies conducted at various regions of Kerala. Although the frequency of fruits and vegetables intake was adequate, their quantity was less. Similarly, poor consumption of vegetables and fruits was stated in the previous studies. The major dietary modification observed among the diabetics was sugar restriction in tea. Despite their disease, most of them had poor restriction on sweets intake. High intake of salt and sugar and decrease in fruits and vegetables intake were reported in the earlier studies.

Majority of the diabetics were sedentary workers and the habit of doing exercise was also poor as reported in previous studies. Most of the patients studied had not consulted any dietitian and as stated in an earlier study, the only source of dietary guidance was their doctors. Majority of the patients had poor knowledge...
on diabetes and its management. Also, similar findings were reported in few other studies. [14,16]

Poor glycemic control was reported in majority of the patients with much higher values of HbA1c. A cross sectional study conducted in 12 countries in Asia reported that 55% of the diabetics had HbA1c values higher than 8%. [17] FBS was positively correlated with FCS, frequent consumption of poultry and meat products.

**Conclusion**

Poor dietary modifications, sedentary behaviour and less exercise habits were observed among the diabetics studied. Poor knowledge on the necessary dietary and activity changes to be brought in their life resulted in poor glycemic control increasing the risk for complications. Hence effective education about diabetes and its management is essential for the diabetics in the study area to gain control over the disease.

**Acknowledgement**

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**Conflict of Interest:** None

**Source of Funding:** Availed UGC-FDP Teacher fellowship.

**Ethical Clearance:** The ethical clearance for the study was obtained from the Institutional Ethical Committee of Gandhigram Rural Institute (Deemed to be University), Tamil Nadu.

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Determinants of Satisfaction Level of Medical Tourists with Reference to Healthcare Industry in Tamil Nadu, India: An Empirical Study

Arunangshu Giri¹, Satakshi Chatterjee², Smita Chakraborty³, Abanti Aich⁴, Swatee Biswas⁵

¹Associate Professor, School of Management & Social Science, Haldia Institute of Technology, ²Assistant Professor, Department of Pharmaceutical Management, Haldia Institute Management, ³Assistant Professor, Department of Hospital Management, ⁴Assistant Professor, Department of Science and Management, Haldia Institute of Health Sciences, ⁵Officer in Charge, Administration Department, Haldia Institute Management, Haldia, West Bengal, India

ABSTRACT

Medical Tourism is a relatively new concept that is emerging at a rapid pace. It has a potential to give huge economic benefits if tapped properly. India is ranked amongst one of the top destinations for medical tourism. This is because of availability of quality services at an affordable price. This paper aims at identifying the factors with underlying variables that are responsible for causing customer satisfaction in this industry. Tamil Nadu has been selected as the sampling area as it is one of the best destinations of India for medical tourism where the tourists often frequent. Reliability of the sample data and validity of the questionnaire were checked. A model on Medical-Tourists-Satisfaction has been developed by structural equation modelling (SEM) through SPSS and AMOS. The findings imply that Indian healthcare industry needs to emphasize more on the identified critical factors in this study and the government needs to intervene to fully tap the potential of this industry.

Keywords: Medical Tourism; Healthcare Industry; Quality Services; Customer Satisfaction; Structural Equation Modelling

Introduction

National Health is considered as one of the most important factors that puts a direct impact on the economic growth of the country (Jackson & Barber, 2014). It is seen that India has been stuck in the vicious cycle around the poor economy as well as deteriorating health conditions of people. Healthcare industry has paved its way in becoming one of the largest industries in India, both in terms of employment generation as well as income. This industry is growing magnificently at a rapid speed and it has been possible because of quality services associated with the products, wide coverage of the industry, increasing expenditure made by the public, etc. Now, medical tourism is a very popular term which is responsible for fetching huge revenues for the organisations. In simple terms, it can be defined as the movement of a particular patient who is travelling from one place to the other for the purpose of seeking a pre-planned healthcare service (Glinos, et al., 2010). Thus, the concept of medical tourism could be considered by the various organisations across the globe in order to generate revenues through the utilisation of an effective marketing strategy.

Present Scenario of Healthcare Industry in India:

India has been successful in becoming a strong medical tourism destination wherein consumers can avail high quality medical services at a relatively lower cost. However, it must be noted here that all the states and cities of India are not prominent in these services. Though there are quite a few places which are good at
delivering quality medical services but the places which need to be mentioned are Bangalore and Chennai which are located in the states of Karnataka and Tamil Nadu respectively. Some of the famous healthcare providers in Bangalore are Apollo, Fortis, Columbia Asia, Manipal hospitals, etc. who are successful in getting medical tourists from all over the world. Similarly, some of the major healthcare providers of Tamil Nadu are Billroth, Apollo, Global Health City, Frontier Lifeline, The Madras Medical Missions, etc. Apart from Karnataka and Tamil Nadu, Delhi and Mumbai also attract many medical tourists from across the globe. It has been seen that the well known hospitals have their franchise in all the major cities and states of India. This is done deliberately in order to make these places the hubs for the affordable delivery of the healthcare services.

**Literature Review**

Medical Tourism has managed to become extremely popular amongst the common masses due to various parameters. One of these parameters is the hospital infrastructure which is a very important factor for the determination of the quality of the healthcare services provided by a particular organisation. Precisely for this reason, the Indian hospitals are looking for imbibing the latest infrastructure in their system in order to increase the quality of their services being provided to the customers (Sharma, 2013). By referring to infrastructure, it does not mean that only the building infrastructure is taken for consideration but it also includes a wide range of tests and diagnosis facilities which are made available in the hospitals across India, thus, making it a favourable destination for medical tourism (Muthyam, 2017). Medical Tourism is creating certain hype in the market because good quality medical services are made available at fair prices without compromising on the services being rendered to the population (Hopkins, et al., 2010). Research findings suggest that the good quality of tests and treatments are essential to increase the perceived value of the patients pertaining to a service provider. This is significantly important to promote the health tourism of a particular country (Haque et al. 2018). The good performance of qualified and experienced doctors as well as their capability for quick diagnosis of the diseases helps in attracting the customers towards a particular destination for medical tourism from all around the world (Kian & Heng, 2015). Not only the doctors but the nurses and staff also form an integral part of the hospitals. They maintain the maximum contact with that of the patient and hence, they are responsible for forming a huge perception in the minds of the patients regarding the service provider. The good performance of the nurses or the staff helps in increasing the perceived value of the patients regarding the particular service provider. Medical tourism destinations must offer affordable and comfortable stays. The local areas should be safe and secure for the tourists to wander (Majeed, et al., 2018). After the treatment is completed, the post treatments follow-up is very important for any healthcare provider. Telemedicine facilities could also be focused by the respective hospitals as well as good facilities must be in place so that the doctors of the hospitals should be contacted by the patients at the time of their need (Cheng et al. 2003). The patients who receive quality treatment from the healthcare providers are more likely to revisit the hospital for any kind of future treatment. Thus, the relationship between the client and the service provider is sustained over a long period of time. According to a research, the perceived performance of the service providers by the patients is success moderators for building the patient satisfaction (Aljumah et al. 2017).

**Objectives of the Study**

- To explore the determinants which have a profound influence on customer satisfaction level of medical tourists with reference to healthcare industry in Tamil Nadu, India.
- To find out the degree of influence of the determinants on customer satisfaction level.

![Figure 1: Hypothesized Research Model](image-url)
Research Methodology

In this study, hypothesized research model (Figure 1) has been prepared and established with the help of both secondary and primary data. A structure questionnaire was constructed with related variables from literature review for survey purpose. To bring rigor in research, it is therefore, essential for the researcher to first establish an evidence of reliability and construct validity before testing the model. 5 point Likert scale is used for measuring the responses of customers related with Tamil Nadu Health Care Industry, India. We targeted the sample elements for our study from 10 hospitals in Tamil Nadu through convenience sampling technique. After that, 192 responses (Patients/Patient-Party) were finally collected through simple random sampling from targeted 10 hospitals for this study. The survey period was from 1st February, 2019 to 20th April, 2019.

Analysis and Results

Structure equation modeling has been used here for developing the model and establishing the hypothesis by the help of AMOS 20.0 software. Validity and model fitness have been judged through measurement and structural model. Exploratory Factor Analysis (EFA) by the help of SPSS-21 describes the questionnaire validation through data reduction method. In this study, KMO and Bartlett’s Test shows sampling adequacy value of 0.782 with significance level (<0.001) which proves the appropriateness of Exploratory Factor Analysis (EFA). Cronbach alpha for all items which is 0.812 shows the satisfactory range of reliability. Variables with factor loading of above 0.5 have created 8 different factors which are extracted from Rotated Component Matrix (Table 1).

Table 1: Result of Factor Analysis - Rotated Component Matrix (a)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Variables</th>
<th>Factor Loadings</th>
<th>% of Variance Explained</th>
<th>Cronbach’s Alpha Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital Infrastructure</td>
<td>q10</td>
<td>.947</td>
<td>18.044</td>
<td>0.971</td>
</tr>
<tr>
<td></td>
<td>q11</td>
<td>.945</td>
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<tr>
<td></td>
<td>q7</td>
<td>.937</td>
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<td></td>
<td>q9</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>q12</td>
<td>.931</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>q8</td>
<td>.857</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>q25</td>
<td>.945</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>q24</td>
<td>.920</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>q26</td>
<td>.899</td>
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<td></td>
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<td>Local Environment</td>
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<td>12.048</td>
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</tr>
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<td></td>
<td>q17</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>q20</td>
<td>.918</td>
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<tr>
<td>Doctor</td>
<td>q19</td>
<td>.906</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>q14</td>
<td>.948</td>
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<td></td>
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<tr>
<td></td>
<td>q16</td>
<td>.909</td>
<td></td>
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<tr>
<td></td>
<td>q13</td>
<td>.837</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>q15</td>
<td>.776</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital Staff/Nurse</td>
<td>q29</td>
<td>.892</td>
<td>11.274</td>
<td>0.914</td>
</tr>
<tr>
<td></td>
<td>q28</td>
<td>.846</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>q30</td>
<td>.833</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Customer Satisfaction</td>
<td>q21</td>
<td>.908</td>
<td>8.525</td>
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<td></td>
<td>q23</td>
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<td></td>
<td>q22</td>
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</tr>
<tr>
<td>Treatment Facilities</td>
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<td>.911</td>
<td>8.460</td>
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</tr>
<tr>
<td></td>
<td>q4</td>
<td>.855</td>
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<tr>
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<td>q6</td>
<td>.795</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Treatment</td>
<td>q1</td>
<td>.854</td>
<td>8.368</td>
<td>0.903</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>.731</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Performance on Service Attributes</td>
<td>q3</td>
<td>.769</td>
<td>7.521</td>
<td>0.890</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization.
Then, the fitness indexes were checked as follows and hypotheses were tested. Confirmatory factor analysis (CFA) was performed for emphasizing on testing how well defined variables represent factors.

Table 2: Fit Indices of Confirmatory Factor Analysis for Structural Model

<table>
<thead>
<tr>
<th>Fit Index with Threshold Levels</th>
<th>Structural Model Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\chi^2$/df ($&lt; 3$)</td>
<td>0.115</td>
</tr>
<tr>
<td>RMSEA ($&lt; 0.06$)</td>
<td>0.001</td>
</tr>
<tr>
<td>GFI ($&gt; 0.90$)</td>
<td>0.999</td>
</tr>
<tr>
<td>AGFI ($&gt; 0.90$)</td>
<td>0.995</td>
</tr>
<tr>
<td>NFI ($&gt; 0.90$)</td>
<td>0.999</td>
</tr>
<tr>
<td>CFI ($&gt; 0.90$)</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Here the fit indices (Table 2) of Structural model (Figure 2) indicate the acceptable range and prove a good model fit.

![Figure 2: Path Diagram of Hypothesized Structural Model on Overall Customer Satisfaction in Tamil Nadu Health Care Industry, India](image)

**Table 3: Path Analysis of Structural Model**

<table>
<thead>
<tr>
<th>Measurement Path</th>
<th>Hypothesis</th>
<th>Estimate</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Performance on Service Attributes ←  Hospital Infrastructure related Issues</td>
<td>$H1 (S)$</td>
<td>0.211</td>
<td>0.001*</td>
</tr>
<tr>
<td>Perceived Performance on Service Attributes ←  Treatment Facilities related Issues</td>
<td>$H2 (S)$</td>
<td>0.278</td>
<td>0.001*</td>
</tr>
<tr>
<td>Perceived Performance on Service Attributes ←  Hospital Staff/Nurse related Issues</td>
<td>$H3 (S)$</td>
<td>-0.225</td>
<td>0.001*</td>
</tr>
<tr>
<td>Perceived Performance on Service Attributes ←  Doctor related Issues</td>
<td>$H5 (S)$</td>
<td>0.1</td>
<td>0.025**</td>
</tr>
</tbody>
</table>
Conted…

<table>
<thead>
<tr>
<th>Perceived Performance on Service Attributes</th>
<th>←</th>
<th>Post Treatment related Issues</th>
<th>H4 (S)</th>
<th>-0.229</th>
<th>0.001*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Performance on Service Attributes</td>
<td>←</td>
<td>Local Environment related Issues</td>
<td>H6 (S)</td>
<td>0.143</td>
<td>0.01*</td>
</tr>
<tr>
<td>Overall Customer Satisfaction</td>
<td>←</td>
<td>Perceived Performance on Service Attributes</td>
<td>H7 (S)</td>
<td>0.344</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

Note: * & ** denote significant Regression Co-efficient with P<0.01 & P<0.05 respectively.

‘(s)’ denotes that hypothesis is supported.

Path Analysis for Hypotheses Testing and Research Findings

H₁: ‘Hospital Infrastructure related Issues’ positively influences the ‘Perceived Performance on Service Attributes’ in Tamil Nadu Health Care Industry, India.

Structural model supports this hypothesis. If good infrastructure is available like advanced machinery and equipment for operation or surgery, various types of advanced testing machinery, various sophisticated x-ray machine, etc. then the doctors will be able to render the best possible services to the patients.

H₂: ‘Treatment Facilities related Issues’ positively influences the ‘Perceived Performance on Service Attributes’ in Tamil Nadu Health Care Industry, India.

Structural model supports this hypothesis. If proper treatment facilities in terms of proper diagnosis and remedial measures are available at a cheaper cost then it will obviously enhance the perceived performance on service attributes.

H₃: ‘Hospital Staff/Nurse related Issues’ negatively influences the ‘Perceived Performance on Service Attributes’ in Tamil Nadu Health Care Industry, India.

Structural model supports this hypothesis. If the attitude of the hospital staff and nurses is not good then medical tourist will not be attracted. Overall satisfaction of the patients depends on the attitude and behavior of hospital staff and nurses.

H₄: ‘Post Treatment related Issues’ negatively influences the ‘Perceived Performance on Service Attributes’ in Tamil Nadu Health Care Industry, India.

Structural model supports this hypothesis. Post care treatment should be given utmost importance in order to retain the existing medical tourists as well as potential medical tourists in the health sector. If post care treatment is not being taken care of then it will lead to dissatisfaction in the minds of medical tourists.

H₅: ‘Doctor related Issues’ positively influences the ‘Perceived Performance on Service Attributes’ in Tamil Nadu Health Care Industry, India.

Structural model supports this hypothesis. Doctors are the pillars of success of health industry. If efficient doctors are available then medical tourists will positively come. The success and failure of any hospital depends on the efficient as well as effective doctors.

H₆: ‘Local Environment related Issues’ positively influences the ‘Perceived Performance on Service Attributes’ in Tamil Nadu Health Care Industry, India.

Structural model supports this hypothesis. Local environment mainly includes cheap and best transportation cost, good weather, political stability, good accommodation facility, availability of food, etc. If these are available then it will positively influence the ‘Perceived Performance on Service Attributes’.

H₇: ‘Perceived Performance on Service Attributes’ positively influences the ‘Overall Customer Satisfaction’ in Tamil Nadu Health Care Industry, India.

Structural model supports this hypothesis. Overall customer satisfaction depends on various factors of service attributes like hospital infrastructure, treatment facilities, hospital staff/nurse, post treatment related issues, doctor related issues, local environment related issues, etc. If all the service attributes are better than overall customer satisfaction will be achieved successfully.

Implications of the Study: From our empirical study, it is very clear that the healthcare industry must consider the above stated factors in order to draw the attention
of medical tourists. It will help the healthcare industry in designing their strategies in order to draw the attention of medical tourists. From our present study, it is also observed that the attitude of nurse & staffs and post care treatment have negative impact on perceived performance. It implies that if the attitude of nurse & staffs are not right then the customers will not be satisfied. On the other hand, if the post care treatment is not given due importance then there will be negative perceived performance among the medical tourists. Therefore, the attitude of nurse & medical staff and post care treatment facilities should be given utmost importance.

**Conclusion**

Medical tourism is slowly and steadily becoming a phenomenon across the globe. Governments are trying their best to tap into this sector as it is capable of generating huge revenue as it is a service industry. The customer of medical tourism with optimum level of satisfaction mobilizes and generates goodwill to the business. The level of satisfaction is highly dependent upon perceived performance on service attributes. In our study, it is also observed from path analysis of structural model that ‘Doctor Related Issues’, ‘Treatment Facilities Related Issues’, ‘Hospital Infrastructure Related Issues’, and ‘Local Environment Related Issues’ having direct impact on overall customer satisfaction. Therefore, the healthcare industry must emphasis on the above stated four factors in order to draw the attention of medical tourists in Tamil Nadu, India. The study also concludes that if there is not efficient and adequate doctors then the medical tourists will be strongly dissatisfied. So, we can say that efficient and adequate doctors are the pillars of success for healthcare industry located in Tamil Nadu, India. However, it is essential for the government to take certain steps in order to develop this industry. In this manner, the gap between the private and the government health services could be reduced further in terms of delivering the quality services.

**Ethical Clearance:** Ethical approval for this study has been taken from selected hospitals of Tamil Nadu, India for carrying out the data collection procedure smoothly. Also Patients/Patient-Parties as our respondents have been assured for maintaining full confidentiality of their feedbacks related to this research.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**REFERENCES**


To Evaluate and Compare the Microleakage in Class Five Cavities Restored by a Nanohybrid and a Nanofilled Composite Resin by Dye Penetration Method—An in Vitro Study

Chitharanjan Shetty, Namrata Khanna, Mithra N. Hegde

Aim and Objective: To evaluate and compare the microleakage in class five cavities restored by a nanohybrid and a nanofilled composite resin by dye penetration method.

Method and Methodology: Twenty premolar teeth were collected and standardized Class five cavities were prepared. The samples were divided into two groups, Group A and Group B. All the samples were then restored with the composite pertaining to that group (n=10). The samples were immersed in 2% methylene blue dye for 24 hours, post which they were sectioned vertically and the microleakage was assessed under the stereomicroscope.

Results and Statistical Analysis: The data for all the samples was obtained and subjected to statistical analysis.

Conclusion: Group B (Nano-filled composite resin) achieved superior results over the nano-hybrid composite resin group and exhibited lesser microleakage.

Keywords: nanofilled, nanohybrid, microleakage, composite resin, dye penetration

Introduction

The treatment of cervical defects is a prevalent clinical procedure in restorative dentistry. Fluoride accessibility and effective preventive programs and improved dental care has perpetuated the longevity of the treatment offered to patients. Preventive care has also led to a larger conservation of natural teeth in the population. Root caries and cervical lesions are still a challenge owing to aging and dentin exposure caused by gingival recession. Composite resins are a suitable alternative for the restoration of such lesions and provide aesthetics and satisfactory physical properties. Cervical restorations are technically demanding as the gingival margin is usually located in dentin or in cementum and this is a critical factor in establishing the adaptation of the margins. A strong bond strength is required for the durability of dental restorations defining its clinical success. Acid etching has certainly enhanced marginal adaptation and yet marginal gaps are a drawback. Regardless of their wide usage, composite resins put forth pertinent disadvantages such as inherent polymerization shrinkage, which explains the contraction gaps at the restoration/tooth interface leading to microleakage.

In an effort to achieve the minimization of unwanted effects of polymerization shrinkage and marginal leakage, an array of newer bonding systems have been introduced along with alternate placement techniques. However, all materials leak to some extent on dentin and cementum, and apart from fulfilling esthetic demands, improvements in the mechanical characteristics helped composite to be used as a posterior restoration as well.
Introduction of enhanced bonding and curing systems and reduction in filler particle size are a contributing factor in its advancement. Composite resins have developed from macro-filled to micro-filled and from hybrids to micro-hybrids and over the years, the dental market has also seen the evolution of the nano-filler technology along with packable and flowable composites.

Nevertheless, each resin based material is conferred with own favorable and unfavorable properties. Amongst these, the hybrid resin materials provide the best blend of adequate physical properties in high clinical demands for anterior as well as, posterior restorations. The nano-filler technology saw the employment of nanomer particles that are discretely 20-75nm in size and nano-clusters that are loosely bound agglomerates of the same. The combination of nanomers as nano-filled particles alone or with other filler-sized composite resins impart strength and showcase an improved polish retention.13

Microfills were thought to be the gold standard in esthetic restorations but their radiopacity and lack of strength and wear resistance limited their use to selected anterior teeth restorations only. Hybrid composite resins on the other hand provided a high filler loading but compromised on the esthetic qualities due to their average particle size being in the sub-micron range.

The two resin composites that were selected for this study were a nano-hybrid composite, Solare Sculpt, GC India Dental (Group A) and the nano-filled composite being Filtek™ Z350 XT Universal Restorative material, 3M™ ESPE, St. Paul, USA (Group B).

Filtek Z350 XT contains bis-GMA, UDMA, TEGDMA, and bis-EMA resins. The fillers are a combination of non-agglomerated/non-aggregated 20 nm silica filler particles and non-agglomerated/non-aggregated 4 to 11 nm zirconia filler particles and aggregated zirconia/silica cluster filler particles that comprise of 20 nm silica and 4 to 11 nm zirconia particles. The inorganic filler loading is around 72.5% by weight (55.6% by volume). Translucent shades and 78.5% by weight (63.3% by volume) for all other shades.14

GC nanotechnology has a unique homogeneous, pre-polymerized nano-fillers with uniform dispersion silane treatment technology and high density. 300 nm strontium glass fillers are homogeneously dispersed for high flexural strength and wear resistance.

Materials and Methodology

20 freshly permanent human premolar caries which were restoration-free without any visible cracks, extracted for orthodontic purposes, were selected. The roots of the teeth were scrubbed and soaked in hypochlorite solution for disinfection and stored in physiological saline solution at room temperature to prevent dehydration. The cemento-enamel junction (CEJ) of each specimen was demarcated with an indelible pen and the apices mounted in modelling wax up to 3 mm below the CEJ. Straight fissure diamond bur (Diamond fissure 330; SS White, Washington, USA) in a high speed handpiece and an air/water spray were used to prepare a standardized class V cavities (4mm mesiodistal width, 2 mm occluso-gingival height and 2 mm axial depth) on the buccal surfaces of each tooth. The occlusal margins of cavities were prepared at the gingival margins extending 1mm above the cementoenamel junction (CEJ). Each bur was used for five preparations. After cavity preparation, the teeth were randomly divided into two groups (n=10). Both groups were etched with 37.5% phosphoric acid for 15 seconds, and then rinsed with water jet for 20 seconds. Then, the teeth were restored with composite pertaining to the group they belonged to in normal consistency following the application of bonding agent used on the etched enamel and dentine. The teeth underwent thermocycling for 500 cycles in a water bath at 5° and 55°C for 30 seconds after which they were subjected to cyclic loading for 10,000 cycles.

The samples were immersed in 2% methylene blue dye for 24 hours, post which they were sectioned vertically and the microleakage was assessed under the stereomicroscope. The dye penetration in the specimens was evaluated for gingival surface based on the graded scoring system given by Araujo et al (2001) and Munro et al (1996) in Table 1.15 Each sample was observed and separately scored by two examiners blindly.

Statistical Analysis and Results

Results were expressed as means and standard deviations. Data was statistically analyzed by using independent t-test. SPSS version 20.0 was used with a significance level set at 5%.
Table 1: The scoring criteria used was that given by Araujo RM et al (2001), and Munro et al (1996)

<table>
<thead>
<tr>
<th>Score</th>
<th>Inference obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No microleakage/No dye penetration</td>
</tr>
<tr>
<td>1</td>
<td>Microleakage observed only at the cavity wall of enamel/Dye penetration through the cavity margin reaching the enamel.</td>
</tr>
<tr>
<td>2</td>
<td>Microleakage observed at the cavity wall of dentin but not on the cavity floor/Dye penetration through the cavity margin reaching the dentin.</td>
</tr>
<tr>
<td>3</td>
<td>Microleakage observed on the cavity floor/Dye penetration through the cavity margin reaching the cavity floor.</td>
</tr>
</tbody>
</table>

Discussion

Microleakage can be defined as the dynamic clinical undetectable passage of bacteria, fluids, chemical substances, molecules and ions in between cavity walls and the restorative material used. Since the very beginning of dentistry, many research studies have been done to bridle the difficulty of microleakage in dental restorations, especially in cervical abrasions and class five cavities, but until today, there have been no dental restorative materials or techniques that can truly and completely eliminate microleakage.16,17
The sealing properties of the restorative material can be affected by improper adaptation of the restorative material to the cavity walls and margins along with how the material is condensed. In this study, dye penetration method was used to evaluate the microleakage because methylene blue dye penetration method provides the evaluators with a perfect and easy visualization of the prepared cavity and the digital images deliver a clear reference point from which scoring can be done. The dye also provides an excellent contrast with the surrounding environment.18

Microleakage is more critical in class V cavities as due to the majority of cervical margins these lesions are located in both dentine and/or cementum, which may lead to a weaker marginal seal than that at the enamel surface. However, it is essential to obtain a reliable dentin bond to the restorative material.19,20 The adhesion between composite resins and dentin is not as strong as with enamel; therefore the material can be dislodged toward occlusal during polymerization contraction, causing a bad adaptation of the restoration at the cervical margins.21

All tested samples exhibited dye penetration at the tooth-restoration interface. This could be attributed to the fact that dimensional changes in the resin often results from polymerization shrinkage of the restorative resin material and differences in coefficient of thermal expansion and contraction between the tooth and the restorative material. These changes in the material produce internal forces that results in gap formation at the tooth-restoration interface, which in turn causes microleakage. 22

While Group A resin’s composition consists of predominantly UDMA resin matrix AND pre-polymerised barium/strontium fillers (300nm) that are individually silanated and homogeneously distributed amongst the matrix for better wear resistance and reduced microleakage, group B achieved better results with respect to microleakage. This could be due to the zirconia/silica filler nanoparticles that exhibit a better polishing and resistance to abrasion. In case of the Group B composite resin, majority of TEGDMA is substituted with BisGMA and UDMA which are high molecular weight particles that considerably reduce shrinkage.

The various composite resins in the market with their varied filler technology provide a clinician an array of options to choose an appropriate restorative material catering to a particular case selection. The most widely used nano-filled resin being Filtek Z350XT is however the most popularly recognized resin from the nano-filler particle range. Nanohybrid resins may also provide matchable and desired results in comparison to the above and are an excellent alternative restorative material. Filler technology has been a boon in the reduction of microleakage as the smaller sized particles contribute to higher strength and lesser spaces between the adjacent particles automatically confers reduced marginal leakage of bacteria and contaminants.

**Conclusion**

Under the limitations of this study, Group B i.e. the Nano-filled composite resin showed lesser microleakage compared to Group A- Nanohybrid composite resin. However, more research is sought out to establish a decisive restorative material that can dominantly be indicated for such lesions.

**Conflicts of Interest:** There were no conflicts of interest with this study.

**Source of Funding:** The study was self-financed.

**Ethical Clearance:** This was an in vitro study that did not require ethical clearance.

**REFERENCES**

5. Grenness MJ, Tyas MJ, Osborn JE. Mapping a non-carious cervical lesion using stereomagery


A Clinical Investigation onto the Effect of Occlusal Interferences & Cognitive Behavioural Therapy in Temporomandibular Disorder Patients

Jinal Barochia1, Vignesh Kamath2, Konark Patil3, Roseline Meshramkar4
1BDS, MDS, (Prosthodontics and Crown & Bridge), Private Practitioner; 2Assistant Professor, Department of Prosthodontics, Faculty of Dentistry, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, Karnataka, India; 3Assistant Professor, Department of Prosthodontics, SDM College of Dental Science, Dharwad, Karnataka, India; 4Professor & Head, Department of Prosthodontics, SDM College of Dental Science, Dharwad, Karnataka, India

ABSTRACT

Purpose: The aetiology of temporomandibular disorder has been considered to be one of the most controversial issues in clinical dentistry. One of the conflicts that have attracted most attention has been the role of occlusal factors in temporomandibular disorder signs and symptoms. Therefore, this clinical investigation was done to evaluate the effect of occlusal interferences & cognitive behavioural therapy in temporomandibular disorder patients.

Method: The study was carried out on 60 dental students, age ranging from 18-25 years. The subjects were screened using Research Diagnostic Criteria for temporomandibular disorder. Further, the T-Scan was used to find the occlusal interferences and accordingly occlusal adjustments were made. These subjects were recalled after 2 weeks for screening and they were counselled under cognitive behavioural therapy for 3 sessions. They were screened again after the completion of 3 sessions i.e. after 6 weeks. At each visit, chewing test is carried out by calculating chewing strokes with test food.

Results: The majority of samples were in the range of 6-7 on pain scale at baseline, after 2 weeks in the range of 4-5 and after 6 weeks the intensity of pain was reduced to 3-4.

Conclusion: Occlusal adjustment can contribute to a positive treatment outcome in combination with other forms of therapy (counselling, splints, physiotherapy, etc).

Keywords: Temporo-mandibular disorders; occlusal interference; cognitive behavioural therapy; T-scan.

Introduction

Temporomandibular joint along with associated structures forms an integral part of stomatognathic system. Any imbalance in the harmonious relationship of temporomandibular joint with stomatognathic system leads to temporomandibular disorders. Temporomandibular disorders and their relevance to dentistry has been a highly debated topic as they include a wide variety of conditions associated with orofacial, head and neck pain dysfunction. Temporomandibular disorders present with a wide variety of symptoms and deleterious effects which adversely affects the patient’s social, professional, and economic life. [1]
The aetiolog of temporomandibular disorder has been considered to be one of the most controversial issues in clinical dentistry. One of the conflicts that have attracted most attention has been the role of occlusal factors in temporomandibular disorder signs and symptoms. Occlusal interferences cause muscle hyperactivity, which in turn can lead to muscle incoordination and dysfunction. Hence, the correction of the interferences eliminates the muscle dysfunction, relieves the pain and allows the muscles to return to normal balanced activity. (2)

Therefore, occlusion has an important place within the multifactorial concept of the temporomandibular disorder etiopathogenesis as well as in every form of dental treatment. Masticatory muscles and temporomandibular joints are directly connected with occlusal relations and temporomandibular disorders are traditionally linked with occlusal disorders.

Mastication is one of the main functions of the stomatognathic system and it may be hampered by temporomandibular disorders. As a result, limited masticatory function is one of the problems that patients with temporomandibular disorders encounter. Rehabilitation in order to improve the masticatory function is therefore one of the goals in the treatment of temporomandibular disorder. (3)

Hence this study was undertaken to investigate the effect of occlusal interferences & cognitive behavioural therapy in temporomandibular disorder patients.

**Materials And Method**

**Source of Data:** The study was carried out on 60 dental students, age ranging from 18-25 years at SDM College of Dental Sciences & Hospital, Dharwad.

Among all the different classification systems Research Diagnostic Criteria -Temporomandibular Disorders (4) is the most recommended diagnostic criterion as it includes an assessment of distress and disability, psychological and social factors. This dual-axis system grades and measures both physical and psychosocial components.

**Inclusion Criteria:**
- Pain and tenderness in the temporomandibular joint
- Tenderness of the masticatory muscles
- Mandibular deviation in occlusion

**Exclusion Criteria:**
- Any obvious other dental anomaly
- History of trauma
- Any other disorders like temporomandibular joint osteoarthritis or capsulitis
- Psychiatric disorder patients
- Subject not willing to accept treatment
- Mandibular deviation more than 3 mm

Informed consent of all the patients was taken and they were explained about the whole procedure.

Ethical clearance was taken from Institutional Review Board.

**Methodology**

The subjects were screened using Research Diagnostic Criteria for temporomandibular disorder. Further, the T-Scan was used to find the occlusal interferences and accordingly occlusal adjustments were made. These subjects were recalled after 2 weeks for screening and they were counselled under cognitive behavioural therapy for 3 sessions. They were screened again after the completion of 3 sessions i.e. after 6 weeks. At each visit, chewing test was carried out by calculating chewing strokes with test food which was a piece of raw carrot (1*1/2 inch) in dimension.

**Results**

Table 1: Visual analogue scale

<table>
<thead>
<tr>
<th>SCALE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>9</td>
<td>19</td>
<td>22</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T1</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>20</td>
<td>26</td>
<td>8</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>-</td>
<td>8</td>
<td>27</td>
<td>23</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
The visual analogue scale (VAS) is one of the most commonly used measures of pain intensity in pain research. It gives reliable outcome in clinical trials on temporomandibular disorders.\(^5\)

- T0 represents baseline (first visit)
- T1 represents subjects screened after 2 weeks
- T2 represents subjects screened after 6 weeks

**Table 2: Masticatory Comfort**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>T0</th>
<th>T1</th>
<th>T2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chewing efficiency with food (chewing strokes)</td>
<td>19(±3)</td>
<td>15(±2)</td>
<td>13(±2)</td>
</tr>
</tbody>
</table>

For chewing tests, each subject was instructed to chew the portion of test food.

For estimating the masticatory performance, raw carrot with the (1*1/2) inch dimension was kept as test food.

**Discussion**

Occlusal therapy/equilibration is defined as ‘the modification of the occlusal form of the teeth with the intent of equalizing occlusal stress, producing simultaneous occlusal contacts or harmonizing cuspal relations.\(^6\)’ Permanent alteration of the occlusal condition is indicated for 2 reasons viz. the first and most common reason is to improve the functional relationship between the maxillary and mandibular teeth. The second reason for permanently altering the occlusal condition is as a treatment goal to eliminate a temporomandibular disorder and correct orthopaedic instability. Occlusal equilibration is appropriate only when alterations of the tooth surfaces are minimal so that all corrections can be made within the enamel structure.\(^7\)’ In the present study, there was a drastic reduction in the intensity of pain among the subjects after 2 weeks post occlusal equilibration. Forsvell H et al in 1987\(^8\) reported in their research work that the occlusal treatment had shown better results than placebo treatment. Vallon D et al in 1995\(^9\) found that occlusal adjustment is a treatment modality with a significant short-term effect on symptoms of craniofacial disorder of muscular origin.

Cognitive Behavioural Therapy (CBT) aims to enable individuals to better manage their difficulties by applying empirically researched principles of thoughts, feelings and behaviours. These principles translate into practical strategies, which can lead to changes in subjective and objective thoughts, feelings and behavioural states. Interventions in cognitive behavioural therapy include: goal setting, challenging negative automatic thoughts, relaxation and breathing exercises, cognitive visualisation exercises, behavioural coping strategies, stress management and assertion skills.\(^10,11\) In the present study, the subjects were counselled under cognitive behavioural therapy for 3 sessions. They were screened again after 6 weeks and reported a gradual reduction in the intensity of pain. Shedden Mora MC et al in 2013\(^12\) in their research demonstrated that biofeedback-based cognitive-behavioural treatment resulted in larger improvements in pain coping skills, and was well accepted by the patients, underlines the importance and feasibility of psychological treatments in the clinical management of temporomandibular disorder. Koop S in 1979\(^13\) reported that the counseling of patients had reduced their subjective symptoms and occlusal adjustment improved the clinical signs of mandibular dysfunction involving the temporomandibular joint.

In dental practice, articulating papers in various colours are most commonly used to visualize the contacts. Occlusal waxes or the computer-aided analysis of silicone check-bites are possible alternatives.\(^14\) One of the most innovative systems for quantitative occlusal analysis was developed by Maness. The Tek-scan system uses a sensor unit that records occlusal contacts on a thin Mylar film and relays the information to a computer. Through analysis of the occlusal contacts it is possible to determine the sequence and timing of which teeth contact with what degree of comparative force. Comparisons can be made for occlusal contacts in centric relation versus centric occlusion.\(^15\) The computerized occlusal analysis system is the only occlusal indicator that demonstrates the ability to provide quantifiable force and time variance in a real-time window from the initial tooth contact into maximum intercuspation. The reported advantages to accurately indicate occlusal contacts make the computerized occlusal analysis system a better occlusal indicator when compared with other non-digital conventional indicator materials available. The advantages of Tek-scan over other methods are pinpoint occlusal contacts and remove interferences with ease, enhance patient communication and education & eliminating the need for multiple
adjustment appointments. Garrido Garcia VC et al in 1997 found that the T-Scan system is a reliable method for the analysis and evaluation of occlusal contact distribution in maximum intercuspation. The goal is to obtain the maximum number of axially directed contacts that are equal in intensity. The pressure of even one tooth contact with greater intensity is sufficient to destroy the muscle harmony and activate a hyperactivity of the unbalanced muscles.

Masticatory performance is the most commonly used measure of masticatory function. It quantifies a patient’s ability to break down food based on the size of food particles after a specified number of chewing cycles. Numerous studies have shown that the masticatory performance is related to occlusal factors. In the present study, there was a considerable change in the number of chewing cycles from baseline to 6 week interval and observed 30 % improvement in masticatory efficiency (Figure 3). Henrikson T et al in 1998 found in their research that masticatory efficiency and ability were partly dependent on the occlusion and the symptoms of temporomandibular disorder had influenced the masticatory efficiency and ability.

The findings of this study are in agreement with the research work of Vallon, Koop and Henrikson and corroborate the conclusion that the occlusal therapy and counselling have shown better results than other measures.

Temporomandibular disorders and muscle disorders are common condition involving pain in the temporomandibular joint and/or associated masticatory muscles. The most recommended diagnostic criterion is the RDC/TMD in which assessment of distress and disability, psychological and social factors may be useful in providing an exact diagnosis. Treatment can range from simple homecare practices, splint therapy, occlusal adjustment, analgesics to psychotropic medication and rarely surgery. However, a simple occlusal adjustment may be defensible as an early treatment for temporomandibular disorders as it may reduce short-term symptoms. Cognitive Behavioural Therapy has been found to be effective in reducing pain and disability in temporomandibular disorders, particularly in combination with other treatment modalities, such as medication and biofeedback.

Moreover, Julian KC et al in 1996 reported that there is significant difference in masticatory performance among men, women, young boys and young girls. Therefore, further studies are required to study the effect of gender-based and age-related changes (body size) in masticatory function.

Conclusion

Occlusal adjustment can contribute to a positive treatment outcome in conjunction with other forms of therapy like counselling which incorporates patient education, encouragement towards self-management, reduce temporomandibular disorder related symptoms and disability.
Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: Obtained and Attached

REFERENCES


Endodontic Management of Maxillary First Molar with Six Canals—A Case Report

Karthick Arumugam¹, Paramasivam Vivekanandhan², Arunajatesan Subbiya², Malarvizhi Dhakshinamoorthy³, Mensudar Radhakrishnan², Geethapriya Nagarajan³

¹Associate Professor, ²Professor, ³Senior Lecturer, Department of Conservative Dentistry and Endodontics, Sree Balaji Dental College and Hospital, Narayananur, Pallikaranai, Chennai

ABSTRACT

All teeth are found to have variations in dental anatomy. For the success of endodontic treatment, clinician should have complete knowledge regarding the variations of the root canal anatomy. This case report demonstrates successful management of maxillary first molar with six canals: two palatal, two mesio-buccal and two disto-buccal canals. Such variation in anatomy exists and so the astute clinician should take a note of these anatomical considerations while treating a tooth.

Keywords: Maxillary first molar, anatomical variations, additional canals.

Introduction

Endodontic treatment aims at achieving three dimensional obturation of the root canal system which can be accomplished by the clinician who possesses thorough knowledge of the root canal anatomy and its variations. In his study on maxillary molars, Pecora et al found that three canals were there in 75% of maxillary first molars, 58% in second molars and 68% in third molars and four canals in 25%, 42%, 32% of first, second and third molars respectively. [1] Most common root canal anatomical finding in maxillary first molar is the presence of second mesiobuccal canal, whose incidence ranges between 18% and 96.1%.[2] Other uncommon variations include presence of one [3], four [4] and five [5] roots and also with unusual morphology within the root canal systems. Case reports with five [6] and six [7] root canals or with a C-shaped canal configuration [8] have also reported earlier.

In two separate case reports, six root canals were identified by Martinez-Berna’ and Ruiz-Badanelli, out of which three were in mesiobuccal roots, two in distobuccal and one in palatal roots. [9] Similarly de Almeida et al [7] and Bond et al [10] in their clinical case found two mesiobuccal, two distobuccal, and two palatal canals accounting to six canals. A case report by Maggiore et al [11] revealed six canals with two mesiobuccal, three palatal, and one distobuccal canals and Adanir [12] had four roots (mesiobuccal, mesiopalatal, distobuccal, and palatal) with six canals (one mesiobuccal, two mesiopalatal, two distobuccal, and one palatal canal). The incidence of two canals in distobuccal root varies between 1.90% - 4.30% [13,14,15] and that of two canals in palatal root varies between 2% to 5.1%.[16]

This clinical case report showcases a successful endodontic management of a maxillary first molar whose root canal anatomy exhibits an anatomic variation of two canals in all three roots resulting in a total of six canals in a single tooth.

Case Report

A 19 year-old young adult was reported to the Department of Conservative Dentistry and Endodontics, Sree Balaji Dental College and Hospital, Chennai, with a chief complaint of spontaneous toothache in his upper left back tooth region for past 2 weeks. Patient gave a history of increase in intensity of pain by thermal stimuli and on mastication. History also revealed an intermittent
pain in the same tooth with hot and cold stimuli for the past one month. Careful examination revealed maxillary left first molar was carious and it was tender to percussion. There was no mobility of the tooth and periodontal probing was within physiological limits.

Vitality testing of the involved tooth with heated gutta-percha caused an intense lingering pain, whereas electronic pulp stimulation (Parkel Electronics Division, NY) caused a premature response. A preoperative radiograph revealed radiolucency approaching the pulp space. Correlating the clinical and radiographic findings, the patient was diagnosed with symptomatic irreversible pulpitis with symptomatic apical periodontitis. Root canal treatment was planned and suggested to the patient.

Variation in canal anatomy could not be identified in radiographic evaluation [Figure 1]. Patient was administered with local anesthesia containing 2% lidocaine with 1:80,000 epinephrine. Under Rubber dam isolation, access opening was made [Figure 2], and four well-defined root canal orifices were located using a DG-16 explorer (Hu-Friedy, Chicago, USA) on the pulpal floor. One orifice for each of the buccal roots and two separate orifices for the palatal root were identified. A working length radiograph was taken which revealed two independent palatal canals joining in the apical portion, and the distobuccal file was not at the center of the canal [Figure 3]. Under magnification with dental operating microscope, dentinal lips around the mesiobuccal root was cleared and mesiopalatal canal orifice was revealed. Confirmation of working length was done with radiograph and an electronic apex locator (Root ZX; Morita, Tokyo, Japan) [mesiobuccal canal -17 mm; mesiopalatal canal, distobuccal canal and distopalatal canal -16.5 mm; and 21 mm and 20 mm for the two palatal canals]. Cleaning and shaping of the canals were performed in a crown-down technique using ProTaper Nickel-Titanium rotary instruments (Dentsply Maillefer). Distobuccal and distopalatal canals were found to be joined after canal preparation and enlargement. Irrigation was done using normal saline, 2.5% sodium hypochlorite solution and 17% EDTA with 2% chlorhexidine digluconate as the final irrigant. Absorbent paper points (Dentsply Maillefer) was used to dry the canals and obturated using cold lateral compaction of gutta-percha (Dentsply Maillefer) with AH Plus resin sealer (Maillefer, Dentsply, Konstanz, Germany) [Figure 4, 5]. Final restoration of the tooth was done with a posterior composite resin core. Full coverage porcelain crown was made and the patient was recalled after 3 months during which he was found to be asymptomatic.
Discussion

Scientific literature emphasizes on the fact that success of endodontic treatment of maxillary molars depends upon thorough knowledge of root canal morphology and its configuration. Existence of root canal anomalies is not an exception but awareness of its presence helps to treat cases with an unusual morphology. Cohen and Burns suggested the fact that the only reason why the canals are not treated is due to the failure of not locating it. [17] The clinician should make every possible effort to locate and treat the canal when he suspects it.

In the present case report during access opening after the removal of the coronal pulp and exploration of the canals, bleeding was present on the pulp chamber floor. On suspecting additional canals further exploration of the floor was carried out under magnification and this lead to the location of the two remaining palatal canals. The palatal root had two orifice openings with a single apical foramen whereas mesio buccal and disto buccal roots had two canals with two separate apical foramen. The success of identifying and negotiating canals requires proper access opening. The shape of access opening for maxillary molars is triangle shaped with apex pointing at the palatal canal and base formed by the buccal canals. But we have modified the access opening to a more trapezoid form in order to include all of the canal orifices. To facilitate cleaning and shaping of all the canals, combination of Hand files, Gates Glidden burs, and rotary Ni-Ti instruments were used.

If the clinician suspects any anatomic variations, he should recognize it by taking radiographs at different angles; by using 1% methylene blue dye to stain the chamber floor; “champagne bubble” test using sodium hypochlorite or by visualizing canal bleeding points. In addition, possibility of additional canals should be considered, if the clinician feels the endodontic files are not well centered in the canal on the radiograph. Microscope also aids in verifying the presence of morphologic variations. Occurrence of a second canal in the distobuccal and palatal roots is not frequent, but awareness of the existence of all possible anatomic variations aids the clinicians in the success of the root canal therapy.

According to Buhrley et al when he compared the groups of microscope, dental loupes and no magnification groups, he found that the frequency of MB2 canal detection in the maxillary first molars were 71.1%, 62.5%, and 17.2%, respectively. [2] In the present case, it was very difficult to predict the root canal anatomy on the basis of preoperative radiograph alone. Inadvertent search for extra canals without the aid of magnification could have led to perforations and excessive removal of tooth structure. Hence, clinicians should familiarize and incorporate dental microscopy in endodontic practice to get additional anatomic information. [18]

Conclusion

The present case report discusses the successful endodontic management of an unusual case of a maxillary first molar with three roots and six canals. It also highlights the role of dental operating microscope as an important analytic tool to ascertain root canal morphology which aids in the success of the treatment.

Source of Funding: Nil

Conflicting of Interest: Nil

Ethical Clearance: Nil
REFERENCES


A Study on Issues on Environment Pollution and Health Hazard in Tamilnadu

R. Bright Reginold Raja¹, S. Antony Selvi²

¹Assistant Professor, Department of Management Studies, St. Xavier’s Catholic College of Engineering, Chunkankadai, Nagercoil; ²Professor, Department of Physiology, Rajas Dental College & Hospital, Kavalkinaru Junction-, Tirunelveli

ABSTRACT

In general, most of the diseases are caused by various mode of pollution. The awareness of the people and the impact of pollution, the causes of diseases may vary. In such circumstance, many social issues regarding environmental pollution have been agitated due to the effect of diseases and the awareness on such pollutions. The present paper portrays the health hazard, environmental pollutions and social issues on various modes of pollution in Tamilnadu during the decade of 2009-2018. Health hazard includes major diseases affected during the study period. Environment pollution consists of land, air and water pollutions. Social issues have happened in various places for the impact of environmental pollutions and the effect of diseases. The recommendations of the present paper will definitely give implication to the policymakers.

Keywords: health hazard, environment pollutions and social issues

Introduction

Society is one of the main pillars of the environment. National development is assured when the protections against health hazard, environmental pollutions, and social issues. The national economy is for providing facilities/services on defense, medical, education, and infrastructures. The economy of a country expected the sources of income from the major sectors such as agriculture, industry, and services. The industry is in the second place of its percentage of contributions to the Indian economy. Besides the environmental pollutions are in the first place. Hence, the protections against industrial pollutions on land, air, and water are significantly increased day-by-day. On the other hand, people affected due to pollutions are also increased subsequently. With the result, social issues have been increased against pollutions and its impact i.e., a health hazard. The awareness of the people is promoted by social media, political parties, public, government, and NGOs. The steps have taken against social issues by the court of law and government is the major implications on the part of the health hazard and environmental pollutions. The present paper enlisted the major issues on environment pollutions and the health hazard in Tamilnadu during the study period. The present paper also revealed the previous studies related to the health hazard, environmental pollutions, and social issues in Tamilnadu during the study period.

Environment Pollutions and its Issues in India: Many pollution issues are giving causations to India with several diseases. The main pollutions are air pollution, (land) garbage pollution, and water pollution. According to World Bank experts, from 1995 to 2010, India has faced and challenged environmental issues on par to other developed nations. Like India, many of the developed countries are facing the same situations. India will suppose to meet a big challenge and threaten in a few forthcoming years. At that time, India will cause of disease, health issues and long term adverse impact on livelihood through environmental issues.
**Water Pollution:** About 30 years back people in villages are used the pond water for their edible and even for drinking purpose. Most of the village people used the well, pond, river, and hand pump water for drinking. After entering the new companies into the Indian water market, they created the demand and unsafe for drinking above said sources of water due to various diseases affected. The packaged drinking water (without minerals) is created its demand even in remote villages. There is no remedy to cure water pollution by means of government, but they also prepared the packaged drinking water. Still, water pollution has been existing, when it is wiped-out or reduced?

**Water Resources:** NASA stated that the groundwater has been declining are highly on Earth between 2002 and 2008 in northern India. Politicians of India are concentrating the capital of India for the political benefits. But they are not for the development of agriculture and the protections against global warming. The people are obviously understood that the government is tried to fetch and sustain the next ruling period during their rule. Hence the survival of the people is a very big question for future water resources.

**Air Pollution:** Indian industry development is galloping its growth in the international arena. It results; the air pollution is stringently causing India. The technology alone will help to reduce air pollution. Because the industry and its usages are may not suppose to reduce or decline. The needs and wants of the commodity, goods and services will definitely be got the straight line growth. The research and development of the nation are responsible for increasing air pollution.

**Soil:** The soil is the main source of mineral in the world. Living organisms are living with the help of soil by means of basic needs. The human being has been polluted the soil unethically. The government is also injudiciously taking sand and other minerals from various sources to making money (politically) or funding the local body. There is no maintenance of water resources, drainage systems, and also collapsing the wastage/drainage water into the water resources. Totally, the government not does anything for the cultivation, rehabilitation of non-cultivatable lands, and agriculture economy.

**Health Expenditure:** The World Bank data have utilized to assess the per capita health expenditure incurred during the study period.

**Table 1: Per capita Domestic Private health expenditure**

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic private health expenditure per capita (current US$)</th>
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<th>Out-of-pocket expenditure (% of current health expenditure)</th>
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**Source:** World Bank Report

The per capita domestic health expenditure is average US$ 29.33. 75.9 percent of domestic health expenditure has been incurred and averagely the expenditure spent out-of-pocket is 69.01 percent. The value of covariance is very low in its percentage of private expenditure and the out-of-pocket. It shows that the consistency of its stability in the same position during the above tabulated period. As per the per capita, the growth has significantly increased by about 8.27 percent of domestic private health expenditure. Hence, the people of India spent their own money health care is significantly increased.
Table 2: Domestic general government health expenditure per capita

<table>
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<tr>
<th>Year</th>
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</table>

Source: World Bank Report

The per capita government health expenditure is average US$ 9.3. 3.12 percent of government health expenditure has been incurred and averagely the expenditure spent out-of-pocket is 69.01 percent. The value of covariance is low in its percentage of government expenditure as per the GDP %. It shows that the consistency of its stability in the same position during the above tabulated period. As per the per capita, the growth has significantly increased by about 11.66 percent of government health expenditure. Hence, the government of India spent money on the health care of people is significantly increased.

Table 3: Level of Air Pollution exceeding WHO Interim Targets 1, 2 and 3

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<tr>
<th>Year</th>
<th>Target-3 value (% of total)</th>
<th>Target-2 value (% of total)</th>
<th>Target-1 value (% of total)</th>
<th>Mean annual exposure (micrograms per cubic meter)</th>
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<tbody>
<tr>
<td>2000-01</td>
<td>99.95</td>
<td>98.87</td>
<td>87.17</td>
<td>61.49</td>
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<td>98.87</td>
<td>87.17</td>
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<td>98.87</td>
<td>87.17</td>
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<td>98.87</td>
<td>87.17</td>
<td>61.49</td>
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<tr>
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<tr>
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<td>99.67</td>
<td>91.89</td>
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<td>65.66</td>
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<td>91.89</td>
<td>65.66</td>
</tr>
<tr>
<td>2008-09</td>
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<td>99.67</td>
<td>91.89</td>
<td>65.66</td>
</tr>
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<td>2009-10</td>
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<td>99.67</td>
<td>91.89</td>
<td>65.66</td>
</tr>
<tr>
<td>2010-11</td>
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<td>85.25</td>
<td>64.60</td>
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<td>97.89</td>
<td>84.60</td>
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<tr>
<td>2012-13</td>
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<td>99.13</td>
<td>91.89</td>
<td>65.66</td>
</tr>
<tr>
<td>2013-14</td>
<td>99.97</td>
<td>99.66</td>
<td>90.23</td>
<td>68.95</td>
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<tr>
<td>2014-15</td>
<td>99.97</td>
<td>99.69</td>
<td>92.65</td>
<td>71.61</td>
</tr>
</tbody>
</table>
The air pollution is averagely 99.96 percent as per target 3. In target 2 is 99.16 percent averagely. But target 1 is attained at 89.16 percent averagely. The value of covariance is very low in its value. It shows that there is the stability of their positions prolong period and also slightly increased. As per the mean exposure of micrograms per cubic meter is got positive growth has significantly attained as 1.18 percent Hence, the air pollution is significantly increased.

### Finding
1. The expenditure spent out-of-pocket is 69.01 percent. The value of covariance is very low in its percentage of private expenditure and the out-of-pocket
2. The per capita domestic health expenditure is average US$ 29.33. 75.9 percent of domestic health expenditure has been incurred
3. The per capita, the growth has significantly increased by about 11.66 percent of government health expenditure. Hence,
4. The per capita government health expenditure is average US$ 9.3. 3.12 percent of government health expenditure has been incurred and averagely
5. The expenditure spent out-of-pocket is 69.01 percent. The value of covariance is low in its percentage of government expenditure as per the GDP %. It shows that the consistency of its stability
6. The air pollution is averagely 99.96 percent as per target 3. In target 2 is 99.16 percent averagely. But target 1 is attained at 89.16 percent averagely.
7. The value of covariance is very low in its value. It shows that there is the stability of their positions prolong period and also slightly increased.

### Conclusion
As per the findings of the above tables, discussions, review of the literature and environmental issues in Tamilnadu, the author concluded that the pollutions by land, air, and water are persisted. The government of India should concentrate on protecting the people from pollution impact on a health hazard. The expenditure against health care is increased by per capita, private, and government. But external expenditure alone has decreased. It shows that other sources like insurance are not responsible for the medication of people in general.

**Ethical Clearance:** Completed

**Source of Funding:** Self

**Conflict of Interest:** Nil

### REFERENCES

Determination of Bacterial Contamination from Well water

Rashmi Saliyan¹, Kusumakshi Nayak²
¹PG Student, ²Assistant Professor, Department of Medical Laboratory Technology, Manipal College of Health Professions, Manipal Academy of Higher Education, Manipal

ABSTRACT

Background: Water is one of the most basic needs of life. 90% of the groundwater accounts for the world’s freshwater resources, used for irrigation, industry, and human consumption. Well water is considered as the sole source of drinking water in many regions. The water should be checked regularly to determine bacterial contamination in order to prevent water born bacterial diseases. This study was performed to evaluate the microbial quality of the water from the wells used for drinking purpose.

Method: In this cross-sectional study, twenty water samples from ten different wells around the agricultural area were collected in a 200ml capacity sterile container, transported to the laboratory and examined for presumptive coliforms by multiple fermentation tube test. The presumptive coliform count per 100 ml of water was determined using the probability table. Bacteria were then identified using conventional methods.

Results: All samples were contaminated with bacteria, and the most predominant bacteria isolated were Klebsiella pneumoniae (40%), followed by Pseudomonas aeruginosa (26%) and E.coli (13%). Of the ten wells tested, seven well water samples were found to be excellent, one satisfactory and two were unsatisfactory. No pathogenic bacteria were seen in any of the samples.

Conclusion: Before consumption of water, it should be adequately boiled, or filtered to prevent the incidence of water-borne diseases. Regular screening for bacterial contaminants is necessary in reducing the contamination and supplying safe drinking water.

Keywords: Well water, water contamination, most probable number, Presumptive coliform test, agricultural area, multiple fermentation tube, water borne diseases

Introduction

Water is one of the most basic needs of life¹. 90% of the groundwater accounts for the world’s freshwater resources and known as a vital global source of water for irrigation, industry, and human consumption². Visually, water should be clear, colorless, and free from all pathogenic organisms, their toxins, as well as poisonous minerals, and other organic substances³. In many of the regions well water is considered as the sole source of drinking water⁴.

Unsaturated zone and saturated zone are the two levels of water beneath the land surface. A saturated zone is filled with groundwater, and upper to that of the saturated zone is called a water table. Below the water table, the pressure is greater and that allows the water to enter into the well, thereby permitting groundwater to be withdrawn for human use. The depth to the water table varies seasonally and from year to year due to wide variation in the quantity, distribution, and timing of rainfall⁵.

Well is a hollow structure that is located in the ground by digging or boring mechanically or manually to access groundwater from the underground aquifers ⁶. Globally, contamination of well water is a problem that contributes to high mortality rates from water and food borne diseases⁷. In groundwater both the microbial and chemical contamination had been detected. There are numerous source of microbial contaminations which includes land disposal of waste outflow, slurry, septic
tank outflow, solid waste, agricultural mining, industrial practices and urban runoff. Water borne diseases such as cholera, hepatitis, typhoid fever, gastroenteritis are mostly caused by the usage of the untreated or inadequately treated ground water\(^8\). Consistent with the WHO, in developing countries, up to 80% of the health challenges are mainly due to water and sanitation related\(^9\).

In drinking water sources, pathogenic organisms are indicated by the presence of bacterial indicators\(^10\) like E. coli, total coliforms, thermo tolerant (fecal) coliforms, Clostridium perfringens and fecal streptococci\(^11\). E. coli are more common and widely distributed normal flora of humans and animal intestine\(^12,13\). Water samples should be regularly investigated to detect coliform bacteria E. coli (faecal indicator bacteria) according to the international ISO standards\(^14\) to check the quality of drinking water\(^15\).

**Materials and Method**

A cross-sectional study was conducted across Manipal, around the agricultural area, to determine the bacterial contamination of well water after obtaining the ethical clearance certificate form Institutional ethical committee, Kasturba Medical College and Hospital, Manipal Academy of Higher Education, Manipal. A total of ten wells used for drinking purpose were selected, and from each well two water samples were collected from two different sides. Informed consent was taken from well owners before the water collection.

World Health Organization guidelines were followed to collect well water samples. Water samples were collected by using 200ml of clean, heat sterilized bottles. An appropriate sized clean sterile stones were tied to the neck of the bottles using a piece of string. The bottles were unlocked and the mouth of the bottles was sterilized with cotton spirit. With no touching sides of the well and without beating the bottom or troubling any deposit, the bottles were lowered into the deep well. Total of 2 water samples from the same well at different sides were collected using two separate bottles. After filing a sufficient amount of water, bottles were removed by backpedaling the string. Nearly 20-30ml of water was removed from the bottles for adequate space to allow easy distribution of the bacteria in the water before processing. The bottles were properly labeled with complete details including source, site, address, date, and time of the collection. The water samples were delivered to the laboratory within 2 hours in a box containing ice packs. Four drops of aqueous thiosulphate solution were added to each of the bottles before sampling the water, to neutralizing chloride residue. Since the complete history of chlorination was obtained from the well owners, all the samples were neutralized with sodium thiosulphate solution soon after the collection\(^16\).

Water samples were processed in the laboratory by multiple tube fermentation test, to find the presumptive coliform count. Double and single strength of MacConkey broth bottles with Durham’s tubes were used and measured amount of water samples were added using graduated pipettes. One number of 50 ml volumes of water was added to 50ml of double strength MacConkey broth, five numbers of 10ml volumes of water added to 10 ml of double strength MacConkey broth and 5 numbers of 1ml volume of water added to the 5ml of single strength MacConkey broth (Table1). The tubes were incubated at 37°C for 24-48 hours. The presumptive coliform count per 100 ml of water was determined from the tubes showing acid and gas production using the McCrady’s Statistical table and interpreted the result \(^17\).

**Table 1: Sample volumes and number of tubes for multiple tube fermentation test**

<table>
<thead>
<tr>
<th>Volume and strength of lactose broth</th>
<th>50ml Double strength</th>
<th>10ml Double strength</th>
<th>5ml single strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of tubes included</td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Volume of water samples added</td>
<td>50ml</td>
<td>10ml</td>
<td>1ml</td>
</tr>
</tbody>
</table>

Tubes those showed turbidity, along with the production of acid which is denoted by yellow color in the bottle, and gas that accumulated in the Durham’s tubes were sub cultured to MacConkey agar plate and incubated at 37°C overnight. Next day, colony morphology was studied and bacteria were isolated and identified based on Gram staining report, typical features like lactose fermentation on MacConkey agar, and biochemical tests such as Catalase test, oxidase test, motility test, Indole test, mannitol fermentation test, triple sugar iron (TSI) agar test, citrate utilization test, and urea hydrolysis test\(^18\).
Result

Of the ten wells tested, seven well water samples were found to be excellent, one satisfactory and two were unsatisfactory. No pathogenic bacteria like Salmonella and Shigella were seen in any of the samples, but all twenty water samples were contaminated with bacteria. The most predominant bacteria isolated were Klebsiella pneumonia (40%) Fig. 1, followed by Pseudomonas aeruginosa (26%), E. coli (13%), Klebsiella oxytoca (8%), Enterobacter species (5%), Coagulase-negative Staphylococcus aureus (5%) and Providencia alcalifaciens (3%). Total bacteria isolated from the well water near agricultural areas are shown in the Graph 1, the bacterial pathogens distributed in the two sides of the wells are shown in the Graph 2.

![Chart 1: Bacterial pathogens isolated from well water sources](image)

**Graph 1: Number of bacteria isolated in the Right and left side of the ten wells**

![Figure 1: Mucoid lactose fermenting colonies of Klebsiella species in the MacConkey agar plate](image)
Discussion

Urbanization, overpopulation, environmental pollution and increasing demand of water pose a risk for the availability of safe drinking water. The guidelines set by WHO states that the existence of enteric coliforms especially E.coli makes the water samples unfit for the human consumption. The common phenomenon that has been reported in the developed and underdeveloped countries are the spread of diseases through the fecal contamination of the water sources.

Few studies showed that well water sources are as contaminated as surface water sources. We found large number of Gram negative bacteria in well water samples. The possible reasons for contamination of the water might be constructional defects on casing, concrete covers, railing, diversion ditches and other plumbing accessories. Apart from this, lack of regular care, disinfection and proper maintenance might also be a reason for the bacterial contamination of well water.

In the present study E.coli was present in four wells, according to the Guidelines for Hygiene Education in Community Water Supply and sanitation; it may due to the poor sanitation habit and hygiene education. The existence of coliform suggest insufficient treatment or post treatment contamination. The presence of fecal coliforms indicates recent fecal contamination of the well water, also propose that the presence of intestinal disease causing bacteria in well water, which is mainly due to the close proximity of the well to commercial toilet. Pseudomonas aeruginosa are the commonly occurring environmental pathogens and they can also be seen in faeces, soil, water and dirt, also seen in most of the wells in the present study. It can also multiply in the biological surfaces that are in contact with the water and also in the water environment. Particles from the surroundings may enter easily to the wells due to its openness and depth, might be a reason for the contamination of the well water by pathogenic bacteria. On the other hand due to poor hygienic state around the areas were such wells are situated or drawing waters from the wells in contaminated containers also a reason for the contamination of the well waters. Diarrhea, dysentery and typhoid fever are some of the unhealthy conditions seen from the enteric diseases in the country and is mainly due to the consumption of the contaminated well water.

Conclusion

According this study, increased incidence of contamination of well water by pathogenic organisms was observed. In order to drop the contamination of well water, it is recommended that the dug wells must be deep and closed properly. In and around the wells, suitable good personal and environmental sanitary practices must be followed. Before using for drinking purpose, water must be boiled or filtered properly which help in preventing the incidence of water-borne diseases. Regular screening of water for bacterial contaminants is required in reducing the contamination and supplying safe drinking water. High strength calcium hypochlorite could be used as disinfection of the contaminated wells.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Ethical clearance was obtained from Institutional ethical committee, MAHE, Manipal

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Study of Orthophosphate, Pyrophosphate, Pyrophosphatase and Citric Acid in Saliva With Reference to Calculus Formation and Inhibition

Rathinavelu Ganesan¹, Bhaskar J.², Kadhiresan Rathinasamy¹, Arunmozhi Ulaganathan⁴, Mohan Valiathan⁴

¹Reader, Department of Periodontics, Sri Venkateswara Dental College, Chennai; ²Professor, Department of Periodontics, Sree Balaji Dental College, BIHER, Chennai; ³Associate Professor, Department of Periodontics, Sri Venkateswara Dental College, Chennai; ⁴Professor, Department of Periodontics, Sri Venkateswara Dental College, Chennai

ABSTRACT

Background: Dental calculus occurs in most adults worldwide. Dental calculus serves as an ideal substrate for sub-gingival microbial colonization and also initiates the inflammatory reaction in the gingiva that leads to periodontitis. Now research has been focused more on inhibition of crystal growth to reduce the formation of calculus. Thus, the aim of the present study is to assess the levels of Orthophosphate, Pyrophosphate, Pyrophosphatase and Citric acid in whole saliva with reference to Calculus groups and Plaque groups.

Materials and Method: 103 patients were randomly selected from Sree Balaji Dental College and Hospital, Chennai – 600100 for this current study. Depending on the calculus index score, individuals were divided into four groups: Group 1, calculus index score 0 to 0.6; Group 2, calculus index score 0.7 to 1.8; Group 3, calculus index score 1.9 to 3; and Group 4, plaque group where index varied from 0 to 3. The saliva was collected and biochemically analyzed for concentration of orthophosphate, pyrophosphate, pyrophosphatase and citric acid.

Results: The mean values of orthophosphate in group 1,2,3, and 4 were 4.7981,4.8683,6.1830 & 4.7904. The mean values of pyrophosphate in group 1,2,3 and 4 were 1.2056,1.1085,1.0879 and 1.2738. The mean values of pyrophosphatase in group 1,2,3 and 4 were 0.1592,0.1619,0.1803 and 0.1173. The mean values of citric acid were 0.1687,0.1753,0.1698 and 0.1816.

Conclusion: The result of the study shows that the components presented in saliva like orthophosphate, pyrophosphate and pyrophosphatase had a significant role with regard to calculus formation and inhibition. However, Citric acid requires increase in sample size to give satisfactory statistical analysis.

Keywords: Saliva, Calculus, Minerals

Introduction

Dental Calculus occurs in most adults worldwide(1). Dental calculus is calcified mineralized plaque which serves as an ideal substrate for sub-gingival microbial colonization(2). Large amount of calculus may hamper the efficiency of daily oral hygiene and initiates the inflammatory reaction of the periodontal tissue(3). Since many studies have shown that the combination of dental calculus, plaque and age is strongly correlated with severity of periodontal disease(3), now research has been focused more on inhibition of crystal growth through developing chemical approaches to prevent or eliminate calculus formation(2). On this basis, activity of Orthophosphate, Pyrophosphate, Pyrophosphatase and citric acid was studied in whole in calculus forming groups and plaque forming groups.

Corresponding Author:
Dr. Rathinavelu G.
Reader, Department of Periodontics,
Sri Venkateswara Dental College, Chennai
Email: ratnavel_86@yahoo.com
Materials and Method

Selection of Patient: 103 patients were randomly selected from Sree balaji dental college and Hospital, Chennai. All of the participants were informed in detail of the procedure and signed an informed consent form in advance of the procedure. Inclusion criteria includes both sex with age 15-35 years, Full complement of teeth, No history of antibiotics for past 3months, non-smoking, no systemic disease. Exclusion criteria include Patient undergone periodontal therapy within 1 year prior to the study, Pregnancy and Lactating mother.

Selected patients were divided into four groups by applying the Calculus index Simplified (Greene and Vermillion 1964)⁴ and Dental plaque scores (Schick and Ash index 1961)⁵. Disclosing agent used for identifying plaque for plaque index scoring. 26 subjects - Group I with calculus index score 0 to 0.6. 26 subject - Group II with calculus index score 0.7 to 1.8. 25 subjects - Group III with calculus index score 1.9 to 3. 26 subjects - Group IV with plaque index varied from 0 to 3.

Methodology

The 5ml whole un-stimulated saliva using passive drooping method is collected in the sterile container from the selected individual of each group. Transportation of saliva samples for biochemical analysis in an ice container. De-proteination of saliva is done by withdrawing 3ml of saliva collected from each donors with help of graduated pipette was transferred to a sterile centrifugal test tubes containing 5ml of 10% Trichloroacetic acid and centrifuged at 3000rpm for 15 minutes at room temperature to remove the salivary proteins.

The clear, supernatant saliva was analyzed for orthophosphate, pyrophosphate, citric acid and pyrophosphatase enzyme.

Estimation of Orthophosphate was done as per the procedure of C.H. Fiske and Yellapragada Subbarow method⁶.

Estimation of Pyrophosphate was done as per the procedure of Ruth M.Flynn, Mary Ellen Jones and Fritz Lipmann⁷.

Estimation of pyrophosphatase was done as per the procedure of John Josse method⁸.

Estimation of Citric acid was done as per the Colorimetric procedure for estimation of citric acid by G.Rajagopal⁹.

Results

Four parameters, ORTHOPHOSPHATE, PYROPHOSPHATE, PYROPHOSPHATASE AND CITRIC ACID were detected in the saliva sample collected from four groups (Group I Plaque group, Calculus group II, group III, group IV). The values were compared with all these four groups.

Mean values and Standard deviation of Orthophosphate, Pyrophosphate, Pyrophosphatase and Citric acid in Plaque group, Calculus group II (Mild), Calculus group III (Moderate) & Calculus group IV (Severe) were shown in table 1.

The result of the study shows that mean values of Orthophosphate in group 4 (Calculus severe group) is found to be high when compared with the other 3 groups(Table 1).

The result of mean values of enzyme Pyrophosphatase were found to be similar to orthophosphate with increased levels in Group 4 (Calculus group severe) when compared with other three groups (Table 1). The results of the study shows that the mean values of pyrophosphate is found to increased in group 1(Plaque group) when compared with other three groups (Table 1). The results of mean values of Citric acid were found to be similar to Pyrophosphate with increased levels in Group 1(Plaque group) when compared with Group III & Group IV (Table 1).

Table 1: Mean values and Standard deviation of Orthophosphate, Pyrophosphate, Pyrophosphatase and Citric acid in Plaque group, Calculus group II (Mild), Calculus group III (Moderate) & Calculus group IV (Severe)

<table>
<thead>
<tr>
<th>Orthophosphate</th>
<th>Plaque</th>
<th>Calculus Mild</th>
<th>Calculus Moderate</th>
<th>Calculus Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Mean</td>
<td>4.7904</td>
<td>4.7981</td>
<td>4.8683</td>
<td>6.1830</td>
</tr>
<tr>
<td>SD</td>
<td>1.9016</td>
<td>1.6546</td>
<td>1.7212</td>
<td>2.1644</td>
</tr>
</tbody>
</table>
Conted…

<table>
<thead>
<tr>
<th></th>
<th>Mean 1.2738</th>
<th>Mean 1.2056</th>
<th>Mean 1.1085</th>
<th>Mean 1.0879</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyrophosphate</td>
<td>SD 1.4502</td>
<td>.6531</td>
<td>1.2593</td>
<td>2.0156</td>
</tr>
<tr>
<td>Pyrophosphatase</td>
<td>Mean .1173</td>
<td>.1592</td>
<td>.1619</td>
<td>.1803</td>
</tr>
<tr>
<td></td>
<td>SD .1035</td>
<td>.1201</td>
<td>.1505</td>
<td>.1059</td>
</tr>
<tr>
<td>Citric acid</td>
<td>Mean .1816</td>
<td>.1687</td>
<td>.1753</td>
<td>.1698</td>
</tr>
<tr>
<td></td>
<td>SD .0949</td>
<td>.0908</td>
<td>.0837</td>
<td>.0946</td>
</tr>
</tbody>
</table>

All four groups were compared for the values of Orthophosphate, Pyrophosphate, Pyrophosphatase and Citric acid by One-way Analysis of Variants. One-Way ANOVA (Analysis of Variants) illustrates that the mean values of Orthophosphate shows the statistically significant difference between all the four groups (p > 0.05) whereas the mean values of Pyrophosphate, Pyrophosphatase and Citric acid did not show any statistically significant difference between all the four groups (p > 0.05) as shown in table 2.

**Table 2: Comparison between values of Orthophosphate, Pyrophosphate, Pyrophosphatase and Citric acid by One-way Analysis of Variants**

<table>
<thead>
<tr>
<th>Group</th>
<th>Orthophosphate</th>
<th>Pyrophosphate</th>
<th>Pyrophosphatase</th>
<th>Citric acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plaque (N = 26)</td>
<td>4.7904</td>
<td>1.2738</td>
<td>.1173</td>
<td>.1816</td>
</tr>
<tr>
<td>Calculus Mild (N = 26)</td>
<td>4.7981</td>
<td>1.2056</td>
<td>.1592</td>
<td>.1687</td>
</tr>
<tr>
<td>Calculus Moderate (N = 26)</td>
<td>4.8683</td>
<td>1.1085</td>
<td>.1619</td>
<td>.1678</td>
</tr>
<tr>
<td>Calculus Severe (N = 25)</td>
<td>6.1830</td>
<td>1.0879</td>
<td>.1505</td>
<td>.1753</td>
</tr>
</tbody>
</table>

**Discussion**

The presence of dental calculus on the root surface is one of the major causes for the periodontitis(2). Over the past 50 years, a large number of clinical associated with laboratory studies have been performed to determine the efficacy of calculus prevention and removal from diseased root surface(2). The presence of various components in saliva like orthophosphate, pyrophosphate and pyrophosphatase itself is possibly responsible for the calculus formation and inhibition(3).

The super saturation of saliva with respect to calcium phosphate is highly responsible for the mineralization of dental plaque(10). This mechanism of dental calculus formation is unique with the formation of renal calculi(11). Since many studies have shown and proven that citric acid prevents renal calculi stones formation by inhibiting crystallization, this study made an attempt to estimate citric acid in saliva and its role in preventing dental calculus formation. Thus in the present study, Citric acid was also investigated in saliva with reference to calculus formation and Inhibition.

This current observation shows that the concentration of orthophosphate was directly proportional to the severity of dental calculus formation which was similar to the study made by A.R.Pradeep et.al (1), and Vincent J.Sawinski and Donald F.Cole (12) who also proved that the orthophosphate concentration in saliva was responsible for the formation of dental calculus. Enzyme alkaline phosphatase presented in saliva, in GCF and in plaque will increase the concentration of orthophosphatase which in turn reacts with calcium ions and lead to precipitation of insoluble calcium apatite crystals and formation of calculus(13). The roles of alkaline phosphatase activity in chronic periodontitis (13) and in chronic periodontitis in post-menopausal women (14) have also shown that it largely reflects on periodontal tissue inflammation.

The result of this study illustrates that concentration of pyrophosphate is directly proportional to the calculus inhibition. Pyrophosphate is naturally formed end product of cellular metabolism and plays an important role in various biosynthetic reactions.

Pyrophosphate, the anti-calculus component of dentifrice(15), is believed to resist and inhibit the crystal
growth of the dental calculus. Various studies have also proven the role of Pyrophosphate in inhibiting crystallization of dental calculus\(^2\). Besides anti-calculus effects of pyrophosphate, pyrophosphate\(^{15}\) also inhibits the growth of both gram positive and gram negative periodontal pathogens in supra-gingival and sub-gingival plaque. The upregulation/increased tissue non-specific alkaline phosphatase (TNAP) causes hydrolysis and deficiency of pyrophosphate by converting them into phosphate which is potentially responsible for the calcification, especially uremic vascular calcification\(^{16}\).

Charles O Neill et.al\(^{17}\), investigated the effects of Pyrophosphate in inhibiting uremic vascular calcification in rats and also found that exogenous pyrophosphate can inhibit uremic vascular calcification even in the presence of calcitriol without producing any adverse effects.

Bisphosphonates represent another group of synthetic pyrophosphate analog that interact strongly with minerals to prevent calculus formation by inhibiting crystal growth\(^2\). M.N.Haq Sikder et.al\(^3\), performed a study to examine the effects of TRK-530 in inhibiting the dental calculus formation. The results shows that TRK-530 in drinking water inhibit the precipitation of calcium phosphate and inhibit the dental calculus formation in a dose dependent fashion than subcutaneous injection of TRK-530.

John Hunter (1771) was interested in renal stone formation and recognized that there is a existing similarity between stone formation and the calcification in describing the formation of enamel of the teeth\(^{18}\). Various studies have shown that citric acid preventing urinary calculi, urolithiasis and nephrolithiasis by inhibiting crystallization. First of all, citrate forms an important complexer of calcium and thereby reducing calcium ion concentration and lowering the urinary saturation\(^{19}\). Secondly, citrate also decreases the calcium oxalate aggregation and also expected to reduce urinary osteopontin, which is the important component of urinary calculi. Thirdly, it increases urinary pH which is important factor for crystallization and uric acid stone formation\(^{19}\).

Ostberg (1931),Boothby and Adam,(1932), Kissin and Locks (1941), Scott et.al,(1943), Nordin (1963), reported that low levels of urinary citric acid is responsible for the formation of calcium containing renal stones\(^{19}\). Koji Tanaka (1989) also investigated the effects of citric acid on retained plaque and calculus of partly scaled root surface\(^{20}\). The result of the study shows that citric acid removes all debris and bacteria and decalcifies the superficial layers of residual calculus when compared with control group.

**Conclusion**

In our study, presence of orthophosphate and Pyrophosphatase in saliva is directly related to the mechanism of dental calcu-lo-genesis either by binding with calcium ions or by competing with pyrophosphate and altering their function based on the theories of calculus formation. Our study also investigated the role of pyrophosphate in saliva with regard to dental calculogenesis and from the interpretation of the results it is proven that pyrophosphate has a stronger inhibitory effect on plaque mineralization.

The aim of the experiment is to find out the role of citric acid in dental calcu-logenesis. Since it is proven inhibitor in renal calculogenesis, the experiment conducted in this regard in our laboratory in our patient indicate that there is a fall in salivary citric acid level in relation to dental calculi formation. However, the fall is not statistically significant. Futher research in large number of cases may indicate the significance and role of citric acid in dental calculogenesis.

**Conflict of Interest:** None.

**Ethical Approval:** Ethics committee approval obtained from Sree Balaji Dental college & Hospital (SBDCH/IEC/11/2014/3)

**Source of Funding:** Self funded

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Potential Protective Role of Beta Carotene on Cadmium Induced Brain and Kidney Damage

Rekha D Kini¹, Nayanatara Arunkumar¹, Sneha Shetty B¹, Anupama N¹, Bhagyalakshmi K², Megha Gokul³

¹Associate Professor, ²Professor & HOD, ³Tutor, Department of Physiology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education (MAHE), Karnataka, India

ABSTRACT

Introduction: Cadmium (Cd) is an industrial pollutant that affects the human health. The purpose of present study was to investigate the protective role of Beta carotene on cadmium induced brain and kidney damage.

Materials and Method: The present study was conducted following approval from Institutional Bioethical Committee at Kasturba Medical college, Mangalore, MAHE and strict internationally accepted guidelines, for the usage of animals in experimental study were. Rats were divided into four groups with 6 rats in each. The Gr. I rats were administered with the single dose of normal saline intraperitoneally. Group II received Beta carotene (10 mg/kg bw) orally for 30 days. Group III received a single dose of 1 mg/kg bw cadmium chloride and Group IV received Beta carotene for 30 days prior to cadmium administration. After the desired protocol, rats were sacrificed and both the kidneys and brain were removed for biochemical and histopathological evaluation. The levels of lipid peroxides (LPO) and were detected in the tissue homogenates of the brain.

Results: In the present study, the level of lipid peroxidation (LPO) was significantly high (P<0.001) in cadmium treated rats compared to normal control. Pre-treatment with beta carotene showed a protective effect by decreasing LPO (P<0.001). The serum level of urea and BUN was high in cadmium treated rats, Pre-treatment with beta carotene showed a protective effect by decreasing serum urea and BUN. There was significant decrease in the neuronal count in cadmium treated rats and pretreatment with beta carotene showed an increase in neuronal count

Conclusion: Results of the present study showed the antioxidative role of beta carotene in protecting the brain and kidney from cadmium induced toxicity.

Keywords: ROS, Oxidative stress, Antioxidant, Lipid peroxidation, Beta carotene

Introduction

Cadmium is a heavy metal which is extremely toxic. Food and cigarettes are also a significant source of cadmium exposure¹. Blood and kidney Cd levels are consistently higher in smokers than nonsmokers. Inhalation due to industrial exposure can be significant in occupational settings for example, welding or soldering, and can produce severe chemical pneumonitis². Cadmium toxicity has been demonstrated in several organs. Cadmium induces tissue injury through creating oxidative stress³⁴⁵. Cadmium acts as a catalyst in forming reactive oxygen species. It increases lipid peroxidation, in addition it depletes antioxidants, glutathione and protein-bound sulphydryl groups⁶. Hence present study was aimed to study whether pretreatment with beta carotene will be helpful in reducing cadmium induced testicular damage. Prolonged exposure to Cd known to cause toxic effect due to its accumulation over time in a variety of tissues, including kidneys, liver, central

Corresponding Author:
Dr. Rekha D Kini (MSc, PhD),
Associate Professor in Physiology,
Department of Physiology,
Kasturba Medical College, Bejai, Mangalore,
Manipal Academy of Higher Education,
Mangalore Karnataka, India
Phone: +919448203310
Email: rekha.kini@manipal.edu

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nervous system (CNS), and peripheral neuronal systems. Cd can be uptaken from the nasal mucosa or olfactory pathways into the peripheral and central neurons; for the latter, Cd can increase the blood brain barrier (BBB) permeability. Exposure to Cd also severely affects the function of the nervous system, with symptoms including headache and vertigo, olfactory dysfunction, parkinsonian-like symptoms, slowing of vasomotor functioning, peripheral neuropathy, decreased equilibrium, decreased ability to concentrate, and learning disabilities. As oxidative stress is one of the important mechanisms of cadmium-induced damages, it can be expected that the administration of some antioxidants should be an important therapeutic approach. As Cd pollution is generally widespread, this work aimed to study histologically and biochemically the possible protective role of beta carotene against the Cd induced changes in the brain and kidney of adult male albino rats.

Materials and Method

The present study was conducted following approval from Institutional Bioethical Committee of Kasturba Medical college, Mangalore, MAHE and strict internationally accepted guidelines, for the usage of animals in experimental study were followed. Inbred adult male rats of wistar strain weighing 200-250g were used in the present study. Animals were housed in polypropylene cages (4-5 rats/cage) under standard laboratory conditions and fed ad libitum with commercial rodent chow (Hindustan Lever Limited) and water. Cadmium chloride (CdCl2) (LobaChemie, India) was dissolved in normal saline. Beta carotene is dissolved in coconut oil and administered orally (10mg/kg bw). Animals were divided into four groups of eight rats in each group. In the normal control group (Group I) rats were administered with the normal saline intraperitoneally. In Group-II animals received beta-carotene (10mg/kg bw) for 30 days orally. In untreated experimental control groups (cadmium treated group) rats were administered with single dose of 1mg/kg bw (Group-III) cadmium chloride intraperitoneally. In pretreated groups rats were pretreated with beta carotene (10mg/kg bw) or 30 days orally and then injected with 1mg/kg bw (Group-IV) cadmium chloride intraperitoneally. In all the groups, rats were sacrificed under anesthesia 15 days after the final cadmium administration. Following the completion of the experimental protocol animals in each group were anaesthetized by injecting sodium pentabarbitone (40mg/kg bw) intraperitoneally under aseptic conditions. The brain and kidneys are quickly removed. Blood samples were collected by cardiac puncture and allowed to clot at room temperature and serum samples were separated by centrifugation at 3000rpm. Biochemical estimation of serum urea and Blood Urea Nitrogen were done by commercially available kits using spectrophotometer. Lipid peroxidation of the brain was estimated spectrophotometrically by thiobarbituric reactive substances (TBARS). Brain tissue is also preserved for histochemical analysis. Coronal sections of the formalin fixed specimen of prefrontal cortex and hippocampus which were embedded in form of paraffin blocks were prepared. The sections were stained with cresyl violet and quantitative analysis of neurons were performed under light microscopy (20X). The neurons in the prefrontal cortex, the dentate gyrus along with various hippocampal regions (CA1, CA2, CA3 and CA4) were counted.

Statistical Analysis: The data was expressed as mean ± SD. Analysis was done by using the unpaired t test. Statistical package SPSS version 17.0 was be used to do the analysis. P<0.05 was taken as significant

Results

The results of the present study showed that the levels of blood urea and blood urea nitrogen was significantly high in cadmium treated rats, but their values were significantly lowered in rats treated with beta carotene (Figure 1 & Table -1).

![Figure 1: Effect of beta carotene on blood urea level](image)
Table 1: Effect of beta carotene on Blood Urea Nitrogen(BUN)

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>Blood urea nitrogen(BUN) mg/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>GR.1</td>
<td>14.18 ± 8.25</td>
</tr>
<tr>
<td>GR.II</td>
<td>14.62 ± 8.57&lt;sup&gt;NS&lt;/sup&gt;</td>
</tr>
<tr>
<td>Gr.III</td>
<td>46.8 ± 29.39&lt;sup&gt;**&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Conted…

Number of animals in each group is 6. Value are expressed as mean ± SD. **P<0.005, Gr.III compared to GR.I & Gr.IV compared to GR.III

Table 2: Effect of beta carotene pretreatment on lipid peroxidation on cadmium induced brain damage

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Gr. I</th>
<th>Gr. I</th>
<th>Gr. III</th>
<th>Gr. IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDA(nanomoles/g wet tissue)</td>
<td>13.40 ± 1.04</td>
<td>12.98 ± 1.02</td>
<td>54.53 ± 2.16&lt;sup&gt;***&lt;/sup&gt;</td>
<td>33.02 ± 1.20&lt;sup&gt;***&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Value expressed as mean ± SD. Number of rats used 6 in each group. <sup>***</sup>P<0.0001 Gr. II compared to Gr. I & Gr. II, GR.IV compared to GR.III.

The results of the present study showed a significant increase in lipid peroxidation cadmium treated group(Gr.III) compared to normal control group (Gr.I) and beta carotene treated group (Gr.II). But there was significant decrease in lipid peroxidation in pretreated group(Gr.IV) compared to Gr.III.(Table-2)

There was a significant (P<0.0001) decrease in the neuronal count in prefrontal cortex and hippocampus in the Gr.III of rats when compared to the Gr.I and Gr.II. Pretreatment with betacarotene (Gr.IV) showed a significant increase in neuronal count in prefrontal cortex and hippocampus compared to Gr.III(Table-3)

Table 3: Effect of beta carotene on neuronal count in the rat brain

<table>
<thead>
<tr>
<th>Neuronal count</th>
<th>Gr.I</th>
<th>Gr.II</th>
<th>Gr.III</th>
<th>Gr.IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG</td>
<td>41.5 ± 1.02</td>
<td>40.5 ± 1.01</td>
<td>4 ± 1.06</td>
<td>39.6 ± 2.10</td>
</tr>
<tr>
<td>CA4</td>
<td>21.5 ± 1.20</td>
<td>22.3 ± 1.12</td>
<td>7 ± 2.0</td>
<td>22.3 ± 1.13</td>
</tr>
<tr>
<td>CA3</td>
<td>21.5 ± 0.5</td>
<td>21.6 ± 0.23</td>
<td>13.5 ±</td>
<td>20.2 ±</td>
</tr>
<tr>
<td>CA2</td>
<td>33 ± 1.26</td>
<td>32.5 ± 1.03</td>
<td>12 ± 1.02</td>
<td>30 ± 1.03</td>
</tr>
<tr>
<td>CA1</td>
<td>26.5 ± 2.12</td>
<td>26 ± 1.26</td>
<td>13 ± 2.16</td>
<td>24 ± 2.13</td>
</tr>
</tbody>
</table>

Value expressed as mean ± SD. Number of rats used 6 in each group. <sup>***</sup>P<0.0001 Gr.II compared to Gr.I & Gr.II, GR.IV compared to GR.III

Discussion

Cadmium is widely distributed in the environment because of its many industrial applications. The health risk to humans from acute and chronic cadmium exposure has been well documented. Previously, Mueller (1986) reported that single-dose cadmium administration increased lipid peroxidation and decreased GSH in the liver<sup>12</sup>. Many investigators reported that the reduction of GSH levels leads to elevation of LPO<sup>12</sup>. The results of the present study showed an increase in lipid peroxidation in brain tissue indicating brain damage due oxidative stress by cadmium administration. The decreased neuronal count in the cadmium treated rats also supported the cadmium damage. Results of the present study also reported a increase in blood urea and BUN indicating kidney damage induced by cadmium administration. In the present study, pretreatment with beta carotene prior to cadmium administration showed a significant reduction in the levels of LPO compared to cadmium treated group. Results of our study showed that oral gavage of rats with beta carotene showed a beneficial effect by decreasing kidney damage induced by cadmium. The level of serum urea and BUN was significantly lower in beta carotene rats compared to cadmium injected rats.

Conclusion

In conclusion, present study showed that cadmium has damaging effects on the kidneys and brain and treatment with beta carotene has protective role in attuning cadmium induced kidney and brain damage.
Conflict of Intrest: Nil
Source of Funding: Self

REFERENCES


Prevalence of Bacterial Vaginosis among Antenatal Women Attending to a Tertiary Care Hospital

Roshini Gundapaneni1, Ravindranath Gundapaneni2, K. V. S. Prasad3, Banerji Neerugatti4
1Assistant Professor, Dept.of OBGY, NIMRA Medical College, Ibrahimpatnam, A.P.; 2Professor, Department of Paediatrics, 3Statistician/Lecturer, 4Assistant Professor, Dept.of Community Medicine, ASRAM Medical College, Eluru, A.P.

ABSTRACT

Objective: To study the prevalence of bacterial vaginosis among antenatal women.

Design: Hospital based crosssectional study.

Setting: G.G.L. medical college,Rajahmundry. A.P.

Materials and Method: 500 antenatal women were taken at gsl medical college and examined.

Conclusion: Among 500 subjects, 14.4% prevalence of bacterial was found, high prevalence was among rural, uneducated and among low socioeconomic status was found.

Keywords: bacterial vaginosis, prevalence, ses, urban&rural.

Introduction

Bacterial vaginosis (BV) is a condition in which the normal, lactobacillus-predominant vaginal flora is replaced with anaerobic bacteria, gardnerella vaginalis, and mycoplasma hominis (Bacterial vaginosis has been associated with missed abortion, premature rupture of membranes, preterm delivery, intrauterine growth retardation, infection of the chorion and amnion, histologic chorioamnionitis, infection of amniotic fluid. Anaerobic Gram-negative rods, G.vaginalis, and M. hominis, have been linked to above complications. BV is detected by Gram stain (Nugent criteria) and accepted Gold standard criteria (Amsel’s composite criteria).

This suggests that it may be possible to prevent above complications by early detection and treatment for bacterial vaginosis and eradicating it early in pregnancy.

Background

Bacterial vaginosis is a common cause of abnormal vaginal discharge in a woman of reproductive age group. Until 1950’s the term bacterial vaginosis was referred to as ‘non-specific vaginitis’ because no causative organism was identified. In 1954, Gardener and Dukes proposed that this condition was caused by a bacteria,Hemophilus Vaginalis.. In 1963, this bacteria was reclassified and renamed as Corynebacterium vaginalis. In 1984, the term “BACTERIAL VAGINOSIS” was proposed to reflect the polymicrobial alteration in vaginal flora causing an increase in vaginal PH and sometimes associated with homogenous discharge but in the absence of demonstrable inflammatory response. Then onwards this conditions was called BACTERIAL VAGINOSIS. At the same time the diagnostic criteria determined by Amsel et al based on aggregate clinical findings were evaluated and accepted as the “Gold standard” for detecting the condition1.

The vaginal lining is composed of non-keratinized stratified squamous epithelium and underlying lamina propria. Below this there is a muscular layer, which consists of smooth muscle, collagen, and elastin. Beneath this muscularis lies an adventitial layer consisting of collagen and elastin (Weber and Walters, 1997). There are no vaginal glands. Instead, the vagina is lubricated
by a transudate that originates from the vaginal subepithelial capillary plexus and crosses the permeable epithelial layer (Gorodeski, 2005). Due to increased vascularity during pregnancy, vaginal secretions are notably increased. At times, this may be confused with amniotic fluid leakage.

During pregnancy the amount of glycogen is increased to maximum and the acidity of vagina is high [pH: 3.5-4.5]. During pregnancy there is copious, acidic vaginal secretion which normally consists of a curd-like product of exfoliated epithelium and bacteria. Lactobacilli species are removed from most pregnant women in higher concentrations than in non-pregnant women. These are the predominant bacteria of the vagina during pregnancy. During the puerperium and also in cases of leucorrhoea the acidity of the vagina is reduced and pathogenic organisms are then able to survive. After the menopause the epithelium atrophies and loses its glycogen. Doderlein’s bacilli are found in few numbers and the pH rises to a range of 6-8. Bacterial vaginosis involves an imbalance in the vaginal bacterial ecosystem, such that hydrogen peroxide producing lactobacilli are diminished and Gardnerella vaginalis, anaerobic gram-negative rods belonging to the genera Prevotella, Porphyromonas and Bacteroides and peptostreptococci, mycoplasma hominis and mobiluncus species are increased. Bacterial vaginosis is characterised by high concentrations (108-1011 CFU/gm of fluid) of G. vaginalis and a set of pathogenic microorganisms like Prevotella species, Peptostreptococcus species, Porphyromas species and Mobiluncus species. Species of lactobacilli are decreased in number or absent in bacterial vaginosis.

The changes in bacterial vaginosis include elevated pH, increased vaginal fluid concentrations of diamines, polyamines, organic acids and enzymes such as mucinases, sialidases, IgA protease, collagenases and non-specific proteases, phospholipase A2 and C, endotoxin, cytokines. PGE2, interleukin-1alpha and PGF2 alpha are also increased in presence of bacterial vaginosis. During pregnancy phospholipase A2 act on cervical mucus and non-specific proteases act on cervical and amniochorionic connective tissue and promotes the cervical ripening. It causes focal amniochorionic weakening. In addition phospholipases promotes the release of prostaglandin by activating arachidonic acid and leads to preterm birth.

The vaginal secretion in bacterial vaginosis is characterised by fishy odour. This is the basis for the Whiff test or KOH test.

**Predisposing Risk Factors**
- sexually active
- new sexual partner
- intrauterine device (IUD) use
- women who have sex with women
- smoking
- douching
- may occur without having sexual contact

In several large, prospective, longitudinal studies, the rate of bacterial vaginosis has ranged from 9% to 23%. BV has been studied most widely among women attending publically supported STD clinics, family planning and obstetrical clinics. Women seen in STD clinics have the highest prevalence of BV ranging up to 64%. In pregnant women, studies have documented similar prevalence rates to those seen in non-pregnant populations, ranging from 6% to 32%. BV has been linked to a number of obstetrical complications including spontaneous abortion, preterm labour, PPROM, chorioamnionitis and postpartum endometritis. Eschenbach et al and gravett et al were the first to implicate BV as a risk factor for preterm labour and low birth weight. The presence of BV in the mid trimester with a mean gestation of 32.6 weeks has been associated with increased risk for preterm labour and preterm PROM. PPROM accounts for 30% of spontaneous preterm labour and is associated with increased risk of preterm labor, intrauterine infections, neonatal morbidity and mortality. Cary J.C et al found that risk of preterm rupture of membranes, preterm labour and low birth weight was associated with T. vaginalis, M. hominis and Bacterial vaginosis.

**Diagnosis of Bacterial Vaginosis**

Various methods are available for the diagnosis of BV. These include culture, wet and dry microscopy, biochemical tests (gas-liquid chromatography) for metabolic by-products of vaginal bacteria, oligonucleotide probe-based hybridization for G. vaginalis, multiplex polymerase chain reaction for the identification of BV associated organisms, redox potential, and rapid or office tests. However the costs and complexity of some methods have restricted them for research purposes and not for routine diagnosis of BV.
Objectives

1. To study the prevalence of bacterial vaginosis among pregnant women.
2. To know the association of bacterial vaginosis with socio-demographic profile.

Materials and Method

Type of Study: Hospital based crosssectional study.

Place of Study: G.S.L. medical college, Rajahmundry A.P.

Study Population: All antenatal women attending to gynaecology op satisfying the inclusion criteria.

Duration of the Study: 1st December 2012 to 31st May 2014.(2 yrs 6 months).

Inclusion Criteria: All antenatal women attending gynaecological o.p.

Exclusion Criteria: 1. Women in active labour
2. History of leaking per vaginum
3. Bleeding per vaginum
4. Antibiotic therapy in last one month

Data Collection Procedure: After obtaining Clearance from the Institutional Ethical Committee, the Data was collected by using a predesigned & pretested schedule which includes, a detailed history was taken regarding age, parity, period of gestation in weeks, medical history, history of vaginal symptoms like vaginal discharge, malodour, obstetric history of previous preterm deliveries, abortions, history of leak PV in the present pregnancy. Gestation age was calculated from first day of the last menstrual period and was confirmed by ultrasound examination.

Baseline parameters like pulse, BP, temperature were recorded. Weight and height of the patient were recorded. Presence of pallor, and pedal edema was noted. Cardiovascular and respiratory systems were examined.

Abdominal examination was performed to see height of uterus, presentation, position, lie of fetus, liquor volume, and fetal heart sounds were recorded. Speculum examination was done and any discharge and leak were noted. Length, position, dilatation of cervix, presence or absence of membranes were noted.

The vaginal pH was measured using pH strips. Cotton swabs were used to obtain the vaginal discharge from posterior vaginal fornix and smear was done on a slide. Amine test was done to know the presence or absence of amine odour by addition of 10% KOH for the characteristic fishy smell, also known as Whiff test. Smear was Gram stained and scores for BV as proposed by Nugent et al were assigned.

Data Analysis: Microsoft excels 2010 will be used for data entry, generating charts & diagrams, etc. Data analysis will be done by SPSS V 20 software. Data analysis will be done by applying Chi-square tests. P-value less than 0.05 will be considered as statistically significant. The results will be presented in the form of charts & tables and graphs.

Results

A total of 500 antenatal women participated in the study. Among them 14.4% (72) were diagnosed as Bacterial Vaginosis positive. The Prevalence of the Bacterial vaginosis (BV) was 14.4%.

<table>
<thead>
<tr>
<th>Age</th>
<th>BV Positive</th>
<th>%</th>
<th>BV Negative</th>
<th>%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 – 20</td>
<td>22</td>
<td>17.2</td>
<td>106</td>
<td>82.8</td>
<td>128</td>
</tr>
<tr>
<td>21 – 24</td>
<td>39</td>
<td>14.8</td>
<td>225</td>
<td>85.2</td>
<td>264</td>
</tr>
<tr>
<td>25 – 28</td>
<td>9</td>
<td>10.0</td>
<td>81</td>
<td>90.0</td>
<td>90</td>
</tr>
<tr>
<td>29 - 32</td>
<td>1</td>
<td>7.2</td>
<td>13</td>
<td>92.8</td>
<td>14</td>
</tr>
<tr>
<td>33 above</td>
<td>1</td>
<td>25.0</td>
<td>3</td>
<td>75.0</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>14.4</td>
<td>428</td>
<td>85.6</td>
<td>500</td>
</tr>
</tbody>
</table>

Chi- Square test value is = 3.21 P-value : 0.522(>0.05)
Table 1 Depicts that among 500 subjects, 22(17.2%) were positive for bacterial vaginosis among 17-20 yrs age group followed by 1(25%) were positive among 33yrs and above.

The prevalence of bacterial vaginosis was 14.4% among study population.

Table 2: Socio economic status wise Bacterial vaginosis (BV) Distribution

<table>
<thead>
<tr>
<th>SCE</th>
<th>BV Positive</th>
<th>%</th>
<th>BV Negative</th>
<th>%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>44</td>
<td>19.1</td>
<td>186</td>
<td>80.9</td>
<td>230</td>
</tr>
<tr>
<td>Middle</td>
<td>21</td>
<td>10.1</td>
<td>186</td>
<td>89.9</td>
<td>207</td>
</tr>
<tr>
<td>High</td>
<td>7</td>
<td>11.1</td>
<td>56</td>
<td>88.9</td>
<td>63</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>14.4</td>
<td>428</td>
<td>85.6</td>
<td>500</td>
</tr>
</tbody>
</table>

Chi- Square test value is =7.769 P-value: **0.0216** (< 0.05)

Among study subjects, 44(19.1%) were positive for bacterial vaginosis among low socioeconomic status followed by 7(11.1%) were positive among high socioeconomic status.

The association between socioeconomic status and bacterial vaginosis was found to be statistically significant.

Table 3: Education wise Bacterial vaginosis (BV) Distribution

<table>
<thead>
<tr>
<th>Education</th>
<th>BV Positive</th>
<th>%</th>
<th>BV Negative</th>
<th>%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUCATED</td>
<td>32</td>
<td>10.2</td>
<td>281</td>
<td>89.8</td>
<td>313</td>
</tr>
<tr>
<td>UNEDUCATED</td>
<td>40</td>
<td>21.4</td>
<td>147</td>
<td>78.6</td>
<td>187</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>14.4</td>
<td>428</td>
<td>85.6</td>
<td>500</td>
</tr>
</tbody>
</table>

Chi- Square test value is =11.84 P-value :0.0006 (< 0.05)

Among educated subjects 32(10.2%) were positive for bacterial vaginosis fallowed by 40(21.4%) were positive for uneducated subjects.

Table 4: Rural & Urban wise Bacterial vaginosis (BV) Distribution

<table>
<thead>
<tr>
<th>Area</th>
<th>BV Positive</th>
<th>%</th>
<th>BV Negative</th>
<th>%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>53</td>
<td>14.7</td>
<td>307</td>
<td>85.3</td>
<td>360</td>
</tr>
<tr>
<td>Urban</td>
<td>19</td>
<td>13.6</td>
<td>121</td>
<td>86.4</td>
<td>140</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>14.4</td>
<td>428</td>
<td>85.6</td>
<td>500</td>
</tr>
</tbody>
</table>

Chi- Square test value is =0.108 P-value :0.742 (>0.05)

Among study subjects,53(14.3%) were positive for bacterial vaginosis from rural area fallowed by 19(13.6%) were positive from urban area.

The association between area wise and bacterial vaginosis was found to be statistically significant.

**Discussion**

The Prevalence of the Bacterial vaginosis (BV) is 14.4%.

In Asia, the prevalence of BV during pregnancy is 13.6% in Japan and reported prevalence in Thailand is about 15.9%. The reported prevalence in pregnant women ranges from 14% to 21% in Western countries which are comparable to present study 8. In Iran 9 the prevalence of bacterial vaginosis (BV) ranges from 4 to 64%, depending on the racial, geographic and clinical characteristics of the study population.

In the United States, the National Health and Nutrition Examination Survey (NHANES)10, which included results from self-collected vaginal swabs from over 3700 women, estimated the prevalence of BV was 29 percent in the general population of women aged 14 to 49 years and 50 percent in African-American women,
where as in the present study most (70) of the study population diagnosed with BV belongs to 17-32 years of age group.

In this study bacterial vaginosis is more common in rural population 53 out of 72 women(73.6%) rather than urban population as most of the patients are from rural area. where as in a study conducted by Aggarwal et al 11 from Haryana, India, bacterial vaginosis was diagnosed in a high percentage (48.5%) of rural women which is quite low percentage when compared with our study.

In this study, bacterial vaginosis is more common in low socio-economic group(61.1%) compared to middle and upper class, Where as in a study conducted by Mariam Anjum et al 12 majority of the women suffering from bacterial vaginosis were of low socioeconomic class and the difference was found to be statistically significant (Table 2).

In this study bacterial vaginosis is seen in 32 (44.4%) cases of educated women as most of them have got primary education and 40(55.6%) women were uneducated, this is difference is found to be statistically significant (Table 3). This low incidence among educated women may be due to their good hygiene practices. But in a study conducted by Ibrahim et al 13 women who got primary education were more 37 (54%) out of 54 women and uneducated were 17(25%)out of 54 patients which was not in concurrence with our study.

**Summary & Conclusions**

A total of 500 antenatal women participated in the study. Among them 14.4% (72) were diagnosed as Bacterial Vaginosis positive. The Prevalence of the Bacterial vaginosis (BV) is 14.4% in our study. Prevalence of BV decreased with increasing age in the present study. Prevalence of BV is more in women belonging to low socio economic status in present study. Prevalence of BV is more in uneducated women. Prevalence of BV is more in women belonging to rural area when compared to urban area.

**Conflict of Intrest:** None

**Source of Funding:** Self

**Ethical Clearance:** Clearance from ethical committee; taken

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5. Mc carmic, “the contribution of lower birth weight to infant mortality, and morbidity” n eng j med. 1985: 312:82-89.


A Preliminary Study on Prevalence of Certain Risk Factors for Non-Communicable Diseases in a Rural Population of Karnataka, India

Sachidananda K1, Nanjesh Kumar2, Shahul Hammed3, Kurulkar P1, Ullal Sheetal D4

1Assistant Professor, Department of Community Medicine, A J Institute of Medical Sciences, Kuntikana, Mangalore; 2Associate Professor, Department of Community Medicine, K S Hegde Medical Academy, Mangalore; 3Associate Professor, Department of Community Medicine, Kanachur Institute of Medical Sciences, Mangalore; 4Associate Professor, Department of Pharmacology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education

ABSTRACT

Background: In India the burden of non-communicable diseases (NCDs) has overtaken that of communicable diseases. Since two-thirds of India’s population continues to live in rural areas which have limited health-care resources, studying the prevalence of non-communicable diseases and their risk factors in rural areas should take precedence in order to evolve a better health-care system.

Objective: To study the prevalence of certain risk factors for NCDs in a rural population.

Method: A detailed survey was conducted among adults above 25 years at Alike village in Karnataka. Information on behavioural risk factors like tobacco use, alcohol intake, physical activity and family history of hypertension, diabetes, ischaemic heart disease and stroke were recorded. Blood pressure was measured, BMI was calculated and categorised according to the Consensus Statement for Diagnosis of Obesity, Abdominal obesity and Metabolic Syndrome for Asian Indians. Descriptive analyses was done using SPSS version 21.0.

Results: The mean (± SD) age of the population was 50.9 years (± 11.4). 678 adults were surveyed of which 35.5% had a family history of either hypertension, diabetes, IHD or stroke. Current tobacco use (smoke or smokeless) was prevalent among 34.2% and alcohol intake was 10.3%. The prevalence of inadequate physical activity was 65.8%. One hundred and thirty eight (20.4%) subjects were underweight, 103 (15.2%) were overweight and 133 (19.6%) were obese. The prevalence of high blood pressure was 41.8%.

Conclusion: There is a high prevalence of risk factors for NCDs in this rural community. This necessitates the targeting of modifiable risk factors by improving awareness in the rural community.

Keywords: Non communicable diseases, rural, prevalence

Introduction

It is well established that non-communicable diseases (NCDs) are the leading cause of death in the world, responsible for 40 million of the 56 million global deaths that occurred in 2015. Almost half of these deaths (48%) in low and middle income countries were considered premature1. An estimated 80% of premature cardiovascular diseases and diabetes are preventable, if the risk factors are contained in time1. The burden of NCDs has overtaken that of communicable diseases in a developing country like India as well. In India, NCDs...
especially cardiovascular disease, cancer and type 2 diabetes mellitus, accounted for an estimated 63 per cent of all deaths in 2016, while the risk of premature deaths (before 70 years) is 23% (27% for males and 20% for females). Most of these NCDs share common risk factors such as family history, unhealthy diet, tobacco use, harmful alcohol intake, inadequate physical activity, obesity/overweight, high blood pressure and dyslipidemia. The behavioural risk factor of inadequate physical activity is at the highest at 33% among Indians of all age groups. Primordial prevention of occurrence of risk factors along with their early identification and management can help delay the progress of NCDs.

Since two-thirds of India’s population continues to live in rural areas which have limited health care resources, studying the prevalence of NCDs and their risk factors in rural areas should take precedence in order to evolve a better health care system. Substantial success can be achieved in reducing the modifiable risk factors like tobacco use, harmful alcohol intake, inadequate physical activity and unhealthy diet, simply by creating awareness. There have been few studies conducted in rural areas of Dakshina Kannada district hence this project was undertaken to study the proportion of certain risk factors of NCDs.

Method

A survey was conducted among adults above the age of 25 years at Alike village in Bantval taluk of Dakshina Kannada district in Karnataka. Alike village is located about 45km from the nearest city, Mangaluru. According to 2011 census, the population of Alike is 5840, of which 3206 are males while 2634 are females. Sample size was calculated based on the prevalence of hypertension in rural Tamil Nadu, with a 95% confidence interval, a power of 85% and a non-response rate of 20%, the sample size was calculated as 670. Convenient sampling was done to conduct the survey. Institutional ethics committee clearance was obtained. A written informed consent was obtained from each participant.

Information on behavioral risk factors like current tobacco use, alcohol intake, physical activity was collected using a preformed case record form. Any form of tobacco or alcohol use was considered as an NCD risk factor. Inadequate physical activity was defined as <150 minutes of moderate physical activity per week. Detailed history was also taken with regards to the participants’ current NCD status and concurrent medication for these conditions, if any. Data of family history of diabetes, hypertension, ischemic heart disease (IHD), and stroke were also recorded by interviewing the participants.

Height was measured using a portable stadiometer and weight was measured using a digital weighing scale. Body Mass Index (BMI) was calculated as weight in kilograms divided by height in meters squared and was categorised according to the Consensus Statement for Diagnosis of Obesity, Abdominal obesity and the Metabolic Syndrome for Asian Indians. Accordingly overweight was defined as BMI between 23–25.9 kg/m² and obesity as ≥25 kg/m².

Blood pressure was measured on the left arm using a mercury sphygmomanometer in the sitting position. A second recording was taken for participants who had a systolic blood pressure reading of more than 120mmHg and/or a diastolic blood pressure of more than 80mmHg. Hypertension was defined as a systolic blood pressure of ≥140 mm of Hg, or a diastolic blood pressure of ≥90 mm of Hg or the use of blood pressure-lowering medications for hypertension.

Descriptive analyses of the data was done using SPSS version 21.0. The results of the measurement were provided to each subject and those who required referral were referred to the primary health centre.

Results

A total of 678 individuals (48.4% men, 52.6% women) above 25 years participated in the study. The mean (± SD) age of the participants was 50.89 years (± 11.35) and the majority 71.7% (n=486) were between 36 to 60 years. One hundred and fifty five (22.9%) were illiterate and 523 (77.1%) had some formal education.

The details of certain NCD risk factors detected during the study are shown in table 1. Current use of tobacco was prevalent in 34.2% of the participants. Among the tobacco users 65.9% (n=153) were men and 34.5% (n=79) were women and among men 46.6% used tobacco and among women 22.6% used tobacco. Most of the women (95.5%) used smokeless form of tobacco.

94.3% (n=66) of the alcohol users were men. Inadequate physical activity was disclosed by almost 19% of the participants. Family history of either diabetes, hypertension or ischaemic heart disease/stroke was present in 35.5% participants.
Table 1: Certain risk factors for NCDs

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>N = 678</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tobacco users</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>232</td>
<td>34.2</td>
</tr>
<tr>
<td>Smoking</td>
<td>78</td>
<td>33.62</td>
</tr>
<tr>
<td>Smokeless</td>
<td>154</td>
<td>66.38</td>
</tr>
<tr>
<td><strong>Alcohol intake</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>10.3</td>
</tr>
<tr>
<td><strong>Physical activity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate to vigorous</td>
<td>553</td>
<td>81.5</td>
</tr>
<tr>
<td>Inadequate</td>
<td>125</td>
<td>18.5</td>
</tr>
<tr>
<td><strong>Family History</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes alone</td>
<td>46</td>
<td>6.8</td>
</tr>
<tr>
<td>Hypertension alone</td>
<td>113</td>
<td>16.7</td>
</tr>
<tr>
<td>Both Diabetes and Hypertension</td>
<td>54</td>
<td>8.0</td>
</tr>
<tr>
<td>Ischemic Heart Disease (IHD) alone</td>
<td>16</td>
<td>2.3</td>
</tr>
<tr>
<td>Hypertension and Diabetes and IHD or Stroke</td>
<td>12</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Body Mass Index (BMI) – table 2: Normal BMI was noted among 44.8% participants (n=304), 20.4% (n=138) were underweight (BMI ≤ 18.50kg/m²) while 34.8% participants (n=236) had a high BMI (≥ 23kg/m²).

Hypertension (table 3): In 58.3% of the participants the systolic blood pressure (SBP) was <139 mmHg and diastolic blood pressure (DBP) was < 89 mmHg. Two hundred and forty four (35.5%) participants had blood pressure ≥ 140/90mmHg and 5.8% (n=39) had isolated high systolic blood pressure.

Table 2: Body Mass Index (BMI)

<table>
<thead>
<tr>
<th>BMI kg/m²</th>
<th>N = 678</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 18.50</td>
<td>138</td>
<td>20.4</td>
</tr>
<tr>
<td>18.50 to 22.99</td>
<td>304</td>
<td>44.8</td>
</tr>
<tr>
<td>23.00 to 24.99</td>
<td>103</td>
<td>15.2</td>
</tr>
<tr>
<td>25.00 to 27.49</td>
<td>74</td>
<td>10.9</td>
</tr>
<tr>
<td>27.50 to 29.99</td>
<td>40</td>
<td>6.0</td>
</tr>
<tr>
<td>&gt;30.00</td>
<td>19</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Table 3: Blood pressure record

<table>
<thead>
<tr>
<th>Blood pressure (mmHg)</th>
<th>N = 678</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 120 &amp; &lt; 80</td>
<td>162</td>
<td>23.9</td>
</tr>
<tr>
<td>120 to 139/80-89</td>
<td>233</td>
<td>34.4</td>
</tr>
</tbody>
</table>

Conted…

140-159 or 90 to 99 | 126 | 18.6 |
≥ 160 & ≥ 100 | 118 | 17.4 |
Isolated systolic Hypertension, SBP >140/ DBP < 89 | 39 | 5.8 |

As shown in table 4, one hundred and eighty (26.5%) subjects self-reported to have hypertension, diabetes (9.3%), IHD (1.3%) and/or stroke (0.6%).

Table 4: Proportion of NCDs (self-reported)

<table>
<thead>
<tr>
<th>Known NCDs</th>
<th>N = 678</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>131</td>
<td>19.3</td>
</tr>
<tr>
<td>Diabetes</td>
<td>63</td>
<td>9.3</td>
</tr>
<tr>
<td>Hypertension + Diabetes</td>
<td>26</td>
<td>3.8</td>
</tr>
<tr>
<td>Ischemic heart disease (IHD)</td>
<td>9</td>
<td>1.3</td>
</tr>
<tr>
<td>Stroke</td>
<td>4</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Discussion

Our results showed a high burden of NCD risk factors in the study population belonging to rural coastal Karnataka.

Family history of NCDs was prevalent in 35.5% of the subjects. Very few investigators have studied the family history of NCDs as one of the risk factors for NCDs. Though it is a non-modifiable risk factor, individuals with a family history could be targeted early to modify their behavioural risk factors. Moreover, this subgroup of the population can be expected to be more receptive for preventive measures.

Behavioural risk factors: More than one-third (34.2%) of the participants used tobacco daily, which is similar to (32.5%) the daily average use of tobacco in rural India⁴. Almost 47% men and 23% women were daily users of tobacco which is again similar to the national average⁵. Smokeless form was used by double the number of individuals compared to smoke form of tobacco. In women the smokeless form was predominant (95.5%). This could be because chewing and snuffing tobacco is socially acceptable among local women, but smoking is not. In a study conducted in Shimoga district of Karnataka which only assessed smoked form of tobacco use, 63% of men were current smokers and 58% were current daily smokers; while less than 1% of women
A study conducted in and around Chennai found the prevalence of overall tobacco use in rural areas to be 23.7% and that of tobacco smoking to be 14.3%. In another study the prevalence of overall tobacco use in rural areas of Punjab was only 11.2%, much lower than the present study. The prevalence of inadequate physical activity at 19% was three times more than that in a previous study conducted in Trivandrum district. In another study conducted in Gandhinagar, Gujarat lack of physical activity was observed in 14.2% of the rural population. The prevalence of inadequate physical activity in India appears to vary regionally. However, in general, the overall prevalence is very high for a rural area where we assume people to be physically active. The reason for this finding could be an improvement in the transport system, availability of automated farming practises and lack of awareness of the importance of physical activity.

Overweight and/or obesity was observed in 35% of the participants which is overwhelmingly high for a rural population by Indian standards. The study conducted by Aroor et al observed a prevalence of overweight only among 11.9% of the rural population. The survey in rural Punjab reported the total prevalence of overweight and obesity as 38%, this despite following the WHO classification of BMI which considers BMI > 25.5 as overweight and >30 as obesity, whereas we followed the Consensus Statement for Diagnosis of Obesity, Abdominal obesity and the Metabolic Syndrome for Asian Indians according to which BMI > 23 is considered as overweight.

Prevalence of hypertension was 41.8% which too is high compared to WHO’s overall estimated Indian prevalence. A very similar prevalence was found in rural Punjab. In a study conducted among tribal labourers in Gujarat the magnitude of hypertension was found to be 16.9%. The proportion of patients with self-reported hypertension was only 19.3, which suggests that hypertension is largely undiagnosed.

The proportion of some selected NCDs (diabetes, hypertension, ischaemic heart disease and stroke) based on self-reporting was 26.5%.

This alarmingly high proportion of patients with already proven NCDs, obesity, low physical activity and tobacco use in a rural population calls for an immediate attention towards the health status of this population. Our study has a few limitations: in depth assessment of behavioural risk factors, including tobacco use, and the reasons behind such a high prevalence of the risk factors of NCDs could not be addressed.

**Conclusion**

NCD risk factors studied in this rural population are considerably high. This necessitates the targeting of modifiable risk factors by improving health promotion activities and easily accessible early diagnosis and treatment facility in rural areas.

**Conflict of Interest**: None

**Source of Funding**: None

**Ethical Clearance**: Approval was obtained from the Institutional Ethics Committee, before initiating the study.

**REFERENCES**


Perspectives on Mental and Physical Distress and School Counselling Based Interventions for Sexually Abused Adolescents

Saleena M.1, Suja M. K.2
1PhD Scholar; 2Thesis Advisor and Chairperson, Department of Social Work, Amrita School of Engineering, Coimbatore, Amrita Vishwa Vidyapeetham, India

ABSTRACT

Adolescence is a stage in life for acquiring new skills, attaining mastery over environment, adapting to handle new responsibilities and gaining control over one’s emotions and thoughts. It is believed that emotional difficulties may clear up completely only with adequate support. At present abusive and violent behavior by adolescents is increasing due to pressures from various walks of life.

In the case of children who are sexually abused, children as young as 3 years of age are the victims. Sexual abuse of school going children is an area that was until recently neglected. The victims continue to be victimized in the process of getting justice. Victim blaming is the norm of most societies. Sexually abused children face many mental and physical problems. In depth study of the child sexual abuse cases and its intervention strategies is the need of the hour. The researcher’s experience during the last 8 years as a school counsellor in the School Counselling Centre of Psycho Social Service Scheme for Adolescence, Department of Women and Child development, Government of Kerala has made her understand the importance of counselling in schools as the key element to prevent child sexual abuse and provide protection and care to the victims. This case study is from the eight years experience of the researcher as a school counsellor.

Aim: The aim of the study was to understand the mental and physical problems undergone by the sexually abused children and the interventions provided by the school counsellor. Sexually abused children face so many physical problems and mental health problems. The researcher understood that they show sleep disturbances, sudden behavioural changes, emotional distress, fear of loneliness, social withdrawal, depression, suicidal tendencies and suicide ideation, anxiety, clingingness, running away and lack of concentration in studies. It was noticed that some abused children wait for over a year to reveal their problems due to fear and shame. School counselling has been of great support to many students who suffer from emotional and physical disturbances, due to sexual abuse.

Keywords: Adolescents, Sexual abuse, Mental distress, physical distress, school counselling, intervention.

Introduction

Estimating the prevalence of child sexual abuse has been difficult because many of the cases go unreported. In a study by The National Society for the Prevention of Cruelty to Children (NSPCC), 2010, it is said that around a quarter of young adults who were subjected to sexual abuse (either contact or non-contact) during their childhood was by an adult person or by a peer. The Girls are higher risk than boys of being abused by a family member and while strangers abuse boys more than girls.

Neglected children and children who do not have many friends are targeted by abusers because they are more likely to get attracted to the attention shown by the abuser. Children with disabilities are three times more vulnerable than normal children. Alexander in the year 2011 explains how sexual abuse cause years of negative impacts on the victims and says sexual abuse is a “chronic neurologic disease”. Around 40% of the victims of sexual abuse don’t show long-term negative consequences. The after effect of abuse include depression, eating disorders, post-traumatic stress disorder and very low ability to cope with emotions and stress.

Social justice department of Kerala (2008) has been implementing psychosocial services for adolescent girls for addressing the issues faced by adolescence. The project is called as psychosocial service scheme for adolescent girls. Earlier it was known as school counselling scheme.
for adolescent girls. The project started in 2008 as part of ‘KishoriShaktiYojana’, an already existing project under Ministry of Family and Child Welfare, Government of India. Later, the school counselling project was undertaken by Social Justice Department, Kerala and continued as the Psychosocial Counselling Service for adolescent girls till 2013. The project was implemented in 163 schools earlier and now extended to 1000 schools throughout Kerala. In 2013 the scheme was again redesigned and service is extended at the community level through schools and Anganwadies. Now the project is known as Psycho Social Service Scheme for Adolescent Girls and is under the Department of women child development, Government of Kerala. The main objectives of the project are; to provide social and psychological support to adolescent girls in the community, to undertake activities to enrich and empower adolescents through life skill training and another community based programs, to mobilize and support community based responses on identifying social disintegrating factors that affect development of adolescents, to spread among adolescents about physical mental and social health, to address gender related issues of adolescents.

In this study adolescent means, the children in the age group of 10-19 years those who are studying in the school. Sexual abuse is inappropriate sexual behaviour with a child. It includes fondling a child’s genitals, making the child fondle an adult’s genitals, sexual assault (intercourse, incest, rape, sodomy), exhibitionism and pornography. To be considered child abuse, these acts have to be committed by a person responsible for the care of a child or related to the child (for example a baby-sitter, parent, neighbour, relatives, extended family member, peer, older child, friend, stranger, or a day-care provider).

The mental stress and the physical or biological difficulties that is faced by the children who have undergone physical or sexual violence is deep and negative. School counselling is the services given to students to promote their holistic development. It provides on-going prevention and offers personal counselling to students. In this study intervention means to intentionally become involved in a difficult situation in order to improve it or prevent it from getting worse.

**Methodology**

The present study was conducted in a school counselling center of Kerala. Case histories of 27 sexually abused children during the period February 2009 to December 2017 at school counselling centre was used for the analysis of this study. School counselling centre is a project under the psychosocial service scheme of the department of women and child development, Kerala government. Case study design and detailed explanatory method was used for knowing more about the mental and physical distress of victims and also about the interventions by school counsellor. Six case studies are presented here:

**Case Study 1:** Twelve year girl from middle class family, studying in 7th standard was noticed to be inactive, sitting alone and was unable to concentrate in her studies. The class teacher referred her to school counselling centre. The girl emotionally complained about her father’s misbehavior. Her father was using alcohol and other narcotic substances. He always quarreled with her mother. She was molested inside her home. He forced the child to take part in sexual activity. Once when her mother had gone outside and she was alone at home, her father came and forcibly showed her pornographic videos. All of a sudden he hugged her and started to kiss her. While she was struggling to escape, her father forcefully pushed her on to the bed. She told that she would inform the incident to her mother. Then the father said that if she shared the incident with anybody, he would commit suicide. The same pattern continued and she did not inform to anybody because of fear.

**Intervention by school counsellor:** Counsellor provided psycho social support to the child. Counsellor believed the child and gave reassurance to her and explained about the existence of legal, family and social support system. She listen carefully and had concerns associated with disclosure.

The counsellor through ‘family intervention’ provided counselling to her mother and close family members. Counsellor called the father. Initially he denied all the allegation raised by his daughter. After giving clear picture about the laws, he told the truth. The counsellor tried to refer him to an expert psychologist. But he didn’t cooperate. Very next day girl came to the counselling centre and informed that her father verbally harassed and made up arum or that she had a love affair with a boy. She felt helpless about the situation. Mental harassment of father increased day to day.

The girl was able to get a safe place shelter with her maternal grandmother living alone in their ancestral home. She decided to stay with her grandmother.
Counsellor gave parental counselling to grandmother. Legal Support: with the permission of school Headmistress and family members, Counsellor and girl reported all these to district child welfare committee. Then the Police arrested the father. After that the school counsellor had regular follow up of the girl. The girl became very assertive and came to school very happily and was focusing in her studies.

**Case Study 2:** This is a case of a 13-year-old, mentally challenged student studying in 8th standard who was sexually abused by her neighbour. She reported the incident to school counsellor. She cried and told that she felt pain in private part. After talking with her, counsellor identified that several times this man exhibited his sexual organs in front of her. On the way to school, he caught and raped the girl. Her private parts were wounded.

**Intervention by school counsellor:** Counselling provided emotional support to her. Counsellor immediately informed Head mistress and her parents and referred the child for medical examination with her parents. Counsellor explained the legal aspects to parents and they were willing to seek legal support. Counsellor reported the case to child line with the permission of school authority. They filed the case and the accused man was arrested. Through continuous follow up counsellor provided mental support to girl and taught her to become assertive.

**Case Study 3:** A group of girls studying in 9th and 10th standard came to counselling centre and complained that one male teacher unnecessarily touches their bodies and gave some medicine. He told that the medicine helps to improve their beauty. At the pretext of providing Reiki therapy to girls, he touched their body parts and always looked at them in an indecent manner. The teacher was also touching the students inappropriately as a part of physical punishment for bad behavior. The students were afraid when sitting in his class. They tried to avoid that teacher’s class by using various excuses.

**Intervention by School Counsellor:** School counsellor documented all the incidents with the signature of girls and informed the school authorities. The complaint against the teacher for misbehavior towards the students was taken up very seriously. According to the school counsellor’s decision, the Headmistress warned the teacher and advised him to behave properly. After some time the girls complained that the teacher have reverted to his old behavior. Counsellor informed it to school authorities and school management committee with the permission of students and their parents.

Counsellor taught assertiveness to girls and gave an insight to legal and social support for them. Students themselves reported all the incidents to child line. Then police came to school and an FIR was filed. Teacher (abuser) got punishment transfer from the education department. After that issue some staff members showed negative attitude towards the school counsellor and the students who had complained. With the help of parent teachers association, Principal and Headmistress the counsellor conducted a training for teachers by inviting an expert resource person. After participating in the training, the teachers were sensitized about how to behave well with the students. They got thorough knowledge about The Protection Of Children from Sexual Offences Act (POCSO Act) 2012 and this brought a positive change in the knowledge, attitude and behaviour of the teacher’s towards students.

**Case Study 4:** Sixteen year old girl, studying in plus two showed school refusal. When she came to school, she always had breathing difficulty and complained that she had headache and stomach pain. The girl was brought to counselling center because she fainted during class. During the counselling session, she emotionally expressed that her uncle misbehaves with her. She was sexually abused by him for the last one year. The girl disclosed this to her mother who ignored it. After this the girl felt insecure and showed the above mentioned symptoms.

**Intervention by school counsellor:** Counselling and reassurance to child was provided. Counsellor called her parents and gave them awareness on the mental status of child and the legal aspects of that incident. Counsellor reported it to police with permission of child. Police and respective authorities have taken necessary action towards the uncle. Through several follow up sessions the child came back to the normal state and concentrated on her studies. Parents also became supportive.

**Case Study 5:** 15 year old boy studying in tenth standard had problems in interacting with others. He was also facing difficulty to answer questions raised in class. He showed poor performance in other extra curricular activities and had very few friends. His mother reported that her son was an introvert. Through counselling sessions he told that once his neighbour lady tried to
hug him and touch his private part. He became so scared and escaped from there. After this incident he couldn’t concentrate in studies and became anxious about future.

**Intervention by school counsellor:** Counselling was given by school counsellor, she also provided awareness about the situation which the child faced. Counsellor provided insight therapy, assertiveness training and methods to cope with stress. After several sessions of counselling the boy became better in personal and academic life.

**Case Study 6:** One night a twelve year old girl was sexually abused by her 15 year old relative. After that incident he always tempted her to have sex with him. Gradually she was interested in this activity and was sexually used many times by her relative with her permission. She was in a fantasy world and she told all these experiences to her friends with great interest.

**Intervention by counselor:** Counselling was provided to her and created awareness about the consequences of her acts. With her permission counsellor called her mother and gave an insight about her daughter’s situation. The mother positively cooperated with counsellor. After that the counsellor met her relative boy and also provided counselling to him. Through several sittings they positively changed their risky behavior.

**Major Findings:** The study reveals that there are high levels of mental and physical health problems seen in the victims of abuse. This has affected the adjustment and coping behavior of children with their peer groups. These children also show introvert nature and least interest in studies and other school activities.

Out of the 27 victims, 12 victims faced sexual abuse from their relatives, 9 faced from outside people, 4 from their own teachers and 2 from their peer group. This statistics shows the insecurity of children within the family itself. Lack of sex education and the lack of awareness about safe touch and unsafe touch are the main reasons that these children are victimised. The abuse is seen more in children coming from a poor socio economic background and where parental care is less. Here school counselling services promote the holistic development of students by providing ongoing prevention and intervention services and offering personal counselling to students, parents, teachers and significant others.

From the case studies researcher understood that sexually abused children show sleep disturbances, sudden behavioural changes like withdrawal. They also have feeling of insecurity, emotional distress, fear of loneliness, social withdrawal, violence in class room, depression, suicidal ideation, self harm, anxiety, clingingness, phobia, eating disorder, soma to form disorder, running away, lack of concentration in studies and exam fear, post traumatic stress disorder, behavior problems, sexual anxiety and risky sexual behavior. Male victims show more anti social behavior and use drugs and alcohol for coping previous traumatic memories and emotional problems.

The victims show many physical disturbances like breathing difficulty, headache and stomach pain. In many cases urinary infection and injuries to reproductive parts are also seen. Childhood and adolescent sexual abuse is associated with negative mental and physical health outcomes. It is also seen that some abused children wait for over a year to reveal their problems due to lack of awareness and fear.

School counsellor have a vital role in child sexual abuse cases. Individual counselling has been of great impact on many students who suffer from emotional disturbances. Students say that the greatest benefit of counselling is the chance “to get things off their chest” and understanding that they themselves have the ability to change their lives for better. Many students who responded to the researcher said it was as if a “weight had been lifted.” Parents and children said that counselling made them feel “less alone.” School counselling had changed the way they looked at Sexual Abuse they were able to walk away from disturbed situation and start their life again. Many teachers and parents were satisfied with school counselling programme as they have a facility to offer a quick professional response to distressed students. The school counsellor provides crucial support to students who cannot access help in any other way. In child sexual abuse cases school counsellor provides emotional support, family interventions, legal supports and referral to the victims and their families. School counsellor also provides individual counselling, group counselling, awareness classes, training programmes to parents, children and teachers.

**Discussion and Conclusion**

Issues of child sexual abuse are gaining importance because of the increase in the number of cases reported.
School counsellor have vital role in child sexual abuse cases. Children from low economic background and mentally challenged are more prone to CSA. Reporting of cases from girls is higher than boys. Sexually abused children have several psychological, physical and emotional ill effects. School counselling and interventions provide the abused child and their parents with a ‘safety net’ where they can voice their fear and concerns without being judged. It also helps children to regain their mental stability and work towards better future.

**Ethical Clearance:** Taken from Human Ethics Committee, Dept. of Social Work, Amrita Vishwa Vidyapeetham, Coimbatore, Tamil Nadu, India

**Source of Funding:** Self

**Conflict of Interest:** Nil

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2. Social Justice department, Kerala; 2008


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Assessment of Oral Health Status and Comparative Evaluation of Different Methods of Oral Health Education in Children with Special Health Care Needs

Supriya A.1, Rekha Shenoy2, Praveen Jodalll3, Laxminarayan Sonde3, Imran Pasha4
1Post Graduate Student, 2Professor & Head, 3Reader, 4Senior Lecturer, Department of Public Health Dentistry, Yenepoya Dental College, Mangalore, Karnataka, India

ABSTRACT

Introduction: Oral health is an important aspect of health for all children, and is all the more important for children with special health needs because, severity of medical conditions and perceived general health are significantly associated with dental health status.

Methodology: It is a non-randomised intervention study conducted among 510 children with special health care needs aged 7-18 years attending 5 special schools in Mangalore city. The oral health status among these children was assessed using the OHI-S (1964) at baseline, midway and at the end of 9th month of the intervention. The oral health education continued every month till the 9th month of the study.

Results: In the present study it has been observed that majority of the children had fair oral hygiene i.e 69.4% in the baseline, which increased to 70.0% in the mid intervention period which further increased to 70.6% at the end of 9th month.

Conclusion: The children who received training to brush their teeth with the help of pictures showed slight improvement in their mean OHI-S scores (2.27 to 2.22) at the end of 9th month.

Keywords: Oral health, toothbrushing, health education, special health care needs, Audio-visual

Introduction

Oral health is an important aspect of overall health, which contributes to each individual’s physical and mental well-being, appearance, and interpersonal relations.1 Oral health is not only limited to healthy teeth, but also healthy gums are also equally considerable, as they can have a major impact on people's daily activities as they experience pain, distress and also cause difficulties with eating, as well as in socializing.2

In India, children comprise 40% of the rapidly growing population, but the provision of health care, especially dental health services is poor and dental health services at rural schools are almost nonexistent. Children with Special Healthcare Needs (SHCN) constitute a high-risk group; hence, their health is of significance for the overall improvement of the society. Children with SHCN have considerable oral pathologies because of disability itself, other medical, economic or social reasons and or incapability of caretakers to carry out proper daily oral hygiene.(e.g.,cariogenic effect of medicines with high sugar content, bruxism). Disabilities could be physical, mental, or social. The Maternal and Child Health Bureau (MCHB) has defined children and adolescents with SHCN as those “who have or are at increased risk for a chronic physical, developmental, behavioural, or emotional condition and who require health and related services of a type or amount beyond that required by children generally.”3 Children with special health care needs may have great limitations in oral hygiene performance due to defect in coordination, sensorium and intellect, and so are prone to poor oral health2 Developmental disabilities may be
due to a variety of conditions like cerebral palsy, Down’s syndrome, mental retardation, autism, seizure disorders, hearing and visual impairments, congenital defects and intellectual deprivation. It has been reported that some of the common dental problems such as caries and periodontal diseases has higher prevalence among people with special needs when compared with normal people of same age, due to accumulation of bacterial plaque, and also genetics, muscular and nutritional disturbances were also considered to influence the cause. This group of individuals may also not understand or show interest towards preventive oral health practices.

Since children with disabilities frequently experience heavy plaque accumulation, controlling dental plaque in these individuals is an important issue in preventive healthcare programs. It is well known that toothbrushing is the principal, simple and effective method for reducing levels of plaque/gingivitis, and controlling and preventing periodontal disease; it is a behaviour that should be inculcated quite early, during the primary and secondary socialization of the child.

Schools may provide most effective long term oral health education as they offer communication for many years. Dental health education is the first step in the prevention of oral diseases and also helps in equal distribution of oral health services, thus promoting ideas necessary for the improvement of the population’s quality of life.

Therefore this study was designed to assess the oral health status of children with special needs and to compare and evaluate the different methods of oral health education in improving the oral health status of these children.

**Methodology**

A Non-randomised intervention study was conducted among 510 children with special health care needs aged 7-18 years attending 5 special schools in Mangalore city, to assess the oral health status and to compare and evaluate the efficacy of different methods of oral health education for children with special health care needs. The protocol for the study was presented before Yenepoya (Deemed to be) University Ethics. The ethical clearance was obtained on 5/12/2015 with reference number 2015/260. Permission to examine and impart education on oral health to children with special health care needs was obtained from the authorities of the respective special school. Consent was duly obtained from the parents of the study participants. Uncooperative children, Children who were on use of anti-epileptic drugs and children who have systemic diseases like asthma, haemophilia and HIV infection and who are on long term medication were excluded from the study. After obtaining the informed consent from parents and school authorities, the examiner had visited each school every month for a period of 9 months. The demographic details such as name, age and sex of the patient were recorded in the study proforma. The oral hygiene status was assessed using the Simplified Oral Hygiene Index OHI-S (1964). The OHI-S has two components, the Simplified Debris Index (DI-S) and the Simplified Calculus Index (CI-S). The criteria for the debris and calculus indices are shown in Tables 1 and 2. The DI-S and CI-S scores were calculated separately by summing the attributed scores and then dividing the results by the number of examined surfaces. The total sample was divided into 3 groups based on number of children in each school. (170 in each group). On each visit health education was provided as follows:

**Group I:** Audio-visual: In this group, a video of a peer model, filmed while he is demonstrating the brushing technique with audio clip in the language known to the children was be shown in their schools.

**Group II:** Pictorial activity and individual cast instruction: In this group, a sequentially arranged series of laminated pictures demonstrating the tooth brushing technique, was shown to the children and the correct brushing technique was demonstrated on a study cast.

**Group III:** Training special care children to brush their teeth: This group of individuals received acquisition training that included verbal instruction, demonstration and physical assistance.

The oral health status among these children was assessed at midway through the intervention.

The oral health education continued every month till the 9th month of the study. At the end of 9th month, the oral health status was again assessed among the special care children using OHI-S (1964). At the end of the study, a comparison was made between the efficacy of 3 methods of oral health education based on the OHI-S scores.
Table 1: Debris Index- Simplified

<table>
<thead>
<tr>
<th>Scores</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No debris or stain present</td>
</tr>
<tr>
<td>1</td>
<td>Soft debris covering not more than one third of the tooth surface, or presence of extrinsic stains without other debris regardless of surface area covered</td>
</tr>
<tr>
<td>2</td>
<td>Soft debris covering more than one third, but not more than two thirds, of the exposed tooth surface.</td>
</tr>
<tr>
<td>3</td>
<td>Soft debris covering more than two thirds of the exposed tooth surface</td>
</tr>
</tbody>
</table>

Table 2: Calculus Index- Simplified

<table>
<thead>
<tr>
<th>Scores</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No calculus present</td>
</tr>
<tr>
<td>1</td>
<td>Supragingival calculus covering not more than third of the exposed tooth surface.</td>
</tr>
<tr>
<td>2</td>
<td>Supragingival calculus covering more than one third but not more than two thirds of the exposed tooth surface or the presence of individual flecks of subgingival calculus around the cervical portion of the tooth or both.</td>
</tr>
<tr>
<td>3</td>
<td>Supragingival calculus covering more than two thirds of the exposed tooth surface or a continuos heavy band of subgingival calculus around the cervical portion of the tooth or both.</td>
</tr>
</tbody>
</table>

Statistical Analysis: Data analysis was done using SPSS 22.0 (Statistical Package for Social Sciences). Descriptive statistics were used for the analysis of data and distribution of study variables. Chi square test was used to find the association between the OHI-S scores and the video, pictorial activity and individual instruction group. The level of significance was set at p< 0.001.

Results

The present study was conducted to assess the oral health status and to compare and evaluate the efficacy of different methods of oral health education among 510 children with special health care needs in Mangalore. The mean age of the participants in the video group, picture group and individual instruction group were 13.63 ± 2.64, 12.89 ± 2.64 and 12.12 ± 3.04 respectively. The distribution of study participants based on gender. The study comprised 332 males (65.1%) and 178 females (34.9%). (Table 3)

Table 4 shows distribution of study participants based on Baseline OHI-S scores. In the video group 13.5% of them had a good oral hygiene, 62.9% had a fair oral hygiene and 23.5% of them had a poor oral hygiene. In the picture group 1.2% of them had a good oral hygiene, 70.6% had a fair oral hygiene and 28.2% of them had a poor oral hygiene. In the individual instruction group 4.7% of them had a good oral hygiene, 74.7% had a fair oral hygiene and 20.6% of them had a poor oral hygiene and this difference was statistically significant (p<0.001).

When OHI-S scores were recorded midway through the study, in the video group 13.5% of them had a good oral hygiene, in the picture group 2.4% of them and in the individual instruction group 5.9% of them had a good oral hygiene and this difference was significant (p<0.001). (Table 5)

The data presented in Table 6 shows distribution of study participants based on final OHI-S scores recorded at the 9th month of the study. In the video group, good oral hygiene was seen among 14.7% of the participants, in the picture group 2.9% of them had a good oral hygiene, and in the individual instruction group 6.5% of them had a good oral hygiene and this difference was statistically significant (p<0.001).

Table 3: Distribution of study participants among the 3 groups based on gender

<table>
<thead>
<tr>
<th>Group</th>
<th>Gender</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Males</td>
</tr>
<tr>
<td>Video</td>
<td>124</td>
<td>(72.9%)</td>
</tr>
<tr>
<td>Pictures</td>
<td>107</td>
<td>(62.9%)</td>
</tr>
<tr>
<td>Individual instruction</td>
<td>101</td>
<td>(59.4%)</td>
</tr>
<tr>
<td>Total</td>
<td>332</td>
<td>(65.1%)</td>
</tr>
</tbody>
</table>
Table 4: Distribution of study participants based on Baseline OHi-S scores and their Mean (OHi-S) scores

<table>
<thead>
<tr>
<th>Group</th>
<th>OHi-S scores</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Video</td>
<td>23 (13.5%)</td>
<td>107 (62.9%)</td>
</tr>
<tr>
<td>Pictures</td>
<td>2 (1.2%)</td>
<td>120 (70.6%)</td>
</tr>
<tr>
<td>Individual instruction</td>
<td>8 (4.7%)</td>
<td>127 (74.7%)</td>
</tr>
</tbody>
</table>

χ² = 25.11, p value < 0.001

Table 5: Distribution of study participants based on OHi-S scores recorded at midway through the study and their Mean (OHi-S) scores

<table>
<thead>
<tr>
<th>Group</th>
<th>OHi-S scores</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Video</td>
<td>23 (13.5%)</td>
<td>109 (64.1%)</td>
</tr>
<tr>
<td>Pictures</td>
<td>4 (2.4%)</td>
<td>120 (70.6%)</td>
</tr>
<tr>
<td>Individual instruction</td>
<td>10 (5.9%)</td>
<td>128 (75.3%)</td>
</tr>
</tbody>
</table>

χ² = 19.37, p value < 0.001

Table 6: Distribution of study participants based on OHi-S scores recorded at 9th month of the study and their Mean (OHi-S) scores

<table>
<thead>
<tr>
<th>Group</th>
<th>OHi-S scores</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Video</td>
<td>25 (14.7%)</td>
<td>110 (64.7%)</td>
</tr>
<tr>
<td>Pictures</td>
<td>5 (2.9%)</td>
<td>122 (71.8%)</td>
</tr>
<tr>
<td>Individual instruction</td>
<td>11 (6.5%)</td>
<td>128 (75.3%)</td>
</tr>
</tbody>
</table>

χ² = 18.87, p value < 0.001

Discussion

The present study was conducted to assess the oral health status and to compare and evaluate the efficacy of different methods of oral health education for children with special health care needs. In the present study there were 65.1% males and 34.9% females. These findings are almost similar to a study conducted by Mokthar MS et al.\textsuperscript{10}

The findings of the present study revealed that majority of the children had fair oral hygiene i.e 69.4% in the baseline, which increased to 70.0% in the mid intervention period which further increased to 70.6% at the end of 9\textsuperscript{th} month. These findings are comparable to a study conducted by Teixeira SA et al.\textsuperscript{11} The dental plaque can be removed only when an individual has the dexterity to use a toothbrush. However, the efficient brushing or flossing of teeth may be a difficult task for those individuals with physical and mental disabilities.\textsuperscript{11}

In the present study the mean OHI-S scores in the baseline for the video group was 2.10, for the picture group it was 2.27 and for the individual instruction group it was 2.16. These findings are comparable to a study conducted by Rao D et al.\textsuperscript{1} Snyder et al. pointed out that the lack of manual coordination in disabled children is a factor in the difficulty of their oral hygiene maintenance. Tooth brushing ability, is related to coordinated muscular movements, innate skills, ability to understand instructions, and age of the individual.\textsuperscript{1}

From the results obtained from this study, it was observed that there was a significant decrease in the mean OHI-S scores of all the three groups after teaching the brushing technique. The mean OHI-S scores of all the groups depict that the maximum drop in the OHI-S scores at the 9\textsuperscript{th} month of the study was seen in the picture group (with a drop in mean OHI-S scores from 2.27 to 2.22) when compared to the video group and individual group.
Many studies have highlighted poor oral health status of children with special health care needs in terms of higher calculus deposition, more caries prevalence, and a higher prevalence in malocclusion, emphasizing the need for receipt of timely preventive dental care. Sheehy et al. suggested the use of a Communication Board and picture communication symbols to supplement management in a pediatric dental setting for individuals who have limited or no functional speech because of severe physical, neuromuscular or cognitive deficit. Darwis and Messer used aided augmentative communication system (COMPIC: Computer Pictographs for communication) to manage children with cerebral palsy in a pediatric dental setting. It proved to be a promising adjunct for the care of the child with communication impairment, offering valuable and active management of behavior. 

Conclusion

This study revealed that majority of the children had a fair oral hygiene (70.6%), followed by (21.4%) of them who had poor oral hygiene and only (8%) of them had good oral hygiene. When health education was provided with the help of videos, pictures and individual instruction, the children who received training to brush their teeth with the help of pictures showed slight improvement in their mean OHI-S scores (2.27 to 2.22) at the end of 9th month. The reasons for poor oral hygiene in differently abled children may be due to lower level of concentration and lack of motor skills.

Conflict of Interest: None

Source of Funding: None

REFERENCES


Evaluation of the Baby Friendly Hospital Initiative Programme in Two Hospitals Designated “Baby-Friendly” in Kirkuk City, Iraq

Fakher Abobaker Ahmed Gli1, Dale Spence2, Linda Johnston3, Finoa Lynn4, Richard Tubman5, Ziad Mohammad Sadiq6
1College of Nursing, Kirkuk University, Iraq; 2Senior Lecturer, Queen’s University Belfast, UK; 3University of Toronto, Canada; 4Lecturer, Queen’s University, Belfast, UK; 5Consultant Neonatologist, Belfast Trust, UK; 6College of Medicine, Kirkuk University, Iraq

ABSTRACT

Background: Although the Baby Friendly Hospital Initiative (BFHI) was implemented in Iraq since 1992, a remarkable regression in exclusive breastfeeding has been highlighted by UNICEF (2011). Kirkuk province has experienced the lowest rate of breastfeeding initiation in the first hour of life, with higher neonatal and under five years mortality rates. International organizations have recommended a focus on breastfeeding practices and strengthening the implementation and monitoring of BFHI program in Iraqi provinces.

Method: Two-phase study was carried-out in two-designated Baby-Friendly hospitals (Azadi Teaching Hospital and Kirkuk General Hospital), using a standardized questionnaire. Monitoring BFHI tools utilised to measure the compliance with BFHI. Carolina B-KAP survey questionnaires were used to assess knowledge, attitudes, and practices of clinical and non-clinical staff and to measure the components of Organisational Readiness for Change (ORC) theory through practical and theoretical knowledge of hospitals processes. The Chi-square test of independence was performed to test for group differences in the responses to the Carolina B-KAP questionnaire.

Results: There was compliance in both hospitals with step 1,7 and 10 of the Ten Steps to Successful Breastfeeding, and the International Code of Marketing Breastmilk Substitutes (the Code). However, a non-compliance with step 3, 4, 5,6,8 and 9 were present. KGH also showed non-compliance with step 2 (training on BFHI). A total of 143 participants (124 clinical and 19 non-clinical) responded to the survey. ATH were more likely to have greater knowledge of infant feeding, than respondents working in KGH (p<0.05). Responses indicated that (61.7%) of participants reported that healthy full-term newborns within their care had started to breastfeed within 60 minutes after birth. In terms of matching infant feeding with appropriate clinical support plans, the results show that respondents agreed or strongly agreed on the need for additional guidance and training (78.3%).

Conclusion: Increased compliance with the BFHI programme can have positive impact on breastfeeding initiation, duration and exclusivity. Maternity departments in Kirkuk hospitals must fully implement Baby Friendly Hospital Initiative to support an increase in exclusive breastfeeding rates. Also, implementation of Baby Friendly Community Initiative (BFCI) can provide community support for breastfeeding.

Keywords: Baby Friendly Hospital Initiative (BFHI), the Ten Steps to Successful Breastfeeding, International Code of Marketing Breastmilk Substitutes (the Code), Organisational Readiness for Change (ORC).

Introduction

The Baby Friendly Hospital Initiative (BFHI) is evidence-based practice programme initiated in 1991 by the United Nations Children’s Fund (UNICEF) and World Health Organisation (WHO), and its designated to
increase the rates of initiation, duration and exclusivity of breastfeeding worldwide.\textsuperscript{1} BFHI consist of the Ten Steps for Successful Breastfeeding, and the International Code for Marketing of Breastmilk Substitutes which is a key element of the international standard for promoting, protecting and supporting breastfeeding.\textsuperscript{2} The BFH assessment process, otherwise known as the BFH designation process or accreditation, consists of a set of tools initiated in 1991 and revised and updated in 2006 to 2009. This process was designed based on the BFI quality cycle (Figure 1).\textsuperscript{3} Changing staff attitudes continues to be the greatest challenge to those hospitals that wish to achieve Baby-Friendly certification.\textsuperscript{4} Organisational readiness for change (ORC) is key factor in the effective implementation of new strategies, programs and practices in healthcare facilities.\textsuperscript{5} ORC embodies two important principles for the implementation of change, collective efficacy and collective commitment.\textsuperscript{6,7}

The BFHI was first implemented in Iraq in 1992, including the city of Kirkuk.\textsuperscript{8} The Multiple Indicator Cluster Survey (MICS4) conducted by UNICEF\textsuperscript{9} indicated a marked regression in breastfeeding since 2004 with record low rates of exclusive breastfeeding and duration of breastfeeding at 19.6\% (as compared with 30.9\% in 2004) and 13.8\% (as compared with 15\% in 2004), respectively. Kirkuk province had lower initiation rate of breastfeeding within one hour (10\%) than in any other Iraqi province, while the mortality rate for children under five (51 per 1,000 live births) was higher in Kirkuk than in any other Iraqi provinces and the neonatal mortality rate was 32\%.\textsuperscript{9} The evidence-based report by the U.S. Agency for International Development (USAID)\textsuperscript{9} stressed the importance of conducting a study into breastfeeding practices in health institutions and communities in Iraq, and proposed a further evaluation of the BFHI in Iraq.\textsuperscript{8} This also recommended by a report by the International Baby Food Action Network (IBFAN).\textsuperscript{10}

Two main gaps have been identified through the literature review. First, there is a dearth of studies which apply Organisation Readiness for Change (ORC) theory to assess clinical and non-clinical staffing levels required to deliver the BFHI programme. Second, few researchers have sought to understand how the organisational cultures of individual hospitals influence compliance with the Ten Steps to Successful Breastfeeding and the Code. The aims of this paper, therefore, are as follows:

1. To determine if the two BFHI designated hospitals in Kirkuk have sustained adherence to the Ten Steps to Successful Breastfeeding and the Code.

2. To assess the levels of support reported by clinical and non-clinical staff to successfully deliver the BFHI programme.

![Figure 1: Baby Friendly Initiative quality cycle.\textsuperscript{3}(p.5)](image-url)
**Material and Method**

A quantitative approach was carried out in the maternity departments of two public hospital, Azadi Teaching Hospital (was accredited as a Baby Friendly Hospital in June 2014) and Kirkuk General Hospital (was in the final stage of accreditation), in the city of Kirkuk, Iraq. Both hospitals had high birth rates (13,000 and 15,000 births respectively in 2014).

The standardized instrument Monitoring Baby Friendly Hospitals tools, gathered hospital level data regarding the implementation of BFHI. This mechanism was used to confirm the hospital’s commitment to Step 1 (policy) and Step 2 (training) of the Ten Steps to Successful Breastfeeding and the Code. The questionnaires for breastfeeding mothers [interview of 60 postpartum mothers (experienced vaginal birth or caesarean section birth) across the two participating hospitals through stratified sampling on random basis] were used to confirm the hospital’s commitment to the Steps 3 to 10, of the Ten Steps.

A survey utilized Carolina B- knowledge, attitudes and practices (Carolina B-KAP) questionnaires Nickel 11 were used to assess these aspects in clinical and non-clinical staff (were 125 employees in ATH and 105 in KGH by using self-selecting convenience sample) in relation to the BFHI, and to measure the components of Organisational Readiness for Change (ORC) theory through practical and theoretical knowledge of hospitals processes.

**Data Analysis:** Descriptive statistics were utilised as per the UNICEF/WHO guidance for data analysis. Summarising the data and interpretation of the finding of the Monitoring Baby Friendly Hospital tool, including the questionnaire for breastfeeding mothers, was undertaken to identify the level of the hospital’s adherence with BFHI steps. The data from Carolina B-KAP questionnaires were entered and analysed by the researcher using SPSS program.

**Findings**

The results of Monitoring Baby Friendly Hospitals tool revealed a partial commitment to providing maternal and infant health services under the BFHI program in Azadi Teaching Hospital (ATH), (Table 1) and Kirkuk General Hospital (KGH) (Table 2).

<table>
<thead>
<tr>
<th>Steps</th>
<th>Question Code</th>
<th>Minimum Requirement Needed</th>
<th>Findings from ATH</th>
<th>Compliance Statuses</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>1.1</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.3</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>2.1</td>
<td>At least 80% of the BFHI clinical staff + 3h. clinical</td>
<td>97% (n=110) +YES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.2</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.3</td>
<td>YES</td>
<td>Needs Improvement</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>3.1</td>
<td>70%</td>
<td>0%(n=0)</td>
<td>NO</td>
</tr>
<tr>
<td>S4</td>
<td>4.1</td>
<td>At least 80% on 3 items and 70% on 2. The second item can be reduced to 50% in a special circumstance</td>
<td>70%(n=21)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.2</td>
<td></td>
<td>73%(n=22)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>4.3</td>
<td></td>
<td>73%(n=22)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.4</td>
<td></td>
<td>13%(n=04)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.5</td>
<td></td>
<td>73%(n=22)</td>
<td></td>
</tr>
<tr>
<td>S5</td>
<td>5.1</td>
<td>At least 80% on 3 items and 50% on 2</td>
<td>70%(n=21)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>5.2</td>
<td></td>
<td>57%(n=17)</td>
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</tr>
<tr>
<td></td>
<td>5.3</td>
<td></td>
<td>33%(n=10)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.4</td>
<td></td>
<td>57%(n=17)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.5</td>
<td></td>
<td>Not Included</td>
<td></td>
</tr>
<tr>
<td>S6</td>
<td>6.1</td>
<td>80%</td>
<td>67%(n=20)</td>
<td>NO</td>
</tr>
</tbody>
</table>
Conted…

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S7</td>
<td>7.1</td>
<td>80%</td>
<td>97%(n=29)</td>
<td>YES</td>
</tr>
<tr>
<td>S8</td>
<td>8.1</td>
<td>80%</td>
<td>63%(n=19)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>8.2</td>
<td>80%</td>
<td>47%(n=14)</td>
<td></td>
</tr>
<tr>
<td>S9</td>
<td>9.1</td>
<td>80%</td>
<td>40%(n=12)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>9.2</td>
<td>80%</td>
<td>77%(n=23)</td>
<td></td>
</tr>
<tr>
<td>S10</td>
<td>10.1</td>
<td>80%</td>
<td>90%(n=27)</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>10.2</td>
<td>80%</td>
<td>87%(n=26)</td>
<td></td>
</tr>
<tr>
<td>The</td>
<td>C.1</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C.2</td>
<td>80%</td>
<td>100%(n=30)</td>
<td>YES</td>
</tr>
</tbody>
</table>

Table 2: Monitoring of the BFHI in Kirkuk General Hospital

<table>
<thead>
<tr>
<th>Steps</th>
<th>Question Code</th>
<th>Minimum Requirement Needed</th>
<th>Findings from KGH</th>
<th>Compliance statuses</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>1.1</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>1.3</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>S2</td>
<td>2.1</td>
<td>At least 80% of the BFHI clinical staff + 3h. clinical</td>
<td>74% (n=69) + YES</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>2.2</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.3</td>
<td>YES</td>
<td>Needs Improvement</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>3.1</td>
<td>70%</td>
<td>0%(n=0)</td>
<td>NO</td>
</tr>
<tr>
<td>S4</td>
<td>4.1</td>
<td>At least 80% on 3 items and 70% on 2. The second item can be reduced to 50% in a special circumstance</td>
<td>67%(n=20)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>4.2</td>
<td>70%(n=21)</td>
<td>70%(n=21)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>4.3</td>
<td>70%(n=21)</td>
<td>03%(n=01)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>4.4</td>
<td>77%(n=23)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S5</td>
<td>5.1</td>
<td>At least 80% on 3 items and 50% on 2</td>
<td>83%(n=25)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>5.2</td>
<td>90%(n=27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.3</td>
<td>80%(n=24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.4</td>
<td>47%(n=14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.5</td>
<td>Not Included</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S6</td>
<td>6.1</td>
<td>80%</td>
<td>67%(n=20)</td>
<td>NO</td>
</tr>
<tr>
<td>S7</td>
<td>7.1</td>
<td>80%</td>
<td>97%(n=29)</td>
<td>YES</td>
</tr>
<tr>
<td>S8</td>
<td>8.1</td>
<td>80%</td>
<td>43%(n=13)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>8.2</td>
<td>80%</td>
<td>37%(n=11)</td>
<td>NO</td>
</tr>
<tr>
<td>S9</td>
<td>9.1</td>
<td>80%</td>
<td>70%(n=21)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>9.2</td>
<td>80%</td>
<td>97%(n=29)</td>
<td>NO</td>
</tr>
<tr>
<td>S10</td>
<td>10.1</td>
<td>80%</td>
<td>93%(n=28)</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>10.2</td>
<td>80%</td>
<td>93%(n=28)</td>
<td>YES</td>
</tr>
<tr>
<td>The</td>
<td>C.1</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Code</td>
<td>C.2</td>
<td>80%</td>
<td>100%(n=30)</td>
<td>YES</td>
</tr>
</tbody>
</table>
Survey Results

The response rate was 62% across both hospitals with 143 participants in total (124 clinical and 19 non-clinical staff).

Knowledge of infant feeding: The results in (Table 3) show that for items 1-3 and 6, respondents working in ATH were more likely to have greater knowledge of infant feeding, as they responded correctly to these items, than respondents working in KGH (p<0.05).

<table>
<thead>
<tr>
<th>Items</th>
<th>Items df</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breastfeeding too frequently can cause sore nipples</td>
<td>5.841</td>
<td>0.016</td>
</tr>
<tr>
<td>Maternal body temperature</td>
<td>8.538</td>
<td>0.003</td>
</tr>
<tr>
<td>Hospital policies that interfere with breastfeeding</td>
<td>24.557</td>
<td>0.000</td>
</tr>
<tr>
<td>Latching during breastfeeding</td>
<td>6.664</td>
<td>0.155</td>
</tr>
<tr>
<td>Encouraging successful breastfeeding</td>
<td>11.337</td>
<td>0.023</td>
</tr>
<tr>
<td>Acceptable medical reason to supplement a breastfeeding infant in the hospital</td>
<td>12.372</td>
<td>0.015</td>
</tr>
<tr>
<td>Optimal duration for exclusive breastfeeding</td>
<td>8.826</td>
<td>0.032</td>
</tr>
</tbody>
</table>

Practices in mother-baby care: Only clinical staff (n=124) responded to the 11 items relating to practices in mother-baby care, which included questions about counselling and clinical practice. Most of the respondents (77.4%, n=96) always recommend breastfeeding to the mothers in their care who have not decided how to feed their babies. Responses indicated that (61.7%, n=58) of participants (out of 88 participants involved with Labor and delivery care) reported that healthy full-term newborns within their care had started to breastfeed within 60 minutes after birth.

Attitudes toward commitment and ability in the workplace: The participants responded to 15 questions which measured the components of Organisation Readiness for Change (ORC) across five categories. The first category related to their opinion about clinical staff in the maternity facility where they work and whether they needed additional guidance (Table 4). In terms of matching infant feeding with appropriate clinical support plans, the results show that respondents agreed or strongly agreed on the need for additional guidance or training (78.3%, n=112).

<table>
<thead>
<tr>
<th>Items</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>In my opinion, clinical staff in the maternity facility where I work need additional guidance/training/skills in:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matching infant feeding plans with appropriate clinical support.</td>
<td>0.0 (0.0)</td>
<td>1 (.7)</td>
<td>12 (8.4)</td>
<td>15 (10.5)</td>
<td>73 (51.0)</td>
<td>39 (27.3)</td>
</tr>
<tr>
<td>Counselling/teaching all pregnant women about the benefits and practices of breastfeeding.</td>
<td>1 (.7)</td>
<td>6 (4.2)</td>
<td>3 (2.1)</td>
<td>13 (9.1)</td>
<td>66 (46.2)</td>
<td>48 (33.6)</td>
</tr>
<tr>
<td>Referring patients to breastfeeding resources in the community at discharge.</td>
<td>14 (9.8)</td>
<td>9 (6.3)</td>
<td>8 (5.6)</td>
<td>11 (7.7)</td>
<td>49 (34.3)</td>
<td>44 (30.8)</td>
</tr>
</tbody>
</table>

Discussion

Increases in exclusive breastfeeding rates are associated with high compliance with BFHI practices. Participated hospitals in this study showed non-compliance with many steps of the Ten Steps to Successful Breastfeeding. Specifically, a non-compliance in KGH in relation to step 2 was due to the low proportion of clinical staff who had participated in...
the training courses, which was below the required rate set by the UNICEF and WHO guideline.

There was a non-compliance in both hospitals with Step 3. Given that the total number of births in both hospitals for 2014 exceeded 28000, a small prenatal clinic in both hospitals cannot be expected to cover Step 3. This finding is consistent with the result obtained by Zakarija-Grkovic as a minimum compliance with the same step was reported.

The knowledge of participated hospitals staff was varied according to the hospitals as there is a gap in knowledge to support breastfeeding, respondents working in ATH were more likely to have greater knowledge of infant feeding. This can be linked to lack of training in KGH when that hospital showed non-compliance with step 2 of the BFHI. A study on BFHI confirmed that lack of health training affects the rate of correct answers on breastfeeding knowledge.14

The rate of initiation of breastfeeding (within first hour of birth) in accredited (BFHI) hospitals is greater than those of non-accredited. Based on the opinion of staff working in labour and delivery care, our findings showed that up to 61.7% of healthy, full-term newborns initiate breastfeeding within the first hour of birth. This rate is significantly associated with respondents from KGH (p<0.05). A survey in the District of Shaqlawa, Erbil, Iraq, found a statistically significant relationship between delivery in BFHI hospitals and initiation of breastfeeding.17

Readiness in healthcare organisations is required before implementing evidence-based interventions. Changing staff attitudes requires time and remains the greatest challenge for those wishing to attain Baby Friendly certification. Our findings indicated that the clinical staff require more guidance, training and skills in terms of matching infant feeding plans with appropriate clinical support plans (78.3%). This result was significantly associated with the respondents working at KGH, and those in the age group 31-40 years (p<0.05).

Conclusion

Maternity departments in Kirkuk must fully implement Baby Friendly Hospital Initiative. Organisational Readiness for Change is vital in successful implementation of the BFHI. Training on BFHI develops the knowledge and skills of staff concerned. Community support of optimal breastfeeding practices in Kirkuk is needed through implementation of the Baby Friendly Community Initiative (BFCI) to increase the rates of exclusive breastfeeding at six months.

Conflict of Interest: Nil

Source of Funding: This study was funded by the official representative of the Iraqi Ministry of Higher Education and Scientific Research (MOHESR) in the UK and Ireland.

Ethical Clearance: Ethical approval and permission to access participants was obtained from the School of Nursing and Midwifery Research Ethics Committee, Queen’s University Belfast and the Ministry of Health in Iraq.

REFERENCES


The Combinatory the Effect of Healthy Educational Programs with Kinect Simulation Device on Learning Some of Basketball Skills

Mohammed Shihab Ahmed1, Mayyadah Khalid Jasim1
1Department of Physical Education and Sport Sciences, Faculty of Basic Education, Mustansiriyah University, Baghdad, Iraq

ABSTRACT

The problem that led to this research is derived from neglecting the use of alternative modern methods of learning that simulate the intellectual capabilities of the ones who learn, which urged the researcher to shed the light on this dilemma and try to find the optimal solutions. The researcher had used the experimental approach; as the research sample was represented by the first year students of Physical Education and Sports Sciences, College of Basic Education- Al-Mustansirya University for the academic year (2016-2017). The research’s sample was selected randomly, and the sample divided into three halls, where hall no. (1), represented the second experimental group, whom were taught by using the educational program made by the researcher, while hall no. (2) held the research sample that been taught the skills via the educational program combined with the kinetic simulator device while hall no.(3) held the control group which being taught using the old routine. After the set of the educational units of each skill that being studied for the experimental groups according to the specificity of the educational program along with the simulator device. Each group was examined pre and post testing. The data were collected and analyzed statistically via SPSS

Keywords: Simulator Kinect, Basketball. Health programs.

Introduction

The world is of a fast development in various fields, this had built a burden of accumulation of responsibilities and duties. Which results in a noticeable increase in the numbers of those who participate sport activities, one of those activities is basketball that considered of one of the most popular sport around the globe due to its physical, intellectual, and skillful properties, nevertheless the presence of excitement and thrilling elements for the players and the audience as well.

Accordingly it requires concentration on good planning for educational process hence preparation of great educational curricula related specified to each game that basketball demands special requirements depending on a modern alternative educational methods that simulate the intellectual capabilities of the learners, one of these effective methods is the kinetic simulator device which is considered as the basics of learning, therefore the research use the device along with a specially set educational program proposed by the researcher. As such educational alternative method is crucial in learning skills, especially those of basketball, that they are exhibited as fast rhythm characterization and transition between the attacking and defensing positions, therefore it calls for the use of methods produce diversity in performance

As a sum of all the above, came the importance of proposing this research in preparing an educational program base on the use of simulator device to learn some of attacking skills in basketball that is hoped to be as an aid in teaching process in the future.

The main goal of the kinetic learning theories in every game is to elevate and develop the learning process, which in normal cases relay on the alternative modern
methods of learning therefore, an adherence to proper scientific methodology in learning process is a necessity that reflects the improvement level during learning process. As long as basketball is one of the most popular sports and gained a wide world attention including Iraq, it was essential to define the errors associated with the learning process of its skills and eliminate them.

**Objectives:**

- Identifying the effect of the educational program, which was made by the researcher, on the learning of some types of attacking skills’ in Basketball.
- Identifying the effect of combining the educational program with kinect simulator device in learning some of attacking skills in basketball.
- To identify the effect of the learning technique on types of basketball attacking skills.
- To identify the effect of the best educational programs in learning some of attacking basketball skills.

**1-3 Hypotheses:**

- There are significant statistical differences between the results of pre and post tests while learning some of the attacking skills for the first experimental group favoring the post test results.
- There are significant statistical differences between the results of pre and post tests while learning some of the attacking skills for the second experimental group favoring the post test results.
- There are significant statistical differences between the results of pre and post tests while learning some of the attacking skills for the control experimental group favoring the post test results.
- There are significant statistical differences between the results of post tests result for the research groups.

**Research Domains:**

**Human Field:** Students of Physical Education and Sports Sciences-College of Basic Education- Al-Mustansiriya University.

**Place Domain:** Closed Sports Hall - College of Basic Education-Al-Mustansiriya University.

**Time Domain:** 12/2/2017 to 12/4/2017

**Methodology**

The experimental approach was used to design three groups suitable for the nature of the research.

**Community and Sample Research:** The research community is represented by students of the first grade/Physical Education and Sports Sciences, College of Basic Education.

Al-Mustansiriya University. After excluding of those who failed or those who are experienced, the total number of students was 48 male students. Which divided randomly into three groups, as each of the first and second group consists of 10 students while the control group held 10 students as well, therefore the search sample was 62.5% of the total community.

**Tools and Instruments for the Information Collection:**

**Tools, Devices, Means of Information Collection:**

**Search tools and devices:** For the purpose of conducting the research procedures, the following tools and devices were used:

1. Basketball court
2. Stop watches (2 watches).
3. Basketballs (15 balls) type (Molten).
4. Adhesive colored tape (width 5 cm).
5. Textile measuring tape (15 m).
7. Plastic cone (12 cones).
8. Laptop (Dell).
9. Kinect simulator device
10. TV screen

**Sources of Information Collection:**

1. Arabic and English resources.
2. Performance tests.
3. Registration forms to confirm test scores.
4. International Information Network (Internet).

**The Research Tests (7: 95)**

**Selection of passing ball using one hand over the shoulder (long passing)**

**Purpose of selection:** Measure the accuracy of the bassing with one hand above the shoulder on target.
Accuracy Test of layup shot post dripping

Objective of the test: As this test is one of the tests that show the motor and skillful coordination between the work of arms and legs, therefore it aims to assess the level of accuracy of layup shooting.

The scientific basis for the technical tests:

A. The Truth: It is the order by which the object of test is being measured (4: 64); one of the methods of proving truth is via self-honesty, as mentioned in table (1) that shows the honesty of varies tests.

B. Stability: (it means the reproducing of the results over the repletion of the test on the same group of participants), (1: 70).

Retesting method was conducted to measure the stability coefficient of the test on a group of first grade students other than the research sample.

C. The Objectivity: Objectivity, refers to non bias condition as being referred by (WajihMahjoub), whom defined it as “the subjective judgments are not affected by the experimenter and that objectivity is available without bias and self-intervention by the experimenter) (5: 64). Experts had proven that each skill requires certain selection of proper tests therefore there is no difference in judgment by the experts on certain experiment or on a particular subject) (2: 64), accordingly the tests being used in this research were selected to be known, clear, understandable and easy. And each aspect of each test was clarified including the tasks to accomplish.

In order to identify the objectivity of the selected tests, (Pearson) correlation coefficient was being used on data of the first and second judgment, to gain a value of highly objectivity hence the tests are considered highly objective. Table (1) summarizes that:

<table>
<thead>
<tr>
<th>Tests</th>
<th>Stability</th>
<th>Self honesty</th>
<th>Objectivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ball passing above the shoulder (long passing)</td>
<td>0.85</td>
<td>0.92</td>
<td>0.87</td>
</tr>
<tr>
<td>Lay up shot</td>
<td>0.8</td>
<td>0.89</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Preliminary Testing: It is a preliminary empirical study intended to select research methods and tools) (6:79).

Therefore, the researcher conducted two surveys in 8/2/2017 on Sunday on a group of students of the first year Department of Physical Education and Sports Sciences/College of Basic Education (6 students), whom were excluded from the research sample. The purpose of the experiments was:

1. Demonstration of tests and explain them to the students.
2. Identifying the time required for testing.
3. Identifying the time required for each exercise within the program used in the search.
4. Identifying the obstacles that may hinder tests or educational processes.

Research Field Procedures:

Preliminary Lectures: The researcher presented a lecture for the three groups of research whom were not familiar with these skills before, as the lecture included a demonstration of ball passing above the shoulder and lay up shooting skills.

Pre Tests: The researcher carried out the pretests in 12/2/2017 on the three research groups of the above-the-shoulder ball passing skill and the skill of layup shooting. In the court of Physical Education and sport Sciences at the Faculty of Basic Education, Al-Mustansiriya University.

Educational Program: The researcher designed a special educational program for the exercises associated with the use of Kinect simulator device and was carried out on the first experimental group. While the second experimental group carried out the same educational program without using the simulator device.

This program was employed in the process of learning the long ball passing from above the shoulder and lay up shooting skills as shown in the table below:
The research groups consist of eight units, as one educational unit was given per week, (90 Min.) divided into preparation part (20 Min.); the sum of all units was (160 Min.), and the main part time (60 Min.) per each unit. And the sum of them was (480 Min.), the final part (10 Min.) per unit and (80 Min.) as sum of the units.

The mechanism of applying those skills was through the practical part as the researcher prepared set of skilling exercises concentrating on the skills being studied, for the first experimental group as the early repetition, especially in the first and second educational units, on the skill performances in constant distances and angles to provide the focusing element to the learner thereafter through the late educational units there was a diversity in the motor behavior by using different angles and distances besides using exercises similar to those being practiced by learners with simulator device that being used during the educational units, as the learner was practicing some repetitions of those exercises on the playground, then switch to practice those exercises the simulator device with certain routines, later on the learner will practice those exercises on field. On the other hand the second experimental group the learning process was maintained via the performances of the same exercises being taught in the educational program with increasing the number of repetitions yet without the simulator device, as the repetitions will compensate the time and the device

Post-Tests: Post-tests results for the skills being studied were conducted in 12/4/2017 under the same conditions of performance as the pre tests were established.

Statistical Analysis

The researcher relied on the processing of statistical data using (SPSS)

Chapter Three: Presentation, Analysis, and Discussion of Results

Presentation and Analysis of the Results of pre and post Tests of the Three Groups:

<table>
<thead>
<tr>
<th>Process</th>
<th>Students NO</th>
<th>Measuring Unit</th>
<th>Pre Test Mean</th>
<th>Pre Test STD</th>
<th>Post Test Mean</th>
<th>Post Test STD</th>
<th>Calculated T test</th>
<th>Reference T values</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st group.</td>
<td>10</td>
<td>Point</td>
<td>15.9</td>
<td>2.28</td>
<td>22.1</td>
<td>2.13</td>
<td>14.02</td>
<td>2.262</td>
<td>Significant</td>
</tr>
<tr>
<td>2nd group</td>
<td>10</td>
<td>Point</td>
<td>15.5</td>
<td>1.9</td>
<td>19.6</td>
<td>1.35</td>
<td>10.83</td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Control.</td>
<td>10</td>
<td>Point</td>
<td>15.3</td>
<td>2.21</td>
<td>15.6</td>
<td>2.07</td>
<td>1.406</td>
<td></td>
<td>Non-significant</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process</th>
<th>Students NO</th>
<th>Measuring Unit</th>
<th>Pre Test Mean</th>
<th>Pre Test STD</th>
<th>Post Test Mean</th>
<th>Post Test STD</th>
<th>Calculated T test</th>
<th>Reference T values</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st group</td>
<td>10</td>
<td>2.1</td>
<td>15.9</td>
<td>0.88</td>
<td>5.5</td>
<td>1.08</td>
<td>6.053</td>
<td>2.262</td>
<td>Significant</td>
</tr>
<tr>
<td>2nd group</td>
<td>10</td>
<td>1.4</td>
<td>15.5</td>
<td>0.52</td>
<td>3.8</td>
<td>1.48</td>
<td>5.041</td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Control</td>
<td>10</td>
<td>1.5</td>
<td>15.3</td>
<td>0.53</td>
<td>2.1</td>
<td>0.57</td>
<td>3.674</td>
<td></td>
<td>significant</td>
</tr>
</tbody>
</table>
The results and discussions of the post tests of the three Groups:

Table 4: Demonstration of mean squares among the groups and with each one using calculated and reference F values for post tests of the long ball passing over the shoulders

<table>
<thead>
<tr>
<th>Sources</th>
<th>Variance</th>
<th>Sum of squares</th>
<th>Freedom</th>
<th>Mean squares</th>
<th>Calculated (F) value</th>
<th>Reference (F) value</th>
<th>Significance degree</th>
<th>Statistical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Among groups</td>
<td>215</td>
<td>2</td>
<td>107.5</td>
<td>30.329</td>
<td>3.35</td>
<td>0.05</td>
<td>significant</td>
<td></td>
</tr>
<tr>
<td>within the groups</td>
<td>95.7</td>
<td>27</td>
<td>3.544</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Shows the result of (L.S.D.) in know the least difference between three groups of long ball passing above the shoulder skills

<table>
<thead>
<tr>
<th>Groups</th>
<th>Difference of means</th>
<th>Results of differences</th>
<th>L.S.D</th>
<th>Statistic conference</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1-G2</td>
<td>22.1 – 19.6</td>
<td>2.5</td>
<td>1.73</td>
<td>Significant</td>
</tr>
<tr>
<td>G1-G3</td>
<td>22.1 – 15.6</td>
<td>6.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G2-G3</td>
<td>19.6 – 15.6</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Discussion of the pre and post tests results for three groups concerning the long ball passing above the errand layup shooting skills in the Basketball: The results presented in Tables (2, 3), Show the existence of significant statistical differences for the two experimental groups.

This is due to the harmonization of the given exercise with the research sample, as the set educational program and the given exercises had given enough space to the learner that fit with his ability to adapt and learn while changing the environment of exercise, which is essential for better learning of skills for beginners

Nevertheless the results had shown that there is no significant statistical differences for the control group while practicing the long ball pass over the shoulder, due to insufficient practicing style for such skill as it is not harmonized with their abilities, on the other hand the control group had shown a significant statistical difference with the other skill due to the suffice learning process gained from the educational program and the over repetitions of that skill

Therefore the educational program had proven to be harmonized with the capabilities of learning and produce great results

Posttests results of the three research groups of the long ball passing above the shoulder and the layup shooting skills in basketball: The results of the tables (4, 6) showed that there is a significant difference in the learning of the attacking skills in the basket among the three groups. Which is mainly due to the use of the educational program accompanying the Kinect simulation for the first experimental group while for members of the second experimental group, the educational program was used solely

The results of the LSD test had showed that experimental group 1 has the least significant difference while learning those skills, due to the nature of the exercises that were efficient under changing the environment which create an applicable kinetic program can be used in different circumstances of practicing, nevertheless the kinetic simulating device had a major role in learning those skills by combination effect between the virtual and practical worlds, by adding the thrilling and excitation effects to the learning process which made the learner enthusiastic to learn and practice

Conclusions

The results showed the effectiveness of the educational program prepared by researcher combined with the use of Kinect simulator device for learning long passing from above the shoulder and lay up shooting skills. The results showed the effectiveness of the educational program prepared by the researcher to learn long passing from above the shoulder and lay up shooting skills. The results showed the effectiveness of the method used in learning my skills (long handling
from the shoulder, peaceful correction). The results showed the preference of the educational program prepared by the researcher when accompanied by the Kinect simulator in learning long passing above the shoulder and lay up shooting skills on the educational program prepared and the approach used.

**Recommendations**

The need to connect the virtual and the practical world in the preparation of the educational curricula of learning the skills of basketball. Provide substantial and moral support for teachers and trainers in order to provide such devices to serve the educational process. The researcher recommends conducting similar studies on a different sample from the research sample as well as other skills of basketball and other sports games. The researcher recommends all the specialists in the educational process to keep up dated with what is the latest in the field of simulators and try to employ it in learning sports skills.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Not required

**REFERENCES**


ABSTRACT

Smoking considered as bad habit that has negative reflection on person’s health, society and economic. Civil society organizations and governments were aware about the risk of smoking phenomenon, in Jordan which motivates the government to issue regulations and laws that contribute to put limitations for smoking in public places and sites. Also, it generates many health awareness campaigns to put limit for smoking phenomenon in cooperation with education institutes and civil society organizations in order to urge people to quit smoking. In spite of that, Jordan is still suffering from increasing number of smokers. Because of that, the objective of this study is to investigate the effect of health awareness campaigns in influencing people behavior to stop smoking. Sample of 369 smokers were selected, and the questionnaire composed of the following five dimensions:

Awareness campaigns through media; factors that motivated smoking quit; frustrating factors to quit smoking; Reference groups and smokers response to awareness campaigns.

Study results show that there are motivation factors in the environment that smokers live in, and there is strong relation between antismoking factors and smokers’ response to health awareness campaigns; where the connection factor between them is 0.634. Awareness campaigns could not face the abortive factors to stop smoking and to influence on smokers in spite of the fact that 33% of the sample individuals are planning to quit smoking in the future and the fact that there are three clinics in Amman for assistance to quit smoking and a specialized pharmacy, but the problem is that most people do not have any information about it. It shows, clearly, the failure of health awareness campaigns related to quit smoking. The sponsors must draw suitable strategy that coincides with Jordan reality and suitable to effective factors of smoker behavior.

Keywords: Awareness Campaigns; Smoking; Media tools; Health; Amman

Introduction

Tobacco products, nowadays, are responsible for the death of more than three million yearly around the world; which represents about 6% of the total deaths [1].

However, it is expected that this percentage will increase to 10.9% by the year 2020 or early 2030, related to all deaths of the growing (developing or less developed) countries and up to 17.7% in the more developed (Industrial) countries [2].

This is a major indicator that smoking causes death more than any other single disease. Smokers in growing countries are about 800 million or more than 70% of populations [3].

The age average, that people start smoking, is between the age 12 and 15 years and 90% of the smokers smoke regularly before the age of 21. For that, health awareness campaigns (to quit smoking) must focus on people of age 11, in schools, and these campaigns should continue in universities [4-6].

The workers in awareness campaigns, to quit smoking, work on identification of damages, harms, hurts and disadvantages of smoking to the smokers.
The workers must increase awareness about these risks and to work on performing negative attitudes towards smoking and push smokers to quit smoking by publishing and broadcasting information, conduct seminars, conferences and urge governments to put laws and regulations that stop or reduce smoking process [8].

Jordan is located in advanced position concerning the number of smoker because smokers, in Jordan, represent 65% of the population in a middle of scaring expectation that it will raise up to 88% among males. Specialized authorities are working to apply the national strategy to control smoking through implementation of forbidden smoking in public places. Their efforts were clear in issuing the modified health law (47), 2017, forbidding smoking in public and closed places, where fines are determined and jail penalty to people who break the law [9].

The reason behind that is the fact that smoking becomes a very dangerous phenomenon in Jordan, and the late statistics indicate that tobacco is behind the cause of death for 12% of the total deaths in Jordan between people whom their ages are above thirty years old. Jordan suffers from 29 death cases, weekly, caused by smoking [10].

Objectives

The wide spread of smoking phenomenon pushes us to prepare this study and to investigate the effect of health smoking campaigns on quit smoking through media, reference groups, effect of motivated factors on smoker behavior to quit smoking, and frustrating (abortive) factors to quit smoking.

Study Problem: The indication of Faris Alhawari, Cancer disputing office manager, Al Hussien Center, that number of smokers in Jordan represents 65% from the country population, among expectations that it will increase between males, within few years, to reach 88%. Also, 50% of death cases, in Jordan, are related to smoking. He pointed, as well, to the importance of the implementation of Smoking disputing national strategy, because forbidding of smoking in public places reduces smokers percentages in the Kingdom by 4% within a year [10].

For all of that, the problem that faces the society needs more and more studies to determine and identify reasons for smoking, the proper treatments and medications to reduce number of smokers in Jordan.

Previous Studies: Nurulfarahin et al, mention that quitting smoking is hard as people who stop smoking often start again because of weight gain, stress and withdrawal symptoms. So it is imperative to strengthen the enforcement on regulations advertisement, and develop more activities on motivation among smokers and their families, which may be organized by government or non-government organizations [11]. Unal E., M.E. et al, they mentioned that all the advertisements were more effective for adolescents who had never smoked compared to ex-smokers and current smokers [12].

Bednarski et al, explains that smoking tobacco decreased in many countries due public health campaigns, anti-smoking programs, anti-smoking policies and banding smoking advertisements [13]. Chandra, A., et al, says that health awareness campaign can be implemented through distributing booklets, handbooks, presentation of posters, provide door to door information and the public reacting with the team assigned to awareness campaign [14].

The objective from health awareness campaigns is to educate smokers and non-smokers against smoking by broadcasting and spreading awareness, knowledge and make changes in their beliefs and attitudes, in order to affect their behavior [15]. Also to continue their work spreading awareness to control smoking because continuous awareness campaigns gain and bring more results than short ones or through occurrences separated by long periods. In fact there is a big direction from governments, in the whole world, to support awareness about smoking health warnings [16].

Health awareness campaigns that are anti-smoking must concentrate on all people, where smokers’ friends, their families and attitudes that support smoking have role in encouraging smoking [17].

Workers with anti-smoking health awareness campaigns must stress on smoking damages and harms where smokers suffer for many years from bad health beside the early death [18].

Study Objectives: The study objective is to know how far smokers are responding to health awareness campaigns to quit smoking; through media tools, reference groups and price effect.
Hypotheses of This Study

Ho: There is statistical, not significance (α ≤ 0.05), of the health awareness campaigns, motivated factors, frustrating factors that they play an effective role in driving smokers to quit smoking, and reference groups through media tools

Methodology

This study is implemented on the youth faction (sector) and includes seven independent factors (variables): Television, radio, posters, and seminars, quit smoking Clinics, reference groups and price. The dependent variable is quit smoking.

The questionnaire is designed, formulated and consists of 28 questions in order to gather, analyze data and to reach the conclusions and recommendations based on results of this study.

The study is an experimental research, using a descriptive and analytical approach.

Data Collection

Data collection, manners of analysis and programs used in the current study are based on two sources:

1. Primary Source: the questionnaire that was designed to reflect study objectives and questions. The selected sample was, from youth age, 480 youths. The valid returned questionnaires for the statistical analysis were only 369, which is 77%.

2. Secondary Sources: books, journals, articles and previous theses to write the theoretical framework of the study

Study Model: The following diagram (Figure 1) represents the study model which is based on the study problem, objectives and hypotheses [19-25].

Results

Table 1: Number of respondents who have information on the clinic for quit smoking and pharmacy

<table>
<thead>
<tr>
<th>Clinic/Pharmacy</th>
<th>Frequency</th>
<th>Percent to Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinic 1</td>
<td>32</td>
<td>8.7</td>
</tr>
<tr>
<td>Clinic 2</td>
<td>34</td>
<td>9.2</td>
</tr>
<tr>
<td>Clinic 3</td>
<td>35</td>
<td>9.5</td>
</tr>
<tr>
<td>pharmacy</td>
<td>45</td>
<td>12.2</td>
</tr>
</tbody>
</table>

Number of individual sample visited the clinics and pharmacy 63 individuals 17.1%
Table 2: Dimensions results

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>t</th>
<th>Sig (2 tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Dimension: Health awareness campaigns through media tools</td>
<td>2.81</td>
<td>.80</td>
<td>67.25</td>
<td>.00</td>
</tr>
<tr>
<td>H1: Health awareness campaigns through media tools</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second Dimension: Motivated factors to quit smoking</td>
<td>3.38</td>
<td>.086</td>
<td>75.51</td>
<td>.00</td>
</tr>
<tr>
<td>H2: Motivated factors to quit smoking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Third Dimension: frustrating factors to quit smoking</td>
<td>4.14</td>
<td>.63</td>
<td>124.79</td>
<td>.00</td>
</tr>
<tr>
<td>H3: frustrating factors to quit smoking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fourth Dimension: Reference Groups</td>
<td>3.02</td>
<td>.92</td>
<td>62.74</td>
<td>.00</td>
</tr>
<tr>
<td>H4: Reference Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fifth Dimension: Smokers response (The dependent factor)</td>
<td>3.34</td>
<td>.77</td>
<td>82.75</td>
<td>.00</td>
</tr>
<tr>
<td>H5: Smokers response (The dependent factor)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results show that individuals of the sample do not proceed to follow-up advertisements that encourage quit smoking on radio, see advertisements that encourage quit smoking in local newspapers, and participated in seminar that encourages to quit smoking, this indicates the ineffectiveness of health awareness campaigns against smoking in this area.

Also the results indicate that the mean for all the second dimension questions was greater than the average unit of measurement (3), except the Health awareness campaigns, for quit smoking, contribute to aware smoker that his productivity will be greater when he quit smoking.

On the same hand, results indicate that the factors frustrating to quit smoking took the highest averages, encouraging them to continue smoking, especially question 15, “You feel that seeing a person smoking will make you wish to smoke”; where the value of the mean is the largest value among all questionnaire questions. Based on the results, we reject the null hypothesis.

The results indicate that the health awareness campaigns to quit smoking, affected family members to urge smokers to quit smoking, but did not affect behavior of their co-workers, which push them to encourage him to quit smoking.

Summary and Conclusions

The results indicate that (234) respondents tried to quit smoking by (63.41%), but they had failed to continue quit smoking.

The failure of many attempts to quit smoking needs to provide psychological support, medication and treatment with the proper costs and make space for the opportunity to quit smoking [26-27].

The study reveals that there are about (125) smokers who are planning to quit smoking in the future with percentage of (33.88%) against (244) smokers who are not planning to quit smoking in the future with percentage of (66.12%), which is very high percentage and an indicator to the failure of health awareness campaigns to quit smoking and to affect in smokers behavior; at the same time,

The frustrating (abortive) factors to quit smoking have great effect on the failure of awareness campaigns where the correlation factor represents the highest value which is (0.63). This indicates that there is strong relation between these factors and the case that smokers do not quit smoking.

Recommendations

Health awareness campaigns must be efficient and effective. They have to concentrate on increasing awareness about health, psychological damages and harms caused by smoking and work to change people motives and attitudes towards smoking by providing them with information, present films and arrange awareness seminars.

Also, they must help smokers to put their own plans and provide psychological support for them that will help them to quit smoking.

Such campaigns must be condensed and continuous and all related authorities have to take part in them, like organization of civil society, education organizations,
health departments and work on issuing laws and regulations that push and motivate people to quit smoking.

The work must be on producing awareness campaigns with clear targets, through media tools, and must have an impact on smokers and non-smokers behavior, taking in their consideration to deepen the people awareness about smoking risks that include health, social and economic risks.

For that, specialized authorities, concerned with health awareness campaigns, must put successful plan based on study of environmental factors that smokers live in and the factors that affect their behavior so that they can put efficient programs to help smokers to quit smoking.

Acknowledgments

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Ethical Clearance: Not required

Source of Funding: Deanship of Scientific Research in Al- Zarqa University/Jordan.

Conflict of Interest: Nil

REFERENCES


Active Ocular Involvement in Iraqi Patients with Behçet’s Disease

Yaser A.R. Nasser¹, Riyam Faihan Rashid², Dina Shakir Yasiry³, Mohammed Hadi Munshed Al-Osami⁴, Faiq I. Gorial⁴

¹Senior Lecturer (Ophthalmologist), College of Medicine, Al-Mustansiriyah University; ²Senior Lecturer (Ophthalmologist), Medical and Pharmaceutical Sciences, College of Medicine, Ibn Sina University; ³Rheumatology Specialist, Baghdad Teaching Hospital, Medical City, Baghdad, Iraq; ⁴Rheumatology Unit, Department of Medicine, College of Medicine, University of Baghdad, Baghdad, Iraq

ABSTRACT

Aim of the Study: to assess the prevalence of active eye involvement in Iraqi patients with BD and to evaluate the potential relationship between active eye disease with sociodemographic and clinical characteristics.

Method: A cross-sectional descriptive study was conducted at 64 patients with Behçet’s disease diagnosed according to the International Study Group for Behçet’s disease. Sociodemographic and clinical characteristics were recorded. Comprehensive ophthalmological examination was to assess ocular involvement.

Results: Mean age of patients was 32.3(8.9) years. Males were 81.3%. Active ocular involvement by Behçet’s disease was 27 patients (54%). The risk of having active ocular BD was significantly increased 29,265 folds in male patients, (p= 0.033). genital ulcers increased risk of having active ocular involvement by 19.971 folds (p=0.05). Smoking increases the chance of having active eye involvement in BD by about 3.438 folds (p>0.05).

No significant association between active ocular BD and age of the patient, HLA-B51 status, BMI score, family history of BD, duration of the disease, presence of oral ulcers, headache, joint involvement, skin rash, erythrocyte sedimentation rate(P>0.05).

Conclusion: Active ocular involvement by Behçet’s disease was relatively common and correlated directly and significantly with male gender. This indicate that late diagnosis and treatment might cause these active eye manifestations.

Keywords: Behçet’s disease, active ocular involvement, eye manifestation.

Introduction

Behçet’s disease (BD) is a chronic, relapsing, inflammatory vasculopathy of unknown etiology. (¹,²) The key clinical manifestations are oral and genital aphthosis as well as ocular inflammation. (³) Although ocular involvement is not commonly the presenting feature of Behçet’s disease, it is a major source of serious morbidity. (⁴) Ocular Behçet’s is classically manifested as a bilateral non-granulomatous panuveitis and a retinal vasculitis. However, uveitis may remain unilateral for many years in some patients (⁵). Uveitis can be anterior, intermediate, posterior, or panuveitis (⁶).

Ocular involvement occurs in 60–80% of patients with Behçet’s disease and it is sight threatening. (⁷,⁸). Vision loss in Behçet’s disease usually results from long-standing inflammation and consequent sequelae in the posterior segment, macular lesions, vitreous hemorrhage, and neovascular glaucoma. (⁹). Visual loss also can be due to optic nerve and chorioretinal atrophy, ghosting and attenuation of retinal vessels and those are considered end-stage ocular disease. (¹⁰)

Anterior uveitis occurs with or without hypopyon. A transient, facile hypopyon can be seen by the patient
herself or his family. Hypopyon is explosive in nature, onset occurs within hours and can resolve with or without treatment. Posterior uveitis is the most common form of uveitis across age groups. It includes an obliterator necrotizing retinal vasculitis of both arteries and veins. Vascular sheathing with Cystoid Macular Edema (CME) is one of the manifestations of posterior uveitis. Retinal ischemia with Neovascularization of the iris can also occur. Acute vasculitis may be associated with multifocal areas of chalky white retinitis. With repeated episodes of vasculitis, vessels can become white and necrotic. Vasculitis affecting the arterioles of optic nerve leads to progressive optic neuropathy. This study aimed to assess the prevalence of active eye involvement in Iraqi patients with BD and to explore the possible relationship between active eye disease and socio demographic and clinical characteristics.

Patients and Method

Study Design: A cross-sectional, descriptive study was conducted at Rheumatology Unit in Baghdad Teaching Hospital from July 2015 to July 2017. Ethical approval was taken from College of Medicine, Department of Medicine and patients consent was recorded.

Participants: Sixty-four Iraqi patients enrolled in this study. All were classified as Behçet’s disease by fulfilling criteria of the International Study Group for Behçet’s disease. All included patients agreed to participate in the study. Patients were excluded from the study if they did not fulfill the inclusion criteria, if they had a history of an ocular disease other than Behçet’s or if they had undergone ocular surgery other than cataract or if they suffer from proved inflammatory bowel disease.

Data Entry, Collection, and Measurements: We used a pre-constructed questionnaire sheet. The questionnaire included age, gender, body mass index, smoking history, family history of BD, age of onset and disease duration were reported. We defined the onset of BD as the age of the patient when the initial manifestation of BD presented. The duration of BD was calculated as the time interval between the onset of BD and the age at the last visit of the patient to the hospital.

Patients were examined by an expert same ophthalmologist including external ocular examination, slit lamp biomicroscopy for anterior uveitis, defined as an Anterior Chamber (AC) reaction and/or the presence of hypopyon, or other possible sequelae like synechiae or cataract.

A detailed fundus examination using indirect ophthalmoscopy and slit lamp with aiding lenses (condensing lenses Volk 90, 78) was done to determine vitritis, retinitis and/or retinal vasculitis, these findings defined active uveitis in the posterior segment of the eye.

The definition of retinal vasculitis was based on the observation of inflammatory or gliotic sheathing of the vessels or on the fluorescein angiographic findings of staining, leakage, and/or occlusion of the retinal vasculature.

The intraocular pressure (IOP) was measured using an applanation tonometer. Patients who develop optic atrophy, occluded vessels that look like white cords, and diffuse retinal atrophy with variable scarring and pigmentation were defined as having end-stage eye disease.

Erythrocyte sedimentation rate (ESR) and HLA-B51 were measured. ESR was found using a traditional Westergren method in the hospital laboratory.

Statistical Analysis: Statistical analysis was done using statistical software SPSS 23. Descriptive statistics were reported as numbers(percentiles) for categorical variables and mean(SD) for normally distributed continuous variables. Multiple logistic regression analysis was used to assess predictors of active eye involvement. P<0.05 was considered statistically significant.

Results

Table 1 shows that the mean age of the studied group was (32.3 ± 8.9) years. Males constituted 81.3% of patients. Positive family history was reported in only 2 patients (3.1%). The age of onset ranged between 13 and 43 years with a mean of (28.3 ± 8.4) years. The duration of disease was ≤ 5 years in 49 patients (76.6%), and more than 5 years in the remaining 15 patients, (23.4%). More than half (53.1%) were current smokers, and 43.8% were non smokers, two patients had a previous history of smoking. Body mass index was normal in (42.2%), while (39.1%) were overweight and (18.8%) were obese. Within the last four weeks of the assessment, oral ulcers were present in 50 patients (78.1%), while (76.6%) of patients had joint involvement in the form of arthralgia &/or arthritis. Forty-seven patients (73.4%) had headaches. Skin rashes, genital ulcers were reported in (48.4%) and (70.3%), respectively.
Fifty patients out of the total 64 had ocular involvement. Out of these fifty patients, active ocular Behçet’s disease was reported in 27 patients (54%) at the time of the assessment as shown in figure (1),

Table 2 shows that out of the 27 patients with active ocular BD, nine patients (33.7%) had anterior uveitis, 11 patients (40.7%) had posterior uveitis and 7 patients (25.9%) had panuveitis.

Raised intraocular pressure was increased in 86 of the total 128 examined eyes (67.2%), Anterior chamber reaction was present in 27 (21%) of the total examined eyes. Hypopyon was seen in only eight examined eyes, (7.8%) of the total. Cataract and synechiae were seen in 42(32.8%), 43(33.6%) respectively of the total examined eyes as shown in (table 2). Vitritis, retinitis, retinal vasculitis were seen in 36 (28.1%), 18 (14.1%), 18 (14.1%) of the total 128 examined eyes, respectively. Optic atrophy is seen in (8.5%) of the total examined eyes.

In Table 3, the risk of having an active ocular BD was significantly increased 29,265 folds in male patients, (p value 0.033). Active ocular involvement also correlated significantly with the presence of genital ulcers within the last four weeks prior to assessment, with a p value of 0.05 and an increased risk of 19.971 folds. Current smoking increases the chance of having an active eye involvement in BD by about 3.438 folds, however this was not statistically significant, (P value = 0.226, non-significant) No statistically significant association was found between active ocular BD and age of the patient, HLA-B51 status, BMI score, family history of BD, duration of the disease or mean ESR value (P>0.05). Also the presence of oral ulcers, headache, joint involvement, skin rash during the prior four weeks of assessment did not significantly raise the risk of having active eye involvement, (P>0.05).

Table 1: Demographic characteristics of the studied group (N = 64)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), Mean (SD)</td>
<td>Mean (SD) 32.3 (8.9)</td>
</tr>
<tr>
<td>Gender</td>
<td>Male 52(81.3)</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>Normal 27(42.2)</td>
</tr>
<tr>
<td></td>
<td>Overweight 25(39.1)</td>
</tr>
<tr>
<td></td>
<td>Obese 12(18.8)</td>
</tr>
</tbody>
</table>

Conted…

| Family history | Positive 2(3.1) |
| Smoking        | Non-smoker 28(43.8) |
|               | Ex-smoker 2(3.1) |
|               | Current smoker 34(53.1) |
| Age of onset (year) | Mean (SD) 28.3 (8.4) |
|               | Range 13-43 |
| Duration of disease (year) | ≤ 5 49 (76.6) |
|               | > 5 15(23.4) |
| Extraocular manifestation | Oral ulcers n(%) 50(78.1) |
|               | Joint involvement n(%) 49(76.6) |
|               | Headache n(%) 47(73.4) |
|               | Genital ulcers n(%) 45(70.3) |
|               | Skin rash n(%) 31(48.4) |

BMI mean Body Mass Index, SD Standard Deviation. HLA Human Leucocyte Antigen. ESR Erythrocyte Sedimentation Rate.

Figure 1: Prevalence of active and inactive eye disease in Behçet’s disease

Table 2: Ocular manifestations of Behçet’s disease (N = 128)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Status</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOP</td>
<td>increased</td>
<td>86 (67.2)</td>
</tr>
<tr>
<td>AC reaction</td>
<td>present</td>
<td>27(21.9)</td>
</tr>
<tr>
<td>hypopyon</td>
<td>present</td>
<td>8 (7.8)</td>
</tr>
<tr>
<td>synechiae</td>
<td>present</td>
<td>43(33.6)</td>
</tr>
<tr>
<td>cataract</td>
<td>present</td>
<td>42(32.8)</td>
</tr>
<tr>
<td>vitritis</td>
<td>present</td>
<td>36(28.1)</td>
</tr>
<tr>
<td>Retinitis</td>
<td>present</td>
<td>18 (14.1)</td>
</tr>
<tr>
<td>vasculitis</td>
<td>present</td>
<td>18 (14.1)</td>
</tr>
<tr>
<td>Optic atrophy</td>
<td>present</td>
<td>11(8.5)</td>
</tr>
</tbody>
</table>

IOP intra ocular pressure, AC Anterior Chamber
Table 3: Multiple logistic regression to predict risk of having active ocular disease

<table>
<thead>
<tr>
<th>Variables</th>
<th>P-value</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.526</td>
<td>1.042</td>
</tr>
<tr>
<td>Male gender</td>
<td>0.033</td>
<td>29.265</td>
</tr>
<tr>
<td>BMI score</td>
<td>0.294</td>
<td>1.137</td>
</tr>
<tr>
<td>Family hx</td>
<td>0.856</td>
<td>0.589</td>
</tr>
<tr>
<td>Smoking</td>
<td>0.226</td>
<td>3.438</td>
</tr>
<tr>
<td>Duration</td>
<td>0.420</td>
<td>2.479</td>
</tr>
<tr>
<td>HLAB51</td>
<td>0.124</td>
<td>0.215</td>
</tr>
<tr>
<td>ESR</td>
<td>0.160</td>
<td>1.037</td>
</tr>
<tr>
<td>Oral ulcers</td>
<td>0.487</td>
<td>2.459</td>
</tr>
<tr>
<td>Genital ulcers</td>
<td>0.05</td>
<td>19.97</td>
</tr>
<tr>
<td>Headache</td>
<td>0.554</td>
<td>1.835</td>
</tr>
<tr>
<td>Joint involvement</td>
<td>0.995</td>
<td>0.991</td>
</tr>
<tr>
<td>Skin rash</td>
<td>0.066</td>
<td>0.144</td>
</tr>
</tbody>
</table>

BMI mean Body Mass Index. HLA Human Leucocyte Antigen. ESR Erythrocyte Sedimentation Rate.

Discussion

This study revealed active ocular involvement was relatively common in Iraqi patients with BD and significantly directly correlated with males.

Active eye inflammation was 54% of patients at time of the assessment. Anterior chamber (AC) reaction was 21.9% and Hypopyon 7.8%. Al-Rawi et al (1) reported hypopyon was found in 12%. This difference may be related to change in disease severity in the three decades with a better awareness and advances in treatment.

In the posterior segment, Vitritis was 28.1 % in contrast to a previous study in Tunisia was 84.7% (2) and Jorden about 50% had uveitis (3) and this may be explained by different study design and inclusion criteria.

In this study, each of retinitis and Retinal vasculitis were 14.1 %. while Al-Rawi et al. reported only 3% patients (1) This may be due to different sample size and treatment.

The increased IOP was 67.2 %. Cataract 32.8%. Synechia 33.6%. Optic atrophy 8.5% this differ from another study in which IOP 8%in cataract 31.5%, synechia 32.4%, optic atrophy 13.5% (2). This difference possibly due to difference in time of assessment, disease severity, management approach, follow up and compliance to a better treatment.

In the current study only males increased the risk of an active eye involvement by (29.265) folds (p = 0.033). As shown in previous literature, male has a worse ocular outcome and its associated with a worse course of the disease (4).

This study has some Limitations: Shortage of resources and time led to a small sample size included in our study, additionally the lack of some investigations (like C-Reactive Protein) that would provide an insight about a more thorough laboratory findings association with active ocular Behçet’s. The temporary unavailability of tissue typing HLA-B51 for few months during the period of the study led to limiting the number of selected patients.

In conclusion, Active eye involvement were relatively common in Iraqi patients with BD and correlated with male gender. This suggest the need for high index of suspicion for early diagnosis and, prevention, and treatment. Further larger sample size studies with longer duration are recommended.

Conflict of Interest: The authors declare that there is no conflict of interests among them.

Source of Funding: The source of funding was by authors.

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Effect of Using Simulation (Electronic Media) in Learning of Some Basic Skills in Technical Gymnastic for 2nd Grade’s Female Students

Abeer Ali Hussein1, Bashaer Hashim Abdul-Wahid1, Nidhal Obaid Hamzeh1
1The College of Physical Education And Sport Sciences, University of Karbala, Iraq

ABSTRACT

The research aims to know the effect of using simulation (electronic media) in learning some basic skills in technical gymnastic for the 2nd grade female students and knowing the best group from the two groups (Experimental and controlling) for the skills of research. Research sample was divided into two equaled groups randomly, (16) female student as controlling group and (16) female students as experimental group, controlling group took learning lessons by the classic method of teaching while the experimental group took that by simulation (electronic media). Harmonizing the sample and equalizing the two groups of research that influence the accuracy of results of research and to restricting the differences of influence to the independent variable only. In order to start the research, the two researchers divided the research sample which is (32) female students, controlling group practiced learning exercises according to the curriculum of 2nd grade female students, college of physical education and sport sciences of University of Karbala, for (12) educational unit, while experimental group was divided into two equaled sub-group as (8) female student per each, in order to organize the educational curriculum, female students of the two groups learnt the new skill (front hand jump on mat of ground movements) then practicing on it using and developing using lap top computer and data show screen a skill that they have already learnt it (standing by hand on balance beam), the two groups compose the main experimental finally, educational curriculum lasts for (12) educational unit, each lasts for (90) minutes as two units a week due to the differences of learning environment, decreasing time of learning and exciting female students enthusiasm. One of the most conclusions of the research is the preference of using the technology of electronic simulation in developing and improving the level of learning of some skills in gymnastic devices for female students.

Keywords: Simulation, Basic Skills and Technical.

Introduction

Using computer becomes necessary in our life, what we have witnessed of such tremendous and fast development in technology of computer urges us to activate it in the field of teaching by innovative way, as there is no field that doesn’t include important role of computer. Computer is the backbone of educational, economic and social process..etc, and it is the main and fast tool in processing data, not only spectacular scientific and technical developments are the most discriminative characteristics of our time but furthermore the accelerating in average of that development, and extent of effect upon the educational process. Therefore, the student can’t ignore effect of technical and scientific development especially those that relate with technology of information in all fields of life. Computer is employed in all specializations and job fields. Hence computer becomes so important, and learning how to use it’s diverse programs in all fields including teaching, our educational system is a developed one and keep up with development that our world confronts in field of using computer, this system has been updated and enhanced by technology of information and electronic media to become a main element in this system to improve and develop it, directing it to be compatible with new orientations, hence the two researcher decided to use the electronic simulation in explaining main concepts for some gymnastic skills and explanation of them in a best way.1

Because of that the two researchers are working in college of physical education and sport sciences, they observed that there is a difficulty in practicing some basic skills in technical gymnastic for female students
(front hand jump on mat of ground movements, standing on balance beam) as they need more physical potential by female students, and take longer time as they required muscular power, gracefulness and flexibility for female students. In spite of that it is a practical method for teaching these skills but we have faced a difficulty in teaching these skills due to the difficulty of performing these searched skills by female students due to relying on applying the practical, students confronted a difficulty, that urges the two researchers to tackle with this study.

Material and Method

Population: The two researchers used the experimental method with equivalence groups style because this type is adequate with nature of the research’s problem that requires a solution, population was represented by female students of 2nd grade (day time study), college of physical education and sport sciences – Karbala University, year of (2017-2018) who are (42) students.

Subjects: Post exclusion (10) female students from the population to achieve harmony condition in the sample of learners, sample individuals become (32) student, the sample was divided into two equaled randomly groups, (16) female students as a controlling group, (16) female students as experimental group, controlling group takes lessons by the followed teaching method while the experimental group takes lessons by using simulation (electronic media). Groups have the same teaching sessions specialized to learn (Skills which are in process or researching in technical gymnastic for female students). It has been harmonizing the sample with the equivalence of two groups of research that influence the accuracy of results and to return differences of influence to the independent variable only, that is using simulation, therefore it is important to verify the harmony and equivalence of research sample in the variables that are similar to the skills of research as shown in table (1).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Criteria mistake</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front rolling over ground movement mat</td>
<td>2.86</td>
<td>0.74</td>
<td>0.19</td>
<td>0.22</td>
</tr>
<tr>
<td>Standing by hand over balancing beam</td>
<td>3.13</td>
<td>0.74</td>
<td>0.19</td>
<td>0.22</td>
</tr>
</tbody>
</table>

Table 2: Shows the equivalence of the two groups of research in the variables under study for the experimental and control groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Experimental group</th>
<th>Controlling group</th>
<th>Calculated values of (t)</th>
<th>(t) tabulated</th>
<th>Evidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front hands jump over ground movement mat</td>
<td>2.81</td>
<td>2.44</td>
<td>0.47</td>
<td>2.04</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Standing by hand over balancing beam</td>
<td>7.00</td>
<td>6.44</td>
<td>0.21</td>
<td></td>
<td>Insignificant</td>
</tr>
</tbody>
</table>

Tools and devices used in the research.

Tools and devices:

The two researchers used the following tools and devices:

1. Personal computer.
2. Ground movement mat.
3. Data show.
4. Wooden boxes.

Means of collecting information.

1. Internet.
2. Arabian and foreign references.
3. Observation and experiment.

Field research procedures:

Specifying the two skills of research: The two skills were specified according to technical gymnastic method for 2nd grade in college of physical education and sport sciences to be adapted with the research subject and educational method prepared for it.
**Surveillance experiment:** Surveillance experiment was implemented on (28/2/2017) on the sample of population who were (8) female students from those who didn’t take part in the main experiment, for many aims some of them are:

1. Organizing the work and adjusting time of educational unit’s procedures with all divisions.
2. Knowing how much the tests are adequate with the sample.
3. Knowing the obstacles that may emerge during implementing the tests and educational method and finding solutions for them.
4. Adjusting timings and required recurrent.

**Pretests:** Pretests were implemented for the both groups controlling and experimental on (9-10/3/2017) post finishing two identifying educational units (**), by giving an educational unit for the skill of hand front jump on ground movement mat on (9/3/2017) including explanation of the skill with assistance by pictures and related drawings of such skill, then showing that on a lap top by a special program, then research sample have applied that, at the end of the educational unit, it has been implementing the post test for the sample to assess the technical performance and accuracy of the skill itself.

In the next day on (10.03.2017), giving another educational unit of the skill of standing on hands on balance beam includes same steps of the unit belong to the first skill in term of explanation, showing and application.

Using an accredited skill in assessment of these skills (‘) by giving (10) marks per each skill, this degree is donated by a three - referee committee, then choosing the best degree for each referee via determining the arithmetic mean for the best three degrees to calculate final degree per female student.

**Educational method:** Pre starting implementing the educational method we must illustrate the relation between the styles that aim to find a bunch of aims and make use of electronic simulation in learning some skills of technical gymnastic of students.

Aims of using electronic means are: developing relation between the teacher and student notably developing the student and increasing his personal independency, we noticed that the goal is the harmony, regulation, accuracy, response and controlling in warming-up part of the lesson and concentrating education, that is the reason behind using electronic means.

In order to startup of research procedures, the researcher organized the work of two groups (controlling and experimental) as follow:

- Dividing the research sample which is (32) students by lottery into two groups (controlling and experimental), (16) students per group.
- Controlling group : practicing learning exercises up to the followed educational method for the 2nd grade students in college of physical education and sport sciences of Karbala University base on (12) educational unit.

**Experimental group:** This group has been divided into two equaled sub-groups as (8) students to manage the educational method, female students of both groups trained on learning a new skill of hand front jump on ground movement mat, practicing on it, develop an electronic device (Lap Top), data show and a previous learnt skill of standing by hand on balance beam, these two group compose the main experimental group.

Educational method takes (12) education unit as each one lasts for (90) minutes based on two units per week due to the change of education environment, shortening the learning time and exciting the endeavor of female students.

**Post Tests:** Post finishing applying of educational units experimental and controlling groups, posttest has been implemented to assess the technical performance for the skill of standing by hands on Tuesday (27.04.2018).

On Wednesday (28.04.2018), posttest has been implemented to assess the technical performance of human wheel. Researcher concerned about circumstances to be similar for Pretests in term of (place, time and referees).

**Results**

**Showing, analyzing and discussion the results:** Showing the results for research groups, analyzing and discussion them.
Table 3: Showing results of post and Pretests for controlling group’s individuals for the searched skills

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Pretest</th>
<th></th>
<th></th>
<th></th>
<th>Posttest</th>
<th></th>
<th></th>
<th></th>
<th>Mean differences</th>
<th>(t) values</th>
<th>Statistical evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Criteria mistake</td>
<td>Mean</td>
<td>SD</td>
<td>Criteria mistake</td>
<td>Mean</td>
<td>SD</td>
<td>Criteria mistake</td>
<td></td>
</tr>
<tr>
<td>Front hands jump on ground movement mat.</td>
<td>15</td>
<td>3.26</td>
<td>0.70</td>
<td>0.18</td>
<td>5.13</td>
<td>0.91</td>
<td>0.23</td>
<td>1.87</td>
<td>9.72</td>
<td>Sig.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standing on balance beam</td>
<td>15</td>
<td>3.33</td>
<td>0.61</td>
<td>0.15</td>
<td>5.53</td>
<td>0.83</td>
<td>0.21</td>
<td>2.2</td>
<td>12.60</td>
<td>Sig.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Showing results of post and Pre tests for experimental group (simulation by electronic means) for the skills

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Pretest</th>
<th></th>
<th></th>
<th></th>
<th>Posttest</th>
<th></th>
<th></th>
<th></th>
<th>Mean differences</th>
<th>(t) values</th>
<th>Statistical evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Criteria mistake</td>
<td>Mean</td>
<td>SD</td>
<td>Criteria mistake</td>
<td>Mean</td>
<td>SD</td>
<td>Criteria mistake</td>
<td></td>
</tr>
<tr>
<td>Front hands jump on ground movement mat.</td>
<td>15</td>
<td>3.26</td>
<td>0.79</td>
<td>0.20</td>
<td>7.13</td>
<td>0.74</td>
<td>0.19</td>
<td>3.87</td>
<td>42.56</td>
<td>Sig.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standing on balance beam</td>
<td>15</td>
<td>3.13</td>
<td>0.74</td>
<td>0.19</td>
<td>7.20</td>
<td>0.77</td>
<td>0.20</td>
<td>4.07</td>
<td>61</td>
<td>Sig.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Shows difference of post and Pre measurement for experimental group (Simulation by electronic means).

Tabular value of testing (t) at evidence level of (0.05) and freedom degree of (14) equals to (2.14).

Table 5: Shows statistics for variables in post measurement

<table>
<thead>
<tr>
<th>Variables</th>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Criterion mistake</th>
<th>Min. value</th>
<th>Max. value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front hand jump over ground movement mat</td>
<td>Controlling group</td>
<td>15</td>
<td>5.13</td>
<td>0.91</td>
<td>0.23</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Pending group</td>
<td>15</td>
<td>7.13</td>
<td>0.74</td>
<td>0.19</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Monitor group</td>
<td>15</td>
<td>6.26</td>
<td>1.03</td>
<td>0.26</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>45</td>
<td>6.17</td>
<td>1.21</td>
<td>0.18</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Standing by hands over balance beam</td>
<td>Controlling group</td>
<td>15</td>
<td>5.53</td>
<td>0.83</td>
<td>0.21</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Pending group</td>
<td>15</td>
<td>7.20</td>
<td>0.77</td>
<td>0.20</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Monitor group</td>
<td>15</td>
<td>6.53</td>
<td>0.83</td>
<td>0.21</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>45</td>
<td>6.42</td>
<td>1.05</td>
<td>0.15</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

Discussion of Results

The two researchers confirm, through statistic results, that the followed educational method by the teacher of material has influence upon students’ learning of basic skills over ground movement mat and balance beam in technical gymnastic that depends the educational style relied by material’s teacher to the appropriate recurrences that accompanied educational units, plus to performing the continuous exercises considering its adaption to abilities and capabilities of students in addition to the graduation in difficulty level for movements and skills that ensure performance by all participants, that goes with what was mentioned by (Najah Mahdi Shalash and Akram Mohammed, 2000), as they wrote “Practicing and paying efforts in training and frequent recurrences are so important in process of learning and earning skills, also training is a main factor in process of individual interaction with skill and controlling his movements and achieving
harmony between movements that compose the skill in an intact consecutive performance and appropriate time beside it increases learning of a skill and profession of it”. In order to enable the two researchers to discover the differences between post and Pre differences to the individuals of experimental group, they apply processing data statistically and determining values of arithmetic mean, criterion deviation for all variables of the research as shown in table(4), that confirms that there is a significant effect of educational method in learning some basic skills over ground movement mat and balance beam in technical gymnastic which is applied by the two researchers because the training units include a group of different movements for the back, arms, legs and head, also fast and slow diverse movements up to the time of movement, recurrence and the distance, in addition to using a technology by electronic simulation represented by using a monitor (Data Show) and lap top, all of that helps in learning and earning a good level of legal and scientific knowledge for the material technical gymnastic of the students in addition to the skills of (front hand jumping over ground movement mat and standing by hands over balance beam).

The reason behind this learning and earning skills is the response of students for all learning requirements via educational units considered as the most prominent active means to show the powers, keeping best levels and achieving aims, (Nazar Altalib and Kamil Louis, 2000) referred to that “The athletic who endeavor toward a specific aim will be a motive for him in his work, work without an aim is a fruitless and neglected job so the sport instructor should help the athletic to apply an appropriate goal for him to be able to achieve to create a value for the exercise and to let the athletic knows how much he progress”.

Also (Ed.Lisa Yount) refers that “Using learning technology in training is better because it diminish risks of injury and help hearing-problems student to focus and learn the main skills then study materials more exciting, hence students will become more subjected to remember what they have learnt, economically, VR technology will be cheaper than other means”. The two researchers see that using electronic simulation create an ideal environment for learning notably in gymnastic whereas isolating all external influences on the student and help him to concentrate his learning also to update with nowadays development and increasing thrill and exciting for student to break the routine during practicing exercises in lecture.

Education units included a bunch of different movements for back, arms, legs and head in addition to different movement fast and slow up to the movement time, recurrence and distance besides using virtual reality technology via data show screen, all of that help in learn and earn the searched skills.

That ensures the used exercises in education units with window of virtual reality have participated in learning and earning basic skills (On the movement ground mat, jumping beam, parallel beams and hinge devices) for students, researcher attributed that for the response of students for all learning requirements via educational units considered as one of the most active means to show powers, keeping good levels and achieving goals, researcher sees that showing the skill through screen is a keeping up with the modern development that happens in all fields of science, many universities lack this modern method.

Achieving to the aim of the study including knowing the excellence of differences between using environments of electronic simulation and used method by the teacher in improving performance level for some skills in devices technical gymnastic for female students.

Conclusions

1. Using electronic simulation technology has an active effect in developing and improvement of learning level of some skills on gymnastic’s devices for female students.

2. Results showed that there is an excellence in using electronic simulation technology in developing and improving learning level of some skills on gymnastic’s devices for female students

Ethical Clearance: Taken from University of Karbala committee

Source of Funding: Self

Conflict of Interest: None
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Body Image and Physical Perception of Children with Precocious Puberty in Baghdad City

Adraa Hussein Shawq¹, Eqbal Ghanim Ali²
¹Instructor; ²Professor, Pediatric Nursing Department, College of Nursing, University of Baghdad, Iraq

ABSTRACT

Study Aim: To valuate children physical perception toward their early body maturation and their body satisfaction.

Methodology: A cross-sectional study, of (63) children from both genders, > 7 years diagnosed with precocious puberty, attending endocrine clinics in Baghdad city. Consent form taken from children and their guardians to participate in the study. Tanner scale image and Child Body Image Scale CBIS were used, the discrepancy between children selection reflect their physical perception and body satisfaction. SPSS programme version 23 used for data analyses.

Result: children with precocious puberty were occupied in their earlier body maturation; they showed physical awareness toward these changes, and this earlier maturation caused unaccepted body image for them.

The researchers recommended details psychological assessment for children with precocious puberty during their routine physical examination and provide suitable psychological support for them and their parent.

Keywords: physical perception, body image, precocious puberty

Introduction

Normal onset of puberty characterized usually by development of secondary sexual characteristics between (8-14) years for girls and (9-15) years for boys, while earlier onset of puberty than expected described as precocious puberty (1,2). Precocious puberty is more common in girls than boys, approximate 10:1 with no explanation (3&4), attention needed for diagnosis with precocious puberty that result from tumor or other disorder (5), it is consider stressful period for those children (6). Early physical changes and growth spurt caused by premature activation of hypothalamus-pituitary axis, lead to mismatch between their physical maturation and psychosocial immaturity can cause peer differences, behavioral problems, and unaccepted body changes (7,2,1). Accepted body image is affected on children’s self-esteem, social relations, and academic performance positively (8,7,4). Evaluate children psychosocial condition is helpful to prevent children psychological trauma and faced their challenges positively (9,8,1).

Method and Materials

Method

Research design: A cross-sectional study used, data were collected from first of May tile the first of November 2018.

Setting: study was carried out in outpatient endocrine clinics at pediatric teaching hospitals and specialized centres in Baghdad city.

Instrument of the study and procedure: Tanner scale image and Child Body Image Scale were widely used in previous children studies and showed highly validity and reliability. Tanner scale with five pubertal developmental images, gender specific, developed by Marshal and Tanner (1973) used to assess puberty stage, represent the secondary sexual characteristics development during...
period of maturation. Children were asked to select one that closest to their early body changes as they percept. Children assessment compare with physician assessment regarding their puberty stage, the similarity between children and physician assessment reflect children awareness toward their early physical maturation.

Child Body Image Scale is a pictorial scale, with seven image (1= scrawny, 2 & 3= typical image, 4 & 5= overweight, 6 & 7= obese), used to assess children body satisfaction, the approval taken directly from the ownership. Children asked also to select one image that represent their actual body image and select another image that they desire to be. The discrepancy between children actual and desire body image; reflect their body dissatisfaction.

Statistical Analysis: The statistical package for social science (SPSS) version 23 was used for data analysis. The descriptive statistical measures of frequency, percentage, mean, and standard deviation were used. T-test was used to investigate the differences among groups.

Results

Table 1: Comparison between children and physician regarding stages of assessment

<table>
<thead>
<tr>
<th>Puberty assessment</th>
<th>Children assessment</th>
<th>Physician assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Stage 1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Stage 2</td>
<td>21</td>
<td>33.4</td>
</tr>
<tr>
<td>Stage 3</td>
<td>21</td>
<td>33.4</td>
</tr>
<tr>
<td>Stage 4</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Stage 5</td>
<td>5</td>
<td>7.9</td>
</tr>
<tr>
<td>Do not know</td>
<td>4</td>
<td>6.3</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>100</td>
</tr>
</tbody>
</table>

In this table, (33.3 %) of children assessed their puberty stage in stage (2 and 3) for both of them respectively, compare to (27%, 49.2%) of pubertal physician assessment in stage (2 and 3) respectively.

In these figures, mean age of children diagnosed with precocious puberty is $(8.41 \pm 2.7)$, most of the sample (88.5%) at school age (6-12) years, (85.0%) are girls.

Table 2: Paired Samples Test for puberty assessment scale and child body image scale

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval</th>
<th>T0</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puberty</td>
<td>3.1 ± 0.9</td>
<td>2.43412</td>
<td>1.23453</td>
<td>1.23212 5.23563</td>
<td>6.573</td>
<td>6</td>
<td>.000</td>
</tr>
<tr>
<td>Body image</td>
<td>3.3 ± 0.1</td>
<td>1.46641</td>
<td>2.11043</td>
<td>1.53661 5.54333</td>
<td>4.251</td>
<td>9</td>
<td>.955</td>
</tr>
</tbody>
</table>

In this table there is significant association between children and physician puberty assessment by Tanner scale $(p = .000)$, while no association between children actual and desire body image $(p > 0.005)$.

Figure 3: Comparison between children actual and desired body image
In this figure, (38.15, 23.8%) of children actually select obese and overweight image respectively, while (61.9%) of children desire typical image.

**Discussion**

The result of the study support previous finding that, (85%) of children was girls, (88.5%) at school age (figure, 1). This result supported by Al-Shuwailli (2017) and Hammeh (2015) in their study in Baghdad about precocious puberty that majority of children was girls and mostly were > 6 years (6, 9).

The finding showed higher percentages of children and physician assess puberty development at stage 2 and 3 according to Tanner scale. In addition, figure (2) showed (60.3%) of children assessment similar to physician assessment regarding puberty changes, and in table (2) a significant association between children and physician means was at (p. = .000). This finding concerned that children aware toward their body changes; majority of children at school age, their identity and cognitive development was developed.

Different researcher used Tanner scale to assess children puberty development such, a study by Ernst et al. (2018) about self-assessment of pubertal development with 715 child aged 8-16 years showed that children with late stage of puberty can assess their development correctly (10). Another study by Chan et al. (2008) about reliability of pubertal self-assessment in Hong Kong children that with 354 children aged 8-18 years documented that, Tanner pubertal self-assessment scale can reliably estimate for sexual maturation status (11).

Those children experience also body dissatisfaction; figure (3) revealed most of children selection for actual body image was different to their desired one, and table (2) showed no association between children selection (p > 0.005). Because majority of the sample was girls and their body mass index and sexual characteristics was different and developed earlier than peers; mostly lead to unaccepted body image. This may affects negatively on children well-being later, also low educational level and early marriage and may be associated, especially for girls.

This consistent with a study by Williams et al. (2018) about reviewing and evaluation psychosocial studies concerning children with precocious puberty (pp) that, most studies revealed those children experience body image disturbance, low self-esteem, and negative expressive outcomes about their bodies than normal developing children (12).

Choi & Kim (2016) coincide with the present finding in their study about body image and depression of (82) girls diagnosed with pp that, early puberty mostly lead to negative body image, low self-esteem and usually correlated with negative feeling and behaviours about themselves (13). In addition, their awareness about the degree of sexual maturation body was correlated with body dissatisfaction and depression signs, especially late pubertal stage (3- 5) (13).

Michigan Medicine school (2011) reported in their study about children with precocious puberty that, being different from peers especially in body shape make children in stressful situation, children with early maturing body experience teasing, negative body image, and low self-esteem (14).

**Conclusion**

Children with precocious puberty were occupied with their body changes and showed awareness toward their early sexual characteristics development. These earlier body changes affects negatively on their body satisfaction.

**Recommendations**

Assess children psychosocial profile during routine physical examination. Provide emotional and social support for those children and their parent to avoid psychological trauma.

**Conflict of Interest:** The researchers report no conflict of interest.

**Source of Funding:** This study did not receive any funding from any agency.

**Ethical Clearance:** A permission to conduct this study was obtained from the ethical committee in the College of Nursing, University of Baghdad

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Health Workers Roles as Healthy Model: Concept and Instrument Developing

Agustina Arundina Triharja Tejoyuwono1,2, Lely Lusmilasari3, Toto Sudargo4
1Department of Community Medicine, Faculty of Medicine Tanjungpura University, Jl. Prof Hadari
Nawawi No. 01, Pontianak, West Kalimantan, Indonesia; 2Doctoral Program, 3Department of Nursing,
4Department of Nutrition and Health, Faculty of Medicine, Public Health and Nursing, Universitas
Gadjah Mada, Jl. Farmako Sekip Utara, Yogyakarta, Indonesia

ABSTRACT
Health workers are expected to be a role model, especially in healthy behavior, but the concepts and instruments to assess these roles are still few and not specific. This research purposed to describe the concept and develop an instrument of roles as healthy model. The study was conducted for 22 months in Pontianak and Yogyakarta, Indonesia with two stages of research. The four concepts of health workers roles as healthy models are to have a good knowledge, attitudes and behaviors regarding healthy behavior and have an ideal physical appearance. The results of the construct validity was obtained 60 valid items with Cronbach’s alpha was 0.89. The roles as healthy models have gone through the stages of validity and reliability needed in making instruments.

Keywords: Health Workers, Roles, Healthy Model, Concept, Instrument

Introduction
The role as a role model is considered to be a person’s needs at the highest level, to actualize themselves and self-esteem as health workers. Professionalism behavior will be created on health workers who can become a role model that will ultimately affect the patient’s trust in medical action, adherence and satisfaction with health services 1. Confidence in providing therapy to patients is also affected 2. Based on the health professional code of ethics there are four areas that health workers must have to apply their role as role models of health educators, becoming a mentor, becoming role models in responding to differences, showing performance as a teacher, and gaining trust from society 3.

Several studies that assessed the role model of the health workers in their area had used assessment instruments. Based on the literature search found an instrument that has been developed to assess nurses as role models for health promotion 4, other role model instrument is on the physical therapist 5. Nonetheless, from these literature have never been found that developed instruments for evaluating the role of health workers in several health professions and informant groups specifically regarding the role of health workers as role models for healthy living behaviors.

Method
The research process is carried out in two stages starting from May 2017 until March 2019 in Pontianak City, West Kalimantan. This research had received ethical approvalal from the Medical and Health Research Ethics Committee Faculty of Medicine, Public Health and Nursing Universitas Gadjah Mada number KE/ FK/0528/EC/2017 with continuing review approval KE/ FK/0435/EC/2018.

Stage 1. Concept development: The first phase of this research was conducted to develop the concept of the role of health workers as a role model for healthy living behavior, carried out from May 16, 2017 to August 14, 2018, in Pontianak, West Kalimantan, Indonesia.
The study was conducted with exploratory qualitative methods, data collection using in-depth interviews with 26 informants with the background of health personnel from six stakeholders with criterion sampling method. Table 1 shows the criteria for informants used in the study and the number involved in the study.

Data collection was carried out in various places and times agreed upon between informants and data collectors, explanations of research and objectives were carried out from the beginning of the introduction and requests as informants accompanied by the signing of informed consent. Interviews were carried out in only one meeting, with an average time of 60 minutes/informant, data analysis was carried out by transcribing the results of sound recordings, making coding, categories and themes. This process is carried out 2 times for quality control by all authors, in addition to increasing the validity of the results, the expert test is conducted

<table>
<thead>
<tr>
<th>Informants Groups</th>
<th>Informant Classification</th>
<th>Profession</th>
<th>Participated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Lecture</td>
<td>Had a 3 years experiences as a lecture in faculty of medicine, Tanjungpura University and politeknik kesehatan pontianak</td>
<td>Doctor</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nurse</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nutritionist</td>
<td>2</td>
</tr>
<tr>
<td>Medical Student</td>
<td>A year and students(sixth semester) in faculty of medicine, Tanjungpura University and politeknik kesehatan pontianak</td>
<td>Medical student</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nursing student</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nutritionist</td>
<td>1</td>
</tr>
<tr>
<td>Head of Primary Health Care (PHC)</td>
<td>Working as a head of the PHC &gt; 2 years in the Pontianak City area</td>
<td>Public health</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Midwife</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dentist</td>
<td>1</td>
</tr>
<tr>
<td>Clinical Practitioners</td>
<td>1. As a health practitioner in a health center in the city of Pontianak and a member of the health profession in Indonesia. Had 2 years experiences as a health worker in PHC</td>
<td>Doctor</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nurse</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nutritionist</td>
<td>1</td>
</tr>
<tr>
<td>Professional Health Organiza tion (PHO)</td>
<td>2. 2 years experiences as head or secretary in PHO in Indonesia region</td>
<td>Indonesian Medical Association (LDI)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nurse profession (PPNI)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nutritionist profession (PERSAGI)</td>
<td>1</td>
</tr>
<tr>
<td>Community</td>
<td>Patient of community around PHC that has received health services &gt; 1 year from doctors, nurses and nutritionists</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Experts have a doctoral education background in nursing with experience conducting qualitative research and qualitative training, meeting with experts is done twice face to face and once via email. To maintain the confidentiality, each informant will be given a code namely PHO (O1-O3), head of PHC (H1-H3), community (P1-P3), medical student (S1-S5), clinical practitioner (L1-L6) and health lecture (L1-L6).

Stage 2. Instrument development: Research in the second phase was carried out to make the instruments roles as healthy model, from four variables based on the results of the theme in stage one. The process of making instruments is carried out from September 2018 to March 2019, starting from setting the type of answer choices with a 5-point-likert scale-strongly disagree, disagree, neutral, agree, strongly agree, determining closed question types, compiling answer instructions and instrument formats.
In the initial stage, 172 pool of items were made where in the first variable to third each was 50 items and the last variable was 22 items, the next stage is content validity with five experts, consisting of three experts representing each health professional organization in Yogyakarta and understand the code of ethics of the role of health workers as role models for healthy behaviors. Others experts expertise in the qualitative field and making instruments with educational doctoral backgrounds in the nursing. The experts were asked to provide an assessment of representativeness and clarity on each item using a 4-point Likert scale-not represent/clear, major revision, minor revision, represent/clear 9. Analysis with Aiken’s V for each item based on the responses of experts 7.

The 105 represent questions are proceed to the trial phase 1, validity criterion test. This stage was carried out on 44 health workers in the hospital of Tanjungpura University Pontianak, RS. Abdul Azis Singkawang and the Faculty of Medicine, Tanjungpura University. Analysis with Pearson product-moment (r >0.2973) and alpha reliability >0.7. Phase 2 trials were conducted on 140 respondent’s postgraduate students of Medical, Public Health And Nursing Universitas Gadjah Mada (FKKMK-UGM). At this stage using the confirmatory factor analysis (CFA) test with the aim of testing construct validity by assessing convergence and discriminant of each item. Analysis using Lisrel 8.80 software results from the evaluation was seen from the evaluation of goodness of fit (GOF), namely chi-square (p-value >0.05), root mean square of approximation (RMSEA) <0.08, standardized root mean square residual (SRMR) <0.08, comparative fit index (CFI) >0.90, in addition to testing between items received by looking at the number of factor loading >0.5 and alpha value >0.75 8,9.

Findings

Stage 1. Roles as Healthy Model Theme: Exploration of the opinion of health workers regarding their role as a role model for healthy living is done by involving 2 health education institutions and 5 PHCs in the Pontianak City area. Based on the results of qualitative analysis it was found that the role of health workers as role models of healthy behavior was defined as behavior patterns, values, attitudes, knowledge that must be possessed by health workers as an example for themselves, the community and other colleagues in applying physical activity, patterns balanced eating, smoking behavior and having an ideal physical appearance, which are grouped into 4 criteria: someone who has good knowledge of healthy living behavior, has an attitude as a role model for healthy living behavior, has a healthy lifestyle and has an ideal physical appearance.

These criteria means health workers have to a good abilities and expertise in applying healthy living behavior as an initiator, promoter and informer of health in the community. Doing physical activity, increasing vegetables and fruits consumption, no-smoking behaviour and having an attractive appearance, fit, energetic and rarely ill was a trends, desire and readiness as health workers to increase public trust and behavior and implementation of health programs.

Stage 2. Instrument development of Roles as Healthy Model: At the content validity test stage, expert qualifications determine the results of the instrument assessment, so the selection of experts is also important. Based on the results of the expert assessment with the Aiken’s V test of 172 items tested, 67 questions were not representative and 82 unclear questions, this was because the item had ratings of less than 0.87. Unclear but representative questions have been corrected according to expert input and used at the trial stage.

The sample at the first trial stage was 14 respondents work as doctors, 16 nurses and 14 nutritionists, respondents have worked for approximately 7 years, with education between diplomas to doctoral degrees. At this stage, 74 valid questions were obtained from 105 questions with coefficient alpha 0.933, questions that were invalid and did not affect the objectives of the variables to be measured, omitted and not used at a later stage.

At the second trial stage, 330 questionnaires were distributed to potential respondents divided into five postgraduate study programs at FKKMK-UGM, but only 140 questionnaires (42.4%) were returned and complete. 66 respondents work as doctors, 59 nurses and 15 nutritionists, besides, 73.6% of respondents are women, aged less than 40 years. In table 2, it can be seen the results of construct analysis where 60 questions have a loading factor >0.5 with the reliability level of each criterion >0.75. 14 Invalid items in each criterion are considered inappropriate because they have a small loading factor of <0.5, which in the end the item is discarded.
Table 2: Loading factor Analysis Roles as Healthy Model Items

<table>
<thead>
<tr>
<th>Items</th>
<th>A good knowledge of healthy lifestyle</th>
<th>Have a good attitude of healthy lifestyle</th>
<th>Have a healthy behavior</th>
<th>Have an ideal physical appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.64</td>
<td>0.61</td>
<td>0.27*</td>
<td>0.62</td>
</tr>
<tr>
<td>2</td>
<td>0.61</td>
<td>0.49*</td>
<td>0.19*</td>
<td>0.67</td>
</tr>
<tr>
<td>3</td>
<td>0.59</td>
<td>0.69</td>
<td>0.45*</td>
<td>0.65</td>
</tr>
<tr>
<td>4</td>
<td>0.59</td>
<td>-0.10*</td>
<td>0.51</td>
<td>0.49*</td>
</tr>
<tr>
<td>5</td>
<td>0.52</td>
<td>0.28*</td>
<td>0.63</td>
<td>0.41*</td>
</tr>
<tr>
<td>6</td>
<td>0.41*</td>
<td>0.73</td>
<td>0.67</td>
<td>0.74</td>
</tr>
<tr>
<td>7</td>
<td>0.56</td>
<td>0.77</td>
<td>0.52</td>
<td>0.79</td>
</tr>
<tr>
<td>8</td>
<td>0.58</td>
<td>0.57</td>
<td>0.18*</td>
<td>0.79</td>
</tr>
<tr>
<td>9</td>
<td>0.70</td>
<td>0.70</td>
<td>0.54</td>
<td>0.79</td>
</tr>
<tr>
<td>10</td>
<td>0.58</td>
<td>0.70</td>
<td>0.51</td>
<td>0.68</td>
</tr>
<tr>
<td>11</td>
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<td>12</td>
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<td>0.79</td>
<td>0.54</td>
<td>0.68</td>
</tr>
<tr>
<td>13</td>
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<td>14</td>
<td>0.65</td>
<td>0.58</td>
<td>0.72</td>
<td>0.72</td>
</tr>
<tr>
<td>15</td>
<td>0.46*</td>
<td>0.64</td>
<td>0.71</td>
<td>0.71</td>
</tr>
<tr>
<td>16</td>
<td>0.50</td>
<td>0.70</td>
<td>-0.24*</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>0.65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>0.72</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>19</td>
<td>0.55</td>
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<tr>
<td>20</td>
<td>0.70</td>
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<tr>
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<td>0.55</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>22</td>
<td>0.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>0.42*</td>
<td></td>
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<td>24</td>
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<td></td>
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<td>0.57</td>
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<td></td>
</tr>
<tr>
<td>29</td>
<td>0.59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: invalid items; italic: unfavorable item.

At the beginning 172 items was developed from 4 variables roles as healthy model, after evaluating content by expert, there were 105 items that had a high rating. In the test phase of the validity criteria 31 questions were invalid and eliminate at the next test phase, so that the remaining 74 questions to be tested at the content validity test stage. The final result of the instruments roles as healthy model is 60 questions with alpha coefficient 0.89. The standard GOF measurement model is obtained in the roles as healthy model variable, namely the chi-square value = 0.25, df = 2, p-value = 0.88348, RMSEA = 0.000, so it can be concluded that the measurement model on the role model variable has been designed based on theory fit with data in the field. Roles as healthy model instrument available on request.

Discussions

The roles as healthy model are the results of the development of themes from qualitative exploratory results, which as far as it is known researchers have never made an instrument to assess the role of health workers as a role model for healthy behavior in the community before. This instrument has gone through several stages of testing to produce a valid and reliable instrument to be used in a diverse healthcare profession, especially doctors, nurses and nutritionists. Furthermore this instrument was also developed based on information from informants with different workplaces, namely in hospitals, health centers, and educational institutions, in addition to the different fields of work, namely at the
head of the PHC, administrators of health organizations, practitioners in health centers, user communities health services and teaching and medical students.

Health workers are considered as a role model for the community in a healthy lifestyle because they are considered to have extensive knowledge about health, so the role as a role model is attached to health workers as health educators in the community [3,10]. “Practice what they preach” is one of the responsibilities of a health worker who in this study not only in the community but also in themselves and health colleagues [11,12]. The responsibility as a role model is a competence and an unwritten contract with the community, besides that it is considered as the most powerful learning model to share knowledge and skills with others. So that the role as an example must be realized by health personnel, maintaining behavior at all times and places [13]. Awareness of behavior as a role model will increase trust, perception and closeness of relationships with patients, besides that health workers will find it difficult to provide health promotion if they never apply and have experience doing healthy behaviors [14,15]. As a health promoter, implementing a healthy lifestyle will increase his credibility, which will affect the compliance of the treatment and the patient’s beliefs when consulting. In the end, this increased credibility will also increase self-confidence as a health worker who is considered to have good knowledge and abilities [15,16].

When compared with the concept and role model instruments on health workers that have been formed before, several similarities were found such as the concept of responsibility, practice what they preach and accepting themselves as an agent of change. Another concept that is almost the same is that health workers are also a human being who in acting is not always perfect, as well as being a role model of living behavior, even if seen from the social norms, health workers must adopt healthy behaviors as an example and become an example for yourself, the community and colleagues [3,17]. Being a role model is also considered to affect the trust of health workers, patients will pay more attention to the advice given [14,18,19].

The difference in variables formed by concepts and other instruments is the assessment of the ideal physical appearance of health workers. Physical appearance is considered to affect the first impression of the community on health workers, besides that it will also affect self-confidence in doing work and in social life in the community [20]. Positive appearance is an attribute that must be possessed by health personnel in addition to interpersonal skills, ability to be a leader and commitment to the right actions [21,22].

**Conclusion**

Health workers must have behavior, values and knowledge as a role model for themselves, society and colleagues in healthy behaviors such as applying physical activity, balanced diet and no smoking behavior also having an ideal physical appearance. 60 items Instruments roles as healthy model are developed, namely knowledgeable about good health behavior, have good health behaviors, have healthy life behaviors, and have an ideal physical appearance. This instrument still has weaknesses because the number of samples was too small to assess instruments, besides this research is carried out only in 2 regions in Indonesia so that it still has the opportunity to be developed in other regions.

**Acknowledgements**

The authors would like to thank the Ministry of Research, Technology and Higher Education Republic of Indonesia (KEMENRISTEK DIKTI) as a scholar funder, all expert, informants and respondents who participated in this research and Staffs of Klinik Bahasa FKKMK-UGM.

**Conflicts of Interest:** The authors declare that there is no conflict of interest that may influence them in writing this article.

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15. Fraser SE, Leveritt MD, Ball LE. Patients’ perceptions of their general practitioner’s health and weight influences their perceptions of nutrition and exercise advice received. JPHC. 2013;5(4):301-7.


Assessment of Serum Glucose and its Correlation with the Pregnancy

Alaa Umran Musa
Karbala maternity teaching hospital, Karbala, Iraq

ABSTRACT
Gestational diabetes is a temporary (in most cases) form of diabetes in which the body does not produce adequate amounts of insulin to regulate sugar during pregnancy. The aim of the present study, to evaluate the correlation between the serum glucose levels and pregnancy complications in gestational Diabetes Mellitus (GDM) and healthy individuals. In this case control study, pregnant women with GDM (n=30) and healthy (n=30) visited in the Karbala maternity teaching hospital were enrolled in the study. The women showing a fasting blood glucose (FBG) ≥105mg/dl were considered in the group of gestational diabetes (GDM). The GDM women showed significantly (p≤0.0001) higher area under the curve and the fetus birth weight as compared to the healthy women. This increase in the fetus birth weight results in the C-section delivery. About 83.34% GDM women undergone C-section delivery, while only 16.66% normal delivery occurs. The fetus birth weight is positively correlated with the presence of GDM i.e. insulin resistance. Serum high glucose level was positively correlated with the pregnancy complications such as C-section delivery, premature birth, increased in fetus weight etc.

Keywords: Gestational diabetes, C-section delivery, fasting blood glucose, fetus weight

Introduction
Gestational diabetes is a temporary (in most cases) form of diabetes in which the body does not produce adequate amounts of insulin to regulate sugar during pregnancy. It may also be called glucose intolerance or carbohydrate intolerance. The thrifty phenotype hypothesis state that the low neonatal weight is correlated to an increased level of blood sugar or higher peripheral insulin resistance. This low birth weight may leads to an intrauterine programming process retardation which in turn negatively affect organ maturation.

In normal pregnancy, insulin resistance is similar to type 2 diabetes. This syndrome worsens in the third trimester and leads to gestational Diabetes Mellitus (GDM). Changes in insulin resistance occur to transport glucose across placenta that is needed for normal growth of the fetus. When glucose is transported across placenta it stimulates pancreatic insulin secretion. Insulin is also an important hormone required for growth apart from its role of just maintains glucose homeostasis. In GDM there is increased risk of macrosomia which is increasing birth weight of infant >4kg or >4.5kg, induction of labor and cesarean section. GDM is associated with long term adverse outcomes for mother and also for offspring like obesity and cardiometabolic risk. Carbohydrate intolerance often results in high serum glucose levels i.e hyperglycemia during pregnancy. Hyperglycemia during pregnancy is less severe than in type 2 diabetes. But still, it can lead to adverse pregnancy outcome. Carbohydrate intolerance in pregnancy who are without Gestational Diabetes, also leads to adverse maternal and even fatal outcomes. Thus, fetal morbidity is prone at a very lower glucose level in pregnancy, i.e. <140mg/dL. The American College of Obstetrics and Gynecology (ACOG) had laid a few recommendations for GDM patients. The cutoff capillary glucose value must be, Preprandial glucose <95 mg/dL (5.3 mmol/L), 1-h postprandial glucose 130–140 mg/dL (7.8 mmol/L) and 2-h postprandial glucose <120 mg/dL (6.7 mmol/L). Hyperglycemia during pregnancy is generally detected...
between 24 to 28 weeks. It results in poor pregnancy outcome and must be managed properly. Obesity, pregnancy at old age, multi-parity, weight gain during pregnancy, short stature, family history of diabetes, polycystic ovarian syndrome (PCOS) are a few of the risk factors for hyperglycemia during pregnancy. Therefore, diagnostic criteria were conventionalized for 24–28 weeks of gestation including glucose values during an oral glucose tolerance test (OGTT)\(^{10}\). With this background, we aim to study the correlation between the serum glucose and its pregnancy in Iraqi women.

**Material and Method**

This study included 60 pregnant women enrolled to the Karbala maternity teaching hospital in January 2019 to April 2019. They were successively performed a 100g/3hr oral glucose tolerance test (OGTT) between the 24th and 26th gestational week. The test was performed at Karbala maternity teaching hospital according to recommended guidelines of the American Diabetes Association\(^ {11}\). According to this protocol, a full 100-g 3-h OGTT should be performed in all women and their glucose clearance as measured. In the present study, pregnant women with reported diabetes were screened for their further complications.

Fasting blood (n=30) was collected by a single puncture form the diabetic patients and healthy participants after obtaining informed consent. Gestational diabetes mellitus (GDM) patients consider the age group between 19–40 years with fasting plasma glucose (FPG) ≥ 110mg/dl (As per the ADA guidelines). The parameters like child birth weight, type of delivery and duration of pregnancy was recorded.

The fasting blood was collected (2ml) in the plain vacutainers from the vein after getting participant oral consent. The samples were kept at room temperature for 30min. Followed by the centrifugation at 3000rpm for 15min. The serum was separated and kept at 20°C for further study. The post prandial blood sugar was estimated after 1 and 2hr.

Serum sample was used to evaluate serum glucose by using commercially available kits (Coral Clinical Systems, Goa, India).

**Statistical Analysis:** The data were subjected to statistical analysis using GraphPad Instat (3.0, Trial Version). Results were presented as Mean ± Standard Error (SE). Dunnett Multiple Comparison Test and one way Analysis of Variance (ANOVA) was done to estimate the statistical significance.

**Results**

The women showing a fasting blood glucose (FBG) ≥105mg/dl were considered in the group of gestational diabetes (GDM). Other, women were included in the normal group (FBG ≤105mg/dl). The OGTT was performed for all women. The fasting and postprandial glucose levels are depicted in the Table 1.

| Table 1: Blood glucose (mg/dl) levels of women enrolled in the study |
|----------------|----------------|----------------|
|               | Fasting        | Postprandial 1hr | Postprandial 2hr |
| GDM group     | 116.64 ± 0.91  | 172.09 ± 2.00    | 148.48 ± 1.56    |
| Healthy group | 101.5 ± 0.93   | 141.09 ± 2.24    | 112.51 ± 1.22    |

**Area under curve (AUC) for the OGTT:** The GDM women showed significantly (p<0.0001) higher area under the curve as compared to the healthy women. The AUC of GDM and healthy women were found to be 1094520 ± 8418.0 and 885300 ± 4956.3, respectively. The value reflects the significantly higher insulin resistance in the GDM women as compared to healthy women.

**GDM women showed increased in the fetus weight:** GDM women showed significant (p<0.0001) increased in the fetus weight as compared to the healthy women. The birth weight of the fetus is shown in the Figure 1. This increase in the fetus birth weight results in the C-section delivery. About 83.34% GDM women undergone C-section delivery, while only 16.66% normal delivery occurs.
Average weeks of child delivery were found to be about 36.65 and 39.34 weeks in GDM and healthy women, respectively. The presence of GDM leads to the premature delivery.

The fetus birth weight is positively correlated with the presence of GDM i.e. insulin resistance. Serum high glucose level was positively correlated with the pregnancy complications such as C-section delivery, premature birth, increased in fetus weight etc.

**Discussion**

Sugar is released into serum quickly and causes the blood sugar level to rise. In response to this there is a rapid release of insulin, which is required to normalize blood glucose. But instead of maintaining a steady state of energy throughout the day, it results in tiredness. The low level of sugar maintains a constant energy level. High glucose level in pregnancy leads to weight gain in pregnancy, causes gestational diabetes, pre-eclampsia and baby being overweight in later life. Serum glucose plays a major role in fetal growth. But the normal levels of glucose must be clearly defined in pregnancy and its effect on fetal growth must be evaluated.

Perinatal morbidity and mortality is often affected by blood glucose levels during pregnancy. Serum glucose level during pregnancy affects the infant birth weight. Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) study reported that previous diagnostic cut offs for diabetes in gestation has predictive value for fetal hyperinsulinemia and LGA. Thus, International Association of Diabetes in Pregnancy Study Group and the American Diabetes Association (ADA) revised these cutoffs and later recommended new lower criteria for gestational diabetes diagnosis. But, there are many women whose glucose values are within therapeutic range but still deliver macrosomic infants.

Previous reports have documented that serum glucose influence amniotic fluid glucose concentration. A positive correlation exists between maternal serum glucose and amniotic fluid glucose level. Maternal hyperglycemia affects amniotic fluid glucose and results in elevated glucose levels. Negative correlation is reported between glycemic control and vitamin D levels in serum of gestational diabetes patients. It is speculated that high blood glucose level in pregnancy raises the risk of baby’s congenital heart defect. According to a study led by researchers at the Stanford University School of Medicine it is reported that women with diabetes are likely to give birth to babies having heart problems. Significant correlation was also found between glucose and sonographic parameter which were estimated during gestation. In our study, we found the correlation between the glucose and child birth weight.

In gestational diabetes, blood glucose level becomes high and is associated with increased fetal insulin and fetal size. It results in adverse obstetric outcome. In the pregnancy volume of blood volume, plasma is increased. During the third trimester the female suffers from anemia due to increase in demand of nutrition for the baby. Hemoglobin levels become lower during the third trimester as compared to first trimester in pregnant women. Also, the hematocrit decreases with increase with advancement in gestation. It is well reported that serum glucose concentration increases from first trimester to third trimester. In later stages of pregnancy insulin secretion is is increased by 2-3 folds by the nutrients. This effect is due to binding of receptors to insulin which is altered by hormones released by placenta mainly, human placental lactogen (HPL), estradiol, progesterones, and free cortisol. In pregnancy serum glucose is elevated by appears more prolong in the post prandial state. Hyperglycemia and Adverse Pregnancy Outcomes (HAPO), was important study that highlighted the association between maternal serum glucose level and its prenatal complications. The study reported significant and increasing association between fetal macrosomia, need of caesarean section for delivery, neonatal hypoglycemia, etc. One more study by Riskin-Mashiah et al demonstrated the similar association of fasting glucose in the first trimester and the occurrence of complications in pregnancy. Our finding are accordance with these reports.
Conclusion

From the above study, we can conclude that the fetus birth weight is positively correlated with the presence of GDM i.e. insulin resistance. Serum high glucose level was positively correlated with the pregnancy complications such as C-section delivery, premature birth, increased in fetus weight etc. The serum glucose should be monitored strictly so that it will leads to the healthy or normal delivery.

Ethical Clearance: The blood was collected from the Karbala maternity teaching hospital after their investigation. Oral consent was taken before enrolled the patients in the study.

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES


Building and Applying the Personal Values Measure for the Administrators of Sports Clubs and Clubs for People with Disabilities from the Point of View of the Players of Some Games

Amal Adulameer Tuama¹, Methaaq ghazi¹

¹Faculty of Physical Education and Sports Sciences, University of Thi-Qar, Iraq

ABSTRACT

The research community was identified with disabled players of some games in the provinces of southern and Middle Euphrates Iraq. There were 228 disabled players who constituted 97.36 % of the research community.

The researcher built and applied a measure of personal values to (110) players and the scale was applied to (100) players. The sample was divided into six levels. The highest proportion focused on the levels; excellent and good and good.

The scale entertained some validity, construct and reliability coefficients (0.89). The researcher concluded:

1. The scale designed by the researcher is able to reveal the level of personal values for administrators of sports committees and clubs for people with disabilities.

2. The creation of standard scores and levels of the personal value scale as the objective evidence for the administrators of sports committees and clubs in assessing the level of the player for the group to which he/she belongs.

Keywords: personal values, administrators, disabilities and players.

Introduction

Values are considered an important axis for personality and a criterion for judging the normality and abnormality of behavior for values determine the scope of success obtained by individual and organizations in the achievement of objectives. Many organizations underwent a lot of problems that needed new working techniques to overcome such problems. It is to be noted that organizations and governments can coexist with renewing and increasing financial, economic and political crises, that is why management has to look for new and modern techniques to address such problems for it is impossible to deal future difficulties with outdated methods for applying old pattern of management would lead to the extinction and disappearance of organizations due to their inability to adaption. Studies and researches introduced a new management pattern, which in turn limits the problems of the management. The value-based system was introduced as a contemporary introduction of management. Therefore, authors and researchers were required to go through the value system through which the theory of value-based system will be developed, and the nature of values diagnosed in the way that it can effect on personnel, and determine to how far these values can improve administrative work in general.¹

Among the important areas of the sports institution is the sport of those who need special care for they make the pillars of society building and an active part in the process of its development. The building of such community requires concerted efforts, including individuals who suffer from physical disabilities. The states of the world have recently given serious interest to the disables’ sports as considered a vital part of society which needs to be provided with an opportunity to play an active role in various walks of life, including the sports field represented by the investment and development of their remaining abilities and talents. The selection has to be performed according to special disciplines taking into account the voluntary aspect that stems from the faith in certain values that take care of the society and...
its interaction with the individual subjective values and this is not enough if the privacy of the administrative work and method of modern scientific management are considered. There should be personal and administrative values to constitute a successful basis for the work, similarly as other organizations do in the society.\(^2\)

Personal values express the individual’s self-beliefs, as seen from his point of view considered as a fundamental element of the culture of the organizations constituting individual personality and contributing to the defining of his goals within a proper normative framework. The personal values provide individuals with diverse options that determine their behavior and modify it and help in the prediction of the individual’s behavior. Personal values greatly affect the individuals’ private and practical lives as considered one of the basic components of the personality. The impact covers individuals’ behaviors, trends, attitudes and relationships, and thus provide an important framework to direct individual’s and groups’ behavior and organize it within and without the organizations. The importance of the research lies in the collection of accurate information on the personal values of the administrators of disables’ sports committees and clubs from the point of view of players of some games.\(^3\)

**Methodology of the Research**

The researchers adopted the descriptive methodology, which is an accurate description of the mutual relations between society, trends, desires and development in a way that the research reflects the living reality and devises parameters, and builds future expectations.

**The community and sample of the research:** The research community was determined by the disabled sports players in some gaming teams in the southern and middle provinces of Iraq; they are 228 in number at 97.36% of the research community. The sample included 110 disabled players for the building sample and 100 disabled players for the sample of application. Six of the total number of the players were excluded for the forms were not filled and Table (1).

<table>
<thead>
<tr>
<th>No.</th>
<th>Governorate</th>
<th>Sports Gaming</th>
<th>Building sample</th>
<th>Application sample</th>
<th>Exploration sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Nasiriyah</td>
<td>Volleyball 12</td>
<td>9</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>Thi-qar club</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3.</td>
<td>Misan</td>
<td>Excluded 6</td>
<td>7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Kut</td>
<td>10</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5.</td>
<td>Basra club</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6.</td>
<td>Paralympics Iraqi committee</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7.</td>
<td>Hilla</td>
<td>Volleyball 10</td>
<td>1</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>8.</td>
<td>Najaf</td>
<td>Excluded 10</td>
<td>1</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>9.</td>
<td>Diywaniah</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10.</td>
<td>Simawah</td>
<td>Excluded 8</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>66</td>
<td>36</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Means, tools & appliances used in the Research:**

**Means of collating data:**

- Arabic & foreign sources.
- Personal interviews.
- Questionnaires.

- International electronic information.

**Tools and Appliances:**

- Hp computer (2).
- Manual electronic calculator (Casio) stationary and office tools.
Field procedures of the Research: For the purpose of conducting of the research, the researcher had to build a scale for measuring the personal values of the administrative staff of the sports committees and clubs of the disabled athletes from the viewpoint of the players of certain games in the southern and middle provinces of Iraq as per the following steps:

Measures of building of the measure scale of the personal value:

Drafting of the primary formula of the measure:

1. Reviewing the literatures related to the personal values and identifying articles and schemas of the measurement values.

2. The researcher worked out a questionnaire and distributed it to the experts and specialists in the field of general psychology, cognitive psychology, sport psychology, administration, organization, tests and valuation.

3. The researcher conducted a series of personal interviews with some of specialists in general, and sports psychologies, in international economics, management and organization, business management and administrative systems so as to obtain larger amount of information which helps the process of determination of the measurement values and its norms.

The primary scale of measurement consists of 35 formulated paragraphs. There were also a set of methods pursued by the researcher to form the paragraphs of the measure in a way that each paragraph shall have one idea and its language shall be simple and direct with avoidance of using negation which may embarrass the respondent. The researcher used every day language in the paragraph formulation.

The final analysis about the validity of the domains (values) of measuring personal values resulted in the acceptance of 5 domains out of 6 domains with the exclusion of religious values as shown in Table (2).

Table 2: Shows the percentages and values of (Chi square) of the experts’ views about the validity of the domain (personal values)

<table>
<thead>
<tr>
<th>No.</th>
<th>Domains</th>
<th>valid</th>
<th>Chi Square</th>
<th>Percentage</th>
<th>Not Valid</th>
<th>Chi Square</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Intellectual values</td>
<td>21</td>
<td>21</td>
<td>100%</td>
<td>zero</td>
<td>17.18</td>
<td>4.76%</td>
</tr>
<tr>
<td>2.</td>
<td>Aesthetic values</td>
<td>20</td>
<td>17.18</td>
<td>95.23%</td>
<td>1</td>
<td>17.18</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Economic values</td>
<td>21</td>
<td>21</td>
<td>100%</td>
<td>zero</td>
<td>-</td>
<td>--</td>
</tr>
<tr>
<td>4.</td>
<td>Political values</td>
<td>18</td>
<td>10.7</td>
<td>85.71%</td>
<td>3</td>
<td>-</td>
<td>--</td>
</tr>
<tr>
<td>5.</td>
<td>Sociological value</td>
<td>21</td>
<td>21</td>
<td>100%</td>
<td>zero</td>
<td>-</td>
<td>--</td>
</tr>
<tr>
<td>6.</td>
<td>Religious values</td>
<td>6</td>
<td>3.86</td>
<td>28.57%</td>
<td>15</td>
<td>3.86</td>
<td>71.428</td>
</tr>
</tbody>
</table>

Application of the scale to the building and standardization sample: The scale was applied to the building sample from 19/7/2018 to 10/8/2018. The sample of the building included (110) players representing (22) teams from (8) provinces of Iraq situated in the south and the Middle Euphrates. After answering was completed, the forms were checked to ensure that all paragraphs were answered.

Correction of paragraphs of the measuring scale: The scale of measuring personal values of the administrative personnel from the disabled players’ viewpoint consisted of (29) paragraphs distributed into 5 domains as shown in table (3).

Table 3: Shows domains and paragraphs of the personal values scale

<table>
<thead>
<tr>
<th>No.</th>
<th>Domains</th>
<th>Paragraphs Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Intellectual values</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Aesthetic values</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>Economical values</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>Political values</td>
<td>6</td>
</tr>
<tr>
<td>5.</td>
<td>Sociological values</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>29</td>
</tr>
</tbody>
</table>
The paragraphs were corrected after the player’s total score was known, the mark is calculated according to the grades the player collected by ticking the paragraphs on the stepladder and assigning it the appropriate weight as shown in table (4).

Table 4: It shows the weight values of the paragraphs

<table>
<thead>
<tr>
<th>Significance</th>
<th>Entirely do not agree</th>
<th>Do not agree</th>
<th>Not sure</th>
<th>Agree</th>
<th>Totally agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight value of positive</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Negative values</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

The researcher adopted the pentatonic stepladder after being observed by the experts.

Internal consistency coefficient for scale paragraphs: The internal consistency value of this index was extracted by using the simple correlation coefficient (Pearson) between the score of each paragraph and the total score of the scale, which resulted in the acceptance of all the paragraphs.

Table 5: Shows the values of correlation coefficient of the internal consistency of the paragraphs of the personal value scale

<table>
<thead>
<tr>
<th>No.</th>
<th>R calculated value</th>
<th>No.</th>
<th>R calculated value</th>
<th>No.</th>
<th>R calculated value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>**0.469</td>
<td>11</td>
<td>**0.363</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>**0.342</td>
<td>12</td>
<td>**0.439</td>
<td>22</td>
<td>**0.382</td>
</tr>
<tr>
<td>3.</td>
<td>**0.392</td>
<td>13</td>
<td>**0.407</td>
<td>23</td>
<td>**0.463</td>
</tr>
<tr>
<td>4.</td>
<td>**0.312</td>
<td>14</td>
<td>**0.412</td>
<td>24</td>
<td>**0.453</td>
</tr>
<tr>
<td>5.</td>
<td>**0.409</td>
<td>15</td>
<td>**0.276</td>
<td>25</td>
<td>**0.281</td>
</tr>
<tr>
<td>6.</td>
<td>**0.452</td>
<td>16</td>
<td>**0.347</td>
<td>26</td>
<td>**0.434</td>
</tr>
<tr>
<td>7.</td>
<td>**0.423</td>
<td>17</td>
<td>**0.454</td>
<td>27</td>
<td>**0.292</td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td>18</td>
<td>**0.321</td>
<td>28</td>
<td>**0.462</td>
</tr>
<tr>
<td>9.</td>
<td>**0.388</td>
<td>19</td>
<td></td>
<td>29</td>
<td>**0.311</td>
</tr>
<tr>
<td>10.</td>
<td>**0.379</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The asterisk refers to meaningful correlation at significance level (0.05).

** The double asterisks refer to meaningful correlation at significance level (0.01).

Results and Discussions

Presentation and discussion of the standard levels and their proportions on the normal distribution curve, the raw grades, the standard grades, the number of players and the percentages of each level of the personal values scale:

Table 6: Shows the standard levels and their ratios on the normal distribution curve, the raw grades, the standard grades, and the number of players and the percentages of each level of the personal value scale

<table>
<thead>
<tr>
<th>Levels and their ratios on the normal distribution curve</th>
<th>Raw grades</th>
<th>Standard grades</th>
<th>Number of players</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent 3.14</td>
<td>109.34 on</td>
<td>81-100</td>
<td>27</td>
<td>27%</td>
</tr>
<tr>
<td>Very good 13.59</td>
<td>109.33-92.67</td>
<td>61-80</td>
<td>58</td>
<td>58%</td>
</tr>
<tr>
<td>Good 34.13</td>
<td>92.66-76</td>
<td>60-41</td>
<td>11</td>
<td>11%</td>
</tr>
<tr>
<td>Average 34.13</td>
<td>75-58.34</td>
<td>40-31</td>
<td>4</td>
<td>4%</td>
</tr>
<tr>
<td>Fair 13.59</td>
<td>58.33-41,67</td>
<td>30-21</td>
<td>zero</td>
<td>zero</td>
</tr>
<tr>
<td>Poor 3.14</td>
<td>41.66 down</td>
<td>20-1</td>
<td>zero</td>
<td>zero</td>
</tr>
</tbody>
</table>
Table (6) shows that the excellent level was represented by the raw grades (109.34 and on), which corresponds to the standard grades (81-100) and 27 players with percentage of (27%). The level very good was represented by the raw grades (67, 109.33-92) corresponding to the standard grades (61-80) with 58 players and having the percentage 58%, which corresponds to 13.59%, which is higher than the normal value. While the level good was represented by the raw grades (76-92.66), which corresponds to the standard scores (41-60), where the number of players was (11) player obtaining the percentage of (11%), which corresponds to (34.13%) which is less than the normal value. The level average was determined by the raw grades (58.34-75), which corresponds to the standard grades (31-40) where the number of players was (4) with percentage of (4%), which was less than the normal value (34.13%), whereas the fair level was represented by the raw grades (41.67-58.33), which corresponds to the standard scores (21-30), where the number of players and the percentage were zero, and the poor level was determined by the raw grades (41.66 and down), which corresponds to the standard grades (1 - 20) where the number of players and the percentage were zero. Based on table (6) it was observed that the highest percentage of the research sample was concentrated on the level (excellent), followed by (very good), (good), and (average). 6

The researchers attributed that to the administrators of sports committees and clubs due to importance of personal values and beliefs adopted by the manager or administrator in the organization and its role in activating the administrative process, 7 and found that the more positive values of the administrative leaders increase, 8 the more they impact on the efficiency of administrative procedures, through the understanding by the leaders of their subordinates values and thus taking care of their feelings and concerns in a way that reflect the best impact on their psyche and vice versa as well as the employee who contrasts with his group values or with his superiors’ or with the values of the organization in which he works, he would act differently, 9 creating a conflict that generates divisions and separation among the working individuals of the institution. 10 The levels (fair) and (poor) did not score any proportion on the scale of personal values and the researcher believed that this was attributable to the degree of awareness of the sample which placed them at the fair and poor levels, mainly they did not score any proportion in the levels. 11

**Conclusions**

Based on the presentation, analysis and discussion of the results, the researcher reached the following:

1. The scale designed by the researcher was able to reveal the level of personal values for administrators of sports committees and clubs for disabled people.

2. The founding of standards and levels of the standard measure of personal values that serve as objective evidence for the administrators of sports committees and clubs in assessing the level of the player for the group to which he belonged.

3. The sample was distributed naturally in the level of personal values for administrators of sports committees and clubs for disabled people, and the personal values scale was divided into six levels ranging from poor to excellent.

4. The variation of the sample members in their obtaining different grades, levels and percentages through the application of the measure of personal values, the highest level of proportion was at the level excellent followed by the very good and good levels.

**Ethical Clearance:** Taken from University of Thi-Qar committee

**Source of Funding:** Self

**Conflict of Interest:** None

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Qualitative Study of Family Planning (KB) Village Program’s Implementation in East Java Province-Indonesia

Annisa Ullya Rasyida1, Iswari Hariastuti2, Mardiyono2, Iffah Udiana2, Kuntoro3, Haryono Suyono4, Sri Widati5
1Department of Public Health, Hang Tuah University, Surabaya, East Java and Doctoral Student of Public Health Faculty, Airlangga University, Surabaya, East Java, Indonesia; 2Department of Research and Development, Representative of National Population and Family Planning Board, East Java, Indonesia; 3Professor of Department of Population and Biostatistic, Public Health Faculty, 4Professor of Medical Faculty, 5Department of Health Promotion, Public Health Faculty, Airlangga University, Surabaya, East Java, Indonesia

ABSTRACT

In order to control population growth, Indonesian National Family Planning develop Family Planning (KB) Village Program. The implementation has found some obstacles, in terms of cross-sector/partnership integration reached around 25%. Especially in formal legal aspects and funding which are suboptimal. It is qualitative research with explorative studies. Data collected from in-depth interviews, field observations and analysis. It was conducted in October - November 2017 in KB Village of Bulu Meduro Village, Banjar District, Tuban Region and KB Village of Kota Lama Sub-District, Kedung Kandang District, Malang City. There were 55 participants recruited. The results showed that the implementation of the KB Village Program in Tuban Region had formal legal aspects from the Regional, District and Village Governments, cross-sector partnership had been going well, the Regional Government to the Village Government have allocated budget to support it although limited. Whereas the Implementation of the KB Village Program in Malang City has not received the support of a comprehensive formal legal aspect yet from the level of the City, District and Subdistrict Governments, so that cross-sector integration and financial support still encounter many obstacles. The conclusion is the implementation of the KB Village program needs improvement with the stronger commitment or political will of policy makers at various levels ranging from the Regional Government to the Village Government to provide total support for each planned program.

Keywords: family planning village, cross-sector partnership, local government, formal legal aspects

Introduction

Increased population is a prominent problem experienced by many developing countries, including Indonesia. The total amount and rate of population growth that is not matched by good welfare conditions are still the main problems in Indonesia. The current population of Indonesia is rapidly growing and causing high unemployment and poverty. Based on that situation, family planning programs were created to develop the community. Maximizing the implementation of family planning programs are certainly an absolute choice for the current government. According to the regulation number 52, year 2009 about population growth and family development as the basis for implementing Family Planning Population and Family Development Program.
One of the mandates of the law, specifically in family development is to establish Family Planning (KB) Village which strengthen The Family Planning Population and Family Development Program (KKBPK) that carried out by compiling activities that directly effect the community by providing beneficial activities for the community and also achieving the targeted objectives. KB Village requires the support from government and private group to work in accordance with the needs and conditions of the local, and also implemented at the lowest level which is neighborhood.2

KB villages are expected to be one of the strategic innovations to be able to implement the KKBPK program’s priority activities in full in the field in realizing the Priority Agenda 5 (five) of the 9 government priority agendas for 2015 - 2019 namely “Improving the Quality of Indonesian Human Life” through Family Planning Population and Family Development Program. Moreover, BKKBN itself has compiled the 2015-2019 Strategic Plan with 6 (six) predetermined strategic targets, namely: (1) reducing the average Population Growth Rate (LPP) from 1.38% per year in 2015 to 1.21% per year in 2019, (2) the decrease in the Total Fertility Rate (TFR) from 2.37 per woman of childbearing age (WUS) in 2015 to 2.28 in 2019, (3) the increase of Contraceptiive Prevalence Rate (CPR) of all methods from 65.2% of total fertile age couples (PUS) in 2015 became 66% in 2019, (4) the decline in family planning needs was not served by unmet need from 10.6% in 2015 to 9.91% in 2019, (5) the decrease in the Age Specific Fertility Rate (ASFR) of 46 per 1000 women in the age group 15-19 years in 2015 to 28 per 100 women in the same age group in 2019, (6) the decrease in the percentage of unwanted pregnancies from WUS from 7.1% in 2015 to 6.6% in 2019.2

Data collection techniques that is used are primary data collecting with questionnaires, in-depth interviews, and direct observation. The validity of the data in this study uses source triangulation. Analysis of the data used in this study are data collection, data reduction, data presentation, data analysis and conclusion drawing.

Result

Results of interviews with Sub-District Head, Village Head, Village Midwife, Head of the Prevention of Narcotics Abuse in BNN, Education Agency and National Population and Family Planning Board (BKKBN) related to KB village program implementation in Malang City and Tuban Region are as follows:

There is no Camat Decree for KB Village. Partnerships that have been cooperated through Branch Leadership Deliberation (muspimcab): Military District Command (Danramil), sectoral police (Kapolsek), Islamic teachings and pre-marital directives (KUA), Family Welfare Development (PKK), Cadres, Health Office (for Health), Department of Population and Civil Registration (Dispendukcapil) that giving services in sub-districts. KB Village funds is taken from the District PKK. Data collection in sub-districts is not available, but available in each village. The KB Village specific meeting did not yet exist at the sub-district level. However, there are cross-sectoral meetings every 3 months attended by the head of sub-district, police chief, military command, all the village heads, PKK, and BNN
Activities such as the Elderly Posyandu, twice a month in coordination with the Social Service, and Health Office. Youth activities are actively carried out. Then there is the marriage dispensation (related to the time-consuming marriage management), especially the Madurese.

Whereas in Tuban City the implementation of the KB village is as follows:

The establishment of the KB Village is legal formal, an Instruction letter from the Head of the village, followed by instructions to the village. So the eagerness to enter its budget through the village income and expenditure budget plan (APBDes) could arise. Not merely support through the budget. However, the situation and conditions in the institution often change, for example the Family Planning Field Officer (PLKB) staff from the BKKBN joins the Health Office and then joins Bapemtas, then joins the Center, the numbers are less so weakening. But what strengthens is that the support of the regional head is very strong. Coordination and advocacy from the district level to the lower level must be strengthened.

In Malang City: Frequent activities with KB villages, namely being invited to community groups is the next plan. If there is a meeting, in the sub-district by inviting youth, cadres, KB Field Officer (PLKB), Bhayangkara Fostering Community Security and Order. The status of the working group in Malang City is still needs to be known and should inviting the head of the Technical Implementation Unit (UPT)s to jointly carry out the activities. Especially through Planned Generation (GenRe) activities. The budget provided for activities is usually described in the work plan.

The benefits of the KB Village Program implementation:
According to Puskesmas Midwives in Malang City and Tuban;

After the KB village program is implemented, there are two KB safari services. For acceptors with low income may be served more through KB cadres. The form of family planning (KB) Safari that conducted in Community Health Centre (Puskesmas) is collaboration with PLKB, especially for Intra Uterine Device (IUD)s and Implants.

In Tuban Regency, about the benefits of the KB Village:

After there KB village is established, the residents slowly leaving their habits to defecate in the sea, then build and use their own latrines. KB Village meetings often use a newly constructed building. The Village KB Team Decree was signed by the Head of the Village, but for the KB Village Team decree it still involved its Regent District Head.

Differences before and after the KB village is that after a family planning village has a family planning participation increased, activities about family planning and health care have increased, community awareness about family planning has increased. Physically a special room has been built for KB Field Officer (PLKB) activities, Posyandu rooms, meeting/extension rooms, construction of the gate at the time of launching. There is also a building, accompanied by BKKBN activities.

How is the Budgeting for the KB Village Program Implementation:

There is no special budget for the implementation of KB village programs in each village. However, the budget that has been used so far is Village Budget. During this time the main obstacle in implementing KB villages in each village was the lack of a budget. This is because not all villages have made KB villages a priority for the program.

The obstacles of the implementation of the KB village program:

The obstacle in the implementation of KB Village activities is funding or the budget for KB. The biggest challenge is the community. Do they realize that these drugs damage intelligence. there is no crossing between sector and everything depends on the leader. The challenge is the unique community, because the majority of people are Madurese and difficult to regulate. The strategy that needs to be done is to continue to intensify the KB Village program with other sectors.

Suggestions for implementing the KB village for the future:

Shared commitment that village KB activities must be frequent (because frequency become obstacles) and need mutual care from all parties, especially funding for frequent activities. It is hoped that the Regional Device Organization (OPD)s can open themselves to KB villages. For the majority, KB activities should be promote even more.
The expected results from this study are the increasing use of MKJP, the majority of the community already has latrines, the creativity of adolescents increases, there is no early marriage, and toddlers and the elderly are getting healthier. The challenge of implementing the KB village is the funds that goes for KB village activities that have not been given perfectly.

Discussion

To achieve the success of KB village program, there are at least 6 main factors that need to be improved, those main factors as follows:

1. Strong commitment from stakeholders at all levels (City, Sub-District, village): Support from partners at the provincial level with strong advocacy. One of the most basic things from the success of the KB village is political will or commitment from the head of the region or stakeholders at all levels. This commitment must be clear so that each program in KB Village can run well with budget support. In addition, this commitment is needed to bridge various sectors that must take part in implementing the KB Village program. The reason is that the implementation of the KB Village program was not carried out by the OPD related to family planning but instead required synergy from various existing OPDs.

2. Gather partners donors to help those who have not been able to immediately make latrines: The factors that influence empowerment in human resource development among them are the existence of self-resources and self-abilities in the form of modeling, motivation, and support. There needs to be support and model for village level community members in the provision of healthy latrines.

3. Establish standard procedures at the district level for a grace period for disbursing funds and donors: The family planning program has been recognized as the most effective factor in intervening health problems globally. The need for clear collaboration between the Government and the relevant BKKBN establishes standard procedures at the district level for a grace period for disbursing funds and donors.

4. Integration of the KKBPK program and cross-sector integration: Principle of the KKBPK Program is to embodies a happy and prosperous small family by implementing eight family functions. Cross-sector development and partnerships involve the role of various parties such as the private sector, providers, and other stakeholders. Cross-sector integration is in the form of integrated services between sectors that are community needs, such as family planning services, deed-making services, road and bridge construction, ID card making, reading books, posyandu, Early Childhood Education Programs (PAUD), Program for Increasing the Role of Women Towards Healthy Families (P2WKSS) and others.

5. Enthusiasm and dedication of the KKBPK program managers in field: Family planning is a program that has the most simple yet practical meaningful quantity in improving the family’s social and economic welfare. The success of the important KB Village Program is supported by an increase in public awareness and participation in managing family planning programs carried out by Rural Community Institutions, NGOs, private sector, community leaders and other relevant government institutions.

6. Active Community Participation: Active participation from community leaders, religious leaders and traditional and community leaders in the management and implementation of all activities that will be carried out in KB villages is a basis prerequisite for the establishment of KB villages to improve the standard of living of all communities in the region. In addition, the involvement of the private sector in developing the Development Program in KB Village was very important as a form of mutual cooperation from all parties.

Conclusion

KB village is a strategic innovative program in supporting The Family Planning Population and Family Development Program (KKBPK). Because KB Village is a model or miniature development that involves all sectors in the community. Based on results of the study conducted in 2 locations of KB villages it can be concluded that the existence of KB villages since its inception in 2016 contributed to a number of indicators. The weakness of implementation of the KB Village program needs improvement with commitment.
or political will of policy makers at various levels ranging from the Regional Government to the Village Government to provide total support for each planned program. In addition, eliminating sector ego is an important key to the success of the KB Village program.

**Conflict of Interest:** Authors declare that the information above is correct and the manuscript submitted by us is original. We have no conflict of interest to declare and certify that no funding has been received for the conduct of this study and preparation of this manuscript.

**Source of Funding:** This research is self-supporting and BKKBN founding

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**REFERENCE**


Model of Peer Intervention Assessment of Nutritional Educator in the Efforts to Change Behaviour in Decreasing Overweight in Integrated Islamic Elementary Schools at Makassar

Anto J. Hadi1, Veni Hadju2, Suriah3, Rahayu Indriasari2, Toto Sudargo4, Mappeaty Nyorong5, Masni6

1Public Health Department, Faculty of Public Health, Institut Kesehatan Helvetia, Medan, Indonesia; 1Doctoral Student Program, Faculty of Public Health, Universitas Hasanuddin, Makassar, Indonesia; 2Nutrition Department, 4Health Promotion Department, Faculty of Public Health, Universitas Hasanuddin, Makassar, Indonesia; 5Doctoral Student Program, Faculty of Public Health, Universitas Hasanuddin, Makassar, Indonesia; 6Health Biostatistic Department, Faculty of Public Health, Universitas Hasanuddin, Makassar, Indonesia

ABSTRACT

This study aimed to assess the effect of peer intervention models on nutrition educator intervention in an effort to change behavior in decreasing of overweight at Islamic Elementary School of Makassar. The design of this study was quasi-experimental with non-equivalent control group design. The subjects were selected by proportional random sampling. The intervention did for six months with mentoring of peer nutrition educators and module administration, obesity prevention management leaflets, peer education for 25 minutes each week and evaluating using questionnaires and measuring body mass index of children using WHO’s Anthro Plus. Data processing was analyzed by univariate and bivariate analysis with Independent t-test, Mann-Whitney test and Paired t-test and multivariate with Hotelling test. The results show that there were differences in nutritional knowledge, attitudes toward nutrition, physical activity and significant snacking habits for overweight children before and after peer education by peer nutrition educators (p = 0.000 <0.05). This proves that there is an influence on the peer assistance model of nutrition educators on change in nutritional behavior in an effort to control the lifestyle of overweight children after they are given peer nutrition education. This study expected to implement an integrated peer nutrition education in physical education learning in schools for obesity prevention.

Keywords: Overweight, Obesity, Nutrition Educator Peer, Nutritional Behavior, Physical Activity

Introduction

The prevalence of overweight and obesity are one of the public health problems that occur in school-age in various countries. The world health department has stated that obesity is one of developing determinant factor for diabetes mellitus, hypertension, and heart disease1. Globally, other research conducted in Singapore shows that the prevalence of obesity increased from 9% to 19%. This perspective would continue increasing to reach a prevalence estimate of 9.1% by 20202. Obesity is the cause of various risk factors for disease and death3. Based on the Republic of Indonesia’s basic health research (2018), the prevalence of overweight children aged 5-12 years 11.8% overweight and 9% obese, and the prevalence of overweight in South Sulawesi province according to body mass index per age of 13-15 years as many as 13.6% obese and 21.8% obesity4. The prevalence of overweight and obesity in Indonesia occur mostly in school-age children and is a threat to Indonesian children5.

Corresponding Author:
Anto J. Hadi
Public Health Department, Faculty of Public Health, Institut Kesehatan Helvetia, Medan, Indonesia
Kapten Muslim Street Number 107
Medan Helvetia Distric, Medan City,
North Sumatera Province, Indonesia
Phone: 085242877376
Email: antoarunraja@gmail.com
A preliminary study conducted by the researchers in 16 Integrated Islamic Elementary Schools in Makassar by anthropocentric measurements and calculating body mass index per age of children and then entering into the standard deviation values based on sex and age of children, of the total children 2,177 children, who has nutritional status consisting of very thin 2.53%, thin 4.92%, normal 62.15%, overweight 13.92%, obesity 16.49%. The results of this survey show that school-age children prefer to buy food and eat snacks that are always over-served triggered by urban lifestyles. This is a fact of the high trigger of overweight and obese children. Overweight and obesity are part of the result of an unhealthy diet. The epidemic of overweight and obesity in children caused by bad diet including fewer consumption fruits and vegetables and consuming more high-fat foods but less physical activity\(^6,7\).

The finding on overweight and obesity are due to unhealthy diet behavior and lack of physical activity, thus an intervention strategy that is used in the prevention of obesity that is to assist peer nutrition educators. Nutrition educator peers are reinforcing factors that can influence the behavior of school-age children including eating behavior. Peer groups can have a negative or positive influence on school-age children. Friends of the same age can become peer nutrition educators, as one of the health education strategies\(^8\). Efforts to prevent overweight and obesity in school-aged children are focused on efforts to improve healthy eating patterns and reduce relaxed activities through peer nutrition educator approach in schools. Overweight and obesity is a nutritional problem when adults can be repaired and prevented when children so prevention of obesity in school-age groups can be effective. The peer intervention model of nutrition educator is applied to change nutrition behavior, increase physical activity so that it can prevent overweight and reduce the prevalence of obesity. This study aims to prove the influence of peer intervention models for nutrition educator intervention in an effort to change behavior in decreasing the incidence of overweight.

### Material and Method

The study uses a quasi-experimental approach with non-equivalent control group design with the aim of proving the influence of peer nutrition educator intervention models on behavior change prevention of obesity in the Integrated Islamic Elementary School of Makassar conducted for 6 months. A sample of 80 children consisting of 40 children received intervention in the form of assistance, modules + leaflets and discussions through peer group sharing and 40 children only received modules and leaflets. The research subjects were divided into two namely the treatment group and the control group. Then measurements were taken before and after the intervention (pre-post test) in both groups. The Research had taken two times for measurement of weight and height of school-age children, one time before and after the intervention. Because each school has a different number of overweight children, the proportional random sampling of each child in the selected school is conducted. Data collected were nutritional behavior and physical activity carried out through direct interviews using questionnaires, anthropocentric data including body weight and height, nutritional status assessment determined by WHO’s Anthro Plus 2007 software for school-age children 5-18 years. Before and after the intervention, the child’s eating pattern as measured by the Food Recall form is 24 hours. Analysis of differences in nutritional behavior, diet, physical activity between the treatment and control groups after the intervention were used chi-square test, independent t, t paired, Wilcoxon, Mann Whitney, T² Ho telling.

### Results

This research was conducted in the Integrated Islamic Elementary School of Makassar from September 7, 2018, to February 27, 2019. Distribution of children’s characteristics can be seen in table 1 as follows:

### Table 1: Characteristic of Participant

<table>
<thead>
<tr>
<th>Children’s Characteristics</th>
<th>Group</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention</td>
<td>Control</td>
</tr>
<tr>
<td></td>
<td>n (40)</td>
<td>%</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>19</td>
<td>47,5</td>
</tr>
<tr>
<td>Girls</td>
<td>21</td>
<td>52,5</td>
</tr>
</tbody>
</table>
Table 1 shows that children in the intervention group had more female sex (52.5%), class IV (70.0%), average body weight 39.3 kg with height 137.8 cm. Children in the control group had more female sex (60.0%), average body weight was 35.9 kg with a height of 152.0 cm. The results of the chi-square test and the independent t-test obtained p > 0.05, which means the condition of sex, class, weight, and height of the intervention group children with the same control (homogeneous). Changes in obesity prevention behavior before and after intervention can be seen in the following table:

Table 2: Effect of Peer Educator Nutrition Assistance on Children Obesity Prevention Behavior

<table>
<thead>
<tr>
<th>Nutrition Knowledge</th>
<th>Pre</th>
<th>Post 1(p*) Beda</th>
<th>Post 2(p**) Beda</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intervention</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>14.13</td>
<td>17.55(0.000)</td>
<td>3.43</td>
</tr>
<tr>
<td>Control</td>
<td>9.15</td>
<td>10.73(0.000)</td>
<td>1.58</td>
</tr>
<tr>
<td>p**</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Nutrition Behavior</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>41.40</td>
<td>62.43(0.000)</td>
<td>21.03</td>
</tr>
<tr>
<td>Control</td>
<td>33.10</td>
<td>39.28(0.000)</td>
<td>6.17</td>
</tr>
<tr>
<td>p**</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Physical Activity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>23.93</td>
<td>34.05(0.000)</td>
<td>10.13</td>
</tr>
<tr>
<td>Control</td>
<td>13.35</td>
<td>19.33(0.000)</td>
<td>5.98</td>
</tr>
<tr>
<td>p**</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Snacking Behavior</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>15.53</td>
<td>12.10(0.000)</td>
<td>3.43</td>
</tr>
<tr>
<td>Control</td>
<td>15.93</td>
<td>14.83(0.000)</td>
<td>1.10</td>
</tr>
<tr>
<td>p**</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>IMT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>20.61</td>
<td>19.92(0.000)</td>
<td>0.69</td>
</tr>
<tr>
<td>Control</td>
<td>19.1</td>
<td>18.39(0.000)</td>
<td>0.75</td>
</tr>
<tr>
<td>p**</td>
<td></td>
<td>0.564</td>
<td></td>
</tr>
</tbody>
</table>

p*: Wilcoxon test p**: Mann Whitney test

Table 2 based on the Wilcoxon test results showed that all children had knowledge about nutrition, nutritional attitudes, physical activity and eating habits that increased when post 1 and post-test 2 were compared at pre-test (p = 0.000 < 0.05). This shows that there is an influence of the provision of modules and mentoring peer nutrition educators on increasing children’s knowledge, nutritional attitudes, physical activity, and snacking habits. Increased knowledge of nutrition, nutritional attitudes, physical activity, and snack eating habits were higher in the intervention group compared to controls and decreased nutritional status (p = 0.000 < 0.05). The difference in the influence of peer nutrition educators on changes in nutritional behavior and physical activity towards prevention of obesity can be shown in the following table:
Table 3: Multivariate Analysis Differences in Nutritional Behavior and Physical Activity of Children

<table>
<thead>
<tr>
<th>Nutrition Peer Educator</th>
<th>Value</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotelling’s Trace</td>
<td>733.67</td>
<td>2888.82</td>
<td>0.000</td>
</tr>
<tr>
<td>Nutrition Knowledge</td>
<td>1044.01</td>
<td>649.52</td>
<td>0.000</td>
</tr>
<tr>
<td>Nutrition Behavior</td>
<td>20576.11</td>
<td>27260.07</td>
<td>0.000</td>
</tr>
<tr>
<td>Physical Activity</td>
<td>7507.81</td>
<td>6924.14</td>
<td>0.000</td>
</tr>
<tr>
<td>Snacking Behavior</td>
<td>296.45</td>
<td>637.00</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 3 based on the results of the statistical test with the Hotelling’s T test obtained the value of $F = 2888.82$ and $p = 0.000 < 0.05$. This means that there are differences in nutritional behavior and physical activity of children who receive peer nutrition educators with no peer nutrition educators. Nutrition educator peers influence nutrition knowledge, nutritional attitudes, physical activity and snack eating habits ($p < 0.05$).

**Discussion**

Change of eating habit in school-age children causing of overweight and obesity are low knowledge of nutrition. Knowledge of child nutrition is very influential on food selection\(^{(9)}\). The result of the study prove that all children have knowledge about nutrition which increases when post 1 and post-test 2 compared to the pre-test. This can be seen from the results of the Wilcoxon test which shows a difference in students’ knowledge about nutrition between before and after the post-test 1 and 2. This assumed in the treatment group that with a six-month intervention using peer nutrition educators can improve children’s nutrition knowledge. The result means that there is a difference in the nutritional knowledge of the children in the treatment group before and after nutritional education with a mean change in value higher than the control group. This assumed to increase nutrition knowledge after intervention through modules, leaflets and peernutrition educators. It results in line with the research of Sulisnadewi et al. (2012) showing that family health nutrition education is effective against the family’s knowledge ability to keep diarrhea in children in the treatment group\(^{(10)}\). It shows that after health education with the application of peer nutrition educators to overweight prevention is very effective. After health education is with the application of peer nutrition educators. Good knowledge of children’s nutrition strongly supported by self-efficacy having high confidence to change to be better in controlling a healthy lifestyle in children. Knowledge of good nutrition of children is also in line with the knowledge that has increased from the first month to the sixth. Knowledge of children’s nutrition results in a decrease in body weight or a child’s body mass index. Increased knowledge of nutritional treatment groups from month to month changes. This was due to the fact that at the beginning of the visit, the children had been given a module then given a peer intervention nutrition educator every visit all children were well-informed in preventing and controlling behavior in overweight and obese children.

The attitude of school-age children to overnutrition also plays a role in preventing negative nutritional behavior where the attitude is readiness or willingness to act and not an implementation of certain motives. The positive actions of school-age children on nutrition have a direct effect on children’s eating behavior to be positive, but negative actions on nutrition almost certainly have an impact on nutritional attitudes and behavior\(^{(11)}\). This shows that there are differences in attitudes at the time after post-test 1 and 2 in both treatment and control groups. Nutritional attitude scores were higher in the treatment group than controls and proved in the treatment group that with a six-month intervention using peer models, nutrition educators could improve the nutritional attitudes of overweight children. Thus, the nutritional attitude of a good child will also have sufficient ability to control the child’s lifestyle.

Nutrition education in educating children using modules, children are sure and very useful to obtain nutritional information from peers so that they can improve their nutritional attitudes in choosing healthy foods. This is due to the treatment group in the form of peer nutrition educators, while the control group only obtained modules and leaflets without peer nutrition educators. This statement is justified by other studies suggesting that peer nutrition education plays a major role in children’s attitudes and adherence to a diet. Nutrition educator peer needs an individual peer approach that aims to help individuals gain a better understanding of the over-nutrition problems faced and help to make decisions in overcoming these over-nutrition problems. Education through peer groups is more effective if children are gathered with their peers or their classmates so that children feel more comfortable.
and free in discussions so that they can optimally improve their understanding of healthy snacks. Ayaz, et al. (2015) obtained results through their research that pre-post test scores on students showed a significant value (p < 0.05) higher in students who attended a school that applied peer group learning compared to schools that applied ordinary learning exercises.

Overweight children move a little activity than children with normal weight. Physical activity is needed by children. From there the child learns to enjoy physical activity. Increased physical activity was higher in the control group than in the treatment group. Based on the results of the analysis there were differences in physical activity of children after intervention in the treatment and control groups, changes in activity showed that there was an increase to 93.2% in the sixth month while the physical activity of the control group children decreased. This proves that there is an influence of peer nutrition educator intervention on children’s physical activity. Increased income of people in certain socioeconomic groups, especially in urban areas, causes changes in dietary patterns and patterns of activities that support an increase in the number of obese people. Overweight occurs in children who have a lighter level of physical activity than children with heavy activity.

The decrease in snack eating habits was higher in the intervention group than in the control group. School-age children like to eat snacks such as fried foods, banana chips, cassava chips, sweets, sweets and others that are sold freely in the cafeteria while eating fruits and vegetables is rare so their diet is low in fiber. Snack foods can reduce appetite so that children who consume too much snack foods will usually eat more frequency and fewer portions, often not eating. The behavior of children consuming snacks followed by a sedentary lifestyle (sedentary behavior). Eating snacks while playing games, watching television and rarely moving can lead to overweight. It should be a major concern that to solve the problem of obesity a multi-factor and cross-sector approach is needed. Changes in nutritional behavior and increased activity are a good first step. Low-fat foods, rich in fruits and vegetables and limiting consumption of snacks are the right combination for children who want to maintain a normal nutritional status to prevent obesity.

**Conclusion**

The application of peer nutrition educator assistance and the use of peer nutrition education modules and leaflets affect the prevention behavior of obesity and the reduction in over-nutrition status of children.

**Acknowledgments**

The enumerator wishes to thank all the child who helped in the collection of the data. Respondents who have been willing to spend time in the interview process.

**Conflict of Interest:** The author (s) declare that they have no conflict interest

**Source of Funding:** Self-funded

**Ethical Clearance:** Ethical approval has been obtained from Ethical Commission of Health Research, Faculty of Public Health, with protocol number UH910183001.

**REFERENCES**


Association between Maternal Iron and Vitamin D with Risky Development of Autistic Children

Ashraf M Osman¹, Hanan M Kamel¹, Emad A Abdel-Naem², Aliaa M Higazi², Noha Mahmoud Abdullah³

¹Professor, ²Assistant Professor, ³Assistant Lecturer, Department of Clinical Pathology, Faculty of Medicine, Minia University, Minia, Egypt

ABSTRACT

Autism is one of neurodevelopmental disorders that shows increase in prevalence for last two decades. It was noticed many risk factors associated with development of autism. Here in our study, we were focusing about mothers risk factors that predisposing to get children with autism. We selected mothers that have autistic children and measured serum levels of maternal iron and vitamin D. It was found that iron and vitamin D levels were decreased among mothers with autistic children. Additionally, more reduction in iron and vitamin D levels associated with severity of autism.

Keywords: iron, vitamin D, mothers, Autism, ELF A, CTMA

Introduction

Autism Spectrum Disorder (ASD) are incorporated into a group of diseases concerned about neurodevelopmental disabilities. The rate of incidence of both ASD in the pediatric population was significantly increased. In 2018 the Centers for Disease Control (CDC) determined that approximately 1 in 59 children is diagnosed with an ASD. This estimate is a 14% increase in 2016 and a 47% increase in 2012. Also, the prevalence of autism associates with the greater severity of learning disability or lower verbal IQ. These facts make ASD the most interesting and challenging areas of research. Due to the progress in the incidence of autism in recent decades, a wide range of studies have been done to identify the risk and etiological factors that predispose or underlay autism. It has been suggested that a number of environmental and risk factors could anticipate to the development of ASD. The matter is not only one but a collection of environmental risk factors regarding father, mother and child could participate in the incidence of these disorders. Iron and Vitamin D considered as the most common risk factors for development of autism. Iron deficiency affects 40%–50% of pregnancies. Iron is necessary for early neurodevelopmental processes that are affected in autism spectrum disorder (ASD). Furthermore, the vitamin D is best known for its importance on bone mineral density. However vitamin D are also required for brain function, via its role as neurotrophic and neuroprotective actions, neuronal differentiation, maturation and growth. We conducted this study to detect the association of maternal Iron and Vitamin D with risky development of autism.

Subjects and Method

This study was conducted on 65 mothers divided into 2 groups, control one that containing 20 mothers with apparently healthy children selected from those regularly attending the follow-up at outpatient pediatric clinic for monitoring of their growth. While another group containing 45 mothers with children suffering from autism, they were selected from patients attending the pediatric neuropsychiatric clinic, Pediatric Hospital, Minia University, Minia, Egypt as well as from Kayan charity for education and rehabilitation of ASD, Minia Branch, Egypt. About eight ml of venous blood was collected from each mother by sterile venipuncture under complete aseptic conditions. This sample was divided...
as follow: Two ml in ethylene diamine tetra acetic acid (EDTA) containing tube for CBC and Six ml into one plain tube for iron and vitamin D. Iron was determined by Colorimetric CAB Method in which the Iron reacts with chromazurol B and cetyltrimethyl-ammonium bromide (CTMA) to form a colored ternary complex (Spectrum Diagnostics, Cairo, Egypt). Vitamin D was determined by detecting the level of 25 OH Vitamin D using the ELFA technique (Linked Enzyme Fluorescent Assay) by (Mini Vidas, Biomerieux, France).

Results

Comparison between studied groups regarding laboratory data of mothers: laboratory data of the included mothers found that those with children suffering from autism spectrum disorders had low levels of vitamin D3 as there Mean ± SD was (9.8 ± 4.04). So, there was statistically significant decrease in vitamin D3 levels among mothers with autistic children when compared to the control group (p=0.001) (table 1)

<table>
<thead>
<tr>
<th></th>
<th>GI N = 20</th>
<th>GII N = 45</th>
<th>P values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb (g/dL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>13.5-15.1</td>
<td>9.5-14.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>14.2 ± 0.4</td>
<td>12.1 ± 1.1</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Comparison between ASD subgroups as regards laboratory data of the mothers. group GIa; mild autism spectrum disorder (ASD), GIIb; moderate ASD, GIIc; severe ASD, SD; standard deviation, Hb; hemoglobin, Vit D3; Vitamin D3, N; number, *p value ≤ 0.05 = significant

Comparison between severity of ASD as regards laboratory data of the mothers: our data showed reduction in levels of hemoglobin, iron and vitamin D3 among mothers of autistic children associated with severity of autism. Mean ± SD of hemoglobin levels for mothers with mild autism was (12.5 ± 0.8), moderate autism was (12.2 ± 1.1) and severe autism was (11.3 ± 1.1). There was a statistically significant decrease in mothers of severe autism hemoglobin levels when compared to mild form (p=0.002) and in mothers with severe when compared to moderate (p=0.03). Also, mean ± SD of iron levels in mothers with mild autism was (60.5 ± 19.8), moderate autism was (51.9 ± 12.8) and severe autism was (47.2 ± 15.8). There were a statistically significant decrease in mothers with moderate autism iron levels when compared to mild autism (p=0.01) and in mothers with severe autism when compared to mild (p=0.03). Additionally, mean ± SD levels of vitamin D3 in mothers with mild autism (12.8 ± 4.2), moderate autism (7.6 ± 1.3) and severe autism (6.9 ± 0.3). There was a statistically significant decrease in mothers with moderate autism vitamin D3 levels when compared to mild form (p=0.001) and in mothers with severe autism when compared to mild (p=0.001) (table 2), (Fig. 1,2)
The prevalence of autism was increased in last years. we studied most common risk factors associated with autism. Our data recorded that mothers with chronic iron and vitamin D deficiency, having children with autism. Furthermore, severe deficiency of maternal iron or vitamin D responsible for severity of autism. As iron play an important role in fetal brain development, it was noticed that perinatal iron deficiency leading to developmental delay and cognitive deficits (5). S. Basu et al, 2018, recorded a progressive decrease in concentrations of both neonatal hippocampal volumes and cord blood (brain-derived neurotrophic factor) BDNF with severe maternal iron deficiency(6). Additionally, the association between advanced maternal age and low iron intake had a 5-fold increased ASD risk(5). These previous studies are similar to our finding. About vitamin D, researchers reported vitamin D receptors in most areas of the brain. It appears to protect neurons and promote neural growth (7). Vitamin D deficiency has been associated with cognitive pathology, including ASD(8,9). Zaky et al. 2015, reported that 25% of children with rickets also have ASD (10).

Other studies that supported our results were cried out among Swedish and Australian women. With Swedish female there was association between maternal vitamin D deficiency (< 10 ng/ml) and risk of ASD, especially those with intellectual disability(11) While Australian women with low vitamin D levels (< 10 ng/ml) in mid-gestation had two times risk to have a child with autistic traits compared to those with vitamin D levels >20 ng/ml (12). Meta-analysis was done and supported evidence that increased prenatal exposure to vitamin D was associated with improved cognitive development and decreased risk of attention deficit hyperactivity disorder and autism (13). In trying to find relation between vitamin D and development of autism, first study was done for parental and child vitamin D pathway gene variants and autism by Schmidt Rj et al. 2015. They reported that child GC vitamin D binding protein (VDBP) AA-genotype/A-allele was associated with autism and they suggested a role for (VDBP) and lower plasma vitamin D in autism(14).

Conclusion

The current study supported that mothers with chronic iron and vitamin D deficiency associated with autism risk. Additionally, more progression for both maternal iron and vitamin D deficiency have relation with severity of autism.

Conflict of Interest: The authors report no conflicts of interest in this work.

Source of Funding: by self.

Ethical Clearance: Taken from faculty of medicine–Minia University Committee.

REFERENCES


Incidence and Risk Factors of Hypocalcaemia in Post Thyroidectomy Patients in Tikrit Teaching Hospital

Ayoub M. Zedan
Assist. Prof., College of Medicine, Tikrit University, Tikrit, Iraq

ABSTRACT

Hypocalcemia stands for a well-recognized problem of thyroid surgery. It is frequently transitory event that happens after widespread thyroid resection that may require calcium or vitamin D supplements to alleviate or prevent the symptoms. This study aims to determine the hypocalcemia incidence beyond to thyroid surgery and realize the involved risk reasons regarding the patient gender, age and muscular built, clinical analysis, extent of surgery, ligation of the inferior thyroid artery, and pathology report. This paper has been performed on 50 patients who experienced thyroid surgery for numerous thyroid illnesses at the surgical department of Tikrit Teaching Hospital between January 2016 to January 2017. The results of this occurrence of post-thyroidectomy hypocalcemia are 30% and in most cases (24%) is transient.

On the other hand, it is permanent in just (6%) of cases and has occurred mainly after total thyroidectomy and in cases with ligation of the inferior thyroid artery. We concluded that post-thyroidectomy hypocalcemia is a comparatively mutual complication, but it is transient in most patients. Its incidence is linked with the surgery extent and can be reduced by the use of the correct surgical procedures.

Keywords: hypocalcemia, thyroidectomy, complications, risk factors.

Introduction

Theodor Kocher is accredited with refined methods of thyroidectomy and decreasing the frequency of postoperative hemorrhage. He as well determined the preservation significance of parathyroid glands 1.

Postoperative hypocalcemia represents an effective complication of thyroidectomy, and its occurrence is very common beyond to full thyroidectomy as compared with another more conformist thyroidectomy. The testified transient hypocalcemia incidence is ranged from (1.6% - 9.3%) after subtotal thyroidectomy and from (6.9%- 42%) after full thyroidectomy. On the other hand, permanent hypocalcemia was testified in (0.2 -3%) of patients beyond to subtotal thyroidectomy and in (0.4-29%) of patients later to full thyroidectomy 2,3,4.

It typically shows itself in the 1st 24 hours postoperatively or within the 2-5 days after an operation. Nevertheless, very seldom the onset is overdue after 2-3 weeks5.

In the majority of patients, it is transient that resolves naturally, and only a few patients can be developed to permanent hypocalcemia 6.

In 80% of cases, it resolves in about 12 months7. The risk of these difficulties relies on the surgery extent, the characteristics of the primary disease and the familiarity of the operating surgeon. Additionally, particular surgical difficulties have come across recurrent thyroid disease, huge goiter, anatomical variation, retrosternal or even mediastinal position and injury with respect to the parathyroid glands 8.

Other causal mechanisms that have been concerned in the pathophysiology of post-thyroidectomy hypocalcemia are uptake of calcium by bone for patients with thyrotoxic osteodystrophy, parathyroid suppression from augmented calcium reinstated from the bone of patients with hyperthyroidism, transient post-operative hemodilution with raised renal excretion of calcium, augmented calcitonin release due to thyroid manipulation 9,10.
The 1st clinical symptom of hypocalcemia can be less usual including numbness and tingling sensation nearby the mouth and in the distal edges 11.

Intravenous calcium gluconate can be given 10-20ml of 10% solution slowly until the symptoms disappear, then 50 ml of 10% calcium gluconate can be added to 500 ml of 5% dextrose solution and administered by intravenous drip at a rate of 1 ml/kg/h 12.

**Aims of the study**

This study aims to investigate the incidence of hypocalcemia after thyroid surgery and to find out the complicated risk factors leading to hypocalcemia regarding the patient age, gender and muscular built, clinical diagnosis, the extent of surgery, ligation of the inferior thyroid artery and pathology report.

**Patients and Method**

This study has been conducted on 50 patients who suffered from thyroid surgery for numerous thyroid diseases at the surgical department of Tikrit Teaching Hospital from January 2016 to January 2017.

The patients included were only those who underwent subtotal, near full and full thyroidectomies.

The date form included patient age, gender, muscular built, clinical diagnosis, thyroid function status, type of surgery, ligation of the inferior thyroid artery, and pathology report.

Each patient had serum calcium, phosphate and total serum protein measured preoperative and at day 1,2,3,4,5 postoperatively. Patients who had postoperative hypocalcemia were followed up as outpatients and had serial checking of their serum levels.

A calcium level of 8 mg/dl (2mmol/L) on at least 2 consecutive measurements was considered as a threshold value of hypocalcemia, besides, experiencing symptoms such as perioral and digital paraesthesia and having chvostek’s and Trousseaus sign was also included in a definition.

It has been considered transient if it resolves within 6 months and permanent if it stayed after 6 months, and the patients are maintained on supplementation therapy after calcium and vitamin D. Patients who had clinical evidence of hypocalcemia (circumoral and acral fingers and toes) paraesthesia, and carpopedal spasm were given such as calcium gluconate,10-20ml of 10% solution until the signs and symptoms disappear. Some patients require the dose to be given 2-3 times per day.

Patients who had permanent hypocalcemia were given oral calcium and vitamin D supplementations and were followed up on regular outpatient checking up visits.

The histopathological report was reviewed, and the result was compared with the state of hypocalcemia.

It was not feasible to perform a parathyroid hormone level assay because this test was not available at our hospital lab.

**Results**

A total of 50 patients aged between 20 to 70 years old underwent thyroidectomy in the period between January 2016 to January 2017 at the surgical department of Tikrit Teaching Hospital. About 46 were females, and 4 were males. The majority of patients (70%) had a simple multinodular goiter, (12%) had Grave’s disease, (8%) had a toxic nodular goiter, (6%) had thyroiditis, and (4%) had cancer as shown in Table (1). Total thyroidectomy was performed for (10%) of patients, near-total thyroidectomy for (22%) of patients and subtotal, thyroidectomy for (68%) of patients as shown in Table (1).

<table>
<thead>
<tr>
<th>Table 1: Distribution of 50 Patients Who Underwent Surgery According to Various Thyroid Diseases and Surgical Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Distribution of 50 patients who Underwent Surgery According to Various Thyroid Diseases</strong></td>
</tr>
<tr>
<td>Thyroid Disease</td>
</tr>
<tr>
<td>Multinodular goiter/simple</td>
</tr>
<tr>
<td>Grave’s disease</td>
</tr>
<tr>
<td>Toxic nodular goiter</td>
</tr>
<tr>
<td>Thyroiditis</td>
</tr>
<tr>
<td>Cancer</td>
</tr>
</tbody>
</table>

| **Distribution of 50 patients According to the Type of the Surgical Procedure** | **No. of Patients** |
|-------------------------------------------------------------|
| **Type of Surgical** |  |
| Total Thyroidectomy | 5 |
| Near total Thyroidectomy | 11 |
| Subtotal Thyroidectomy | 34 |
1 of 3 patients who developed permanent hypocalcemia had undergone total thyroidectomy, and the other one had undergone near-total thyroidectomy, and the last patient had undergone subtotal thyroidectomy as shown in Table (2).

**Table 2: Distribution of 50 Patients According to Type of the Surgical Procedure for Various Thyroid Diseases, Type of the Surgical Procedure and its Related Hypocalcaemia and Type of the Surgical Procedure**

<table>
<thead>
<tr>
<th>Type of Surgical</th>
<th>Number of Patients</th>
<th>MNG</th>
<th>CA</th>
<th>Thyroiditis</th>
<th>Grave’s</th>
<th>Toxic Nodular Goiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Thyroidectomy</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Near total Thyroidectomy</td>
<td>11</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Subtotal Thyroidectomy</td>
<td>34</td>
<td>30</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Distribution of 50 patients who Underwent Surgery According to the Type of the Surgical Procedure and its Related Hypocalcaemia

<table>
<thead>
<tr>
<th>Type of Surgical</th>
<th>Hypocalcemia</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Total Thyroidectomy</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Near total Thyroidectomy</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Subtotal Thyroidectomy</td>
<td>6</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>35</td>
</tr>
</tbody>
</table>

About (30%) of patients developed hypocalcemia postoperatively; in (24%) of them it was transient and in (6%) was permanent.

1 of 3 patients who developed permanent hypocalcemia had undergone total thyroidectomy, and the other one had undergone near-total thyroidectomy, and the last patient had undergone subtotal thyroidectomy as shown in Table (2) Table(3).

**Table 3: Distribution of 50 patients who Underwent Surgery According to the Type of the Surgical Procedure and its Related Transient & Permanent Hypocalcaemia**

<table>
<thead>
<tr>
<th>Type of Surgical</th>
<th>Number of Patients</th>
<th>Hypocalcemia</th>
<th>Transient</th>
<th>Permanente</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Thyroidectomy</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Near total Thyroidectomy</td>
<td>11</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Subtotal Thyroidectomy</td>
<td>34</td>
<td>6</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

All the patients with CA had post-thyroidectomy hypocalcemia while (66.66%) of patients with thyroiditis had hypocalcemia and (33.33%) of those with Grave’s disease had hypocalcemia and (50%) of those with toxic nodular goiter had hypocalcemia as depicted in Table (4).

**Table 4: Distribution of 50 Patients According to Type of the Surgical Procedure, Histopathological Report and Their Hypocalcaemia with Incidences of Hypocalcaemia concerning the Ligation of the Inferior Thyroid Artery**

<table>
<thead>
<tr>
<th>Type of Surgical</th>
<th>Number of Patients</th>
<th>Hypocalcemia</th>
<th>MNG</th>
<th>CA</th>
<th>Thyroiditis</th>
<th>Grave’s</th>
<th>Toxic Nodular Goiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Thyroidectomy</td>
<td>5</td>
<td>4</td>
<td>-</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Near total Thyroidectomy</td>
<td>11</td>
<td>5</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Subtotal Thyroidectomy</td>
<td>34</td>
<td>6</td>
<td>5</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
The incidence of Hypocalcaemia concerning the Ligation of the Inferior Thyroid Artery

<table>
<thead>
<tr>
<th>LIGATION OF The Inferior Thyroid Artery</th>
<th>Hypocalcemia</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Bilateral</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Unilateral</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>16</td>
</tr>
</tbody>
</table>

For the patients who underwent total and near-total thyroidectomy, 16 patients had undergone bilateral ligation of the inferior thyroid artery. 10 patients of them (66.6%) had hypocalcemia, with 15 patients out of the 34 who suffered subtotal thyroidectomy had undergone a unilateral ligation of the inferior thyroid artery and only 5 of them (33.4%) had hypocalcemia postoperatively.

Table 5: The incidence of Hypocalcaemia concerning the Age Group

<table>
<thead>
<tr>
<th>Age</th>
<th>Permanent</th>
<th>Transient</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>20-30</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>31-40</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>41-50</td>
<td>0</td>
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<td>2</td>
</tr>
<tr>
<td>51-60</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>61-70</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>12</td>
<td>15</td>
</tr>
</tbody>
</table>

Fig. 1: The incidence of Hypocalcaemia concerning patient genders

About (33.3%) of the patients who had transient hypocalcaemia were between 31-40 years of age, 25 between 20-30 years of age, (16.7%) were between 41-50 years of age, (16.7%) were between 51-60 years of age, and finally (8.3%) were between 61-70 years as stated by Table 5.

(66.6%) of the patients who had permanent hypocalcemia were between 31-40 years of age, (33.3%) were between 20-30 years of age. Mean age of hypocalcemia patients is 39 years as shown in.
Discussion

Postoperative hypocalcemia is a relatively common complication of thyroid surgery and is known as a major cause of postoperative morbidity, but most often it is a transient event that occurs after extensive thyroid surgery.

The results of this study showed that the incidence of hypocalcemia is 30% and it was transient in the majority of the cases.

Regarding the age, most of the patients who had transient hypocalcemia (33.3%) belong to the 31-40 years age group, and most of the patients who had permanent hypocalcemia (66.6%) belong to that age group also, which is nearly similar to other studies.

Regarding the gender depicted in Fig.1, most of the patients who had transient hypocalcemia (91.66%) were females, and most of the patients who had permanent hypocalcemia (66.66%) were females also, which is similar to Thomuusch et al. study.

Regarding the type and extent of the surgical procedure, the research found that the incidence of transient hypocalcemia was (60%) after total thyroidectomy while it was (36.3%) after near-total thyroidectomy and it was only (14.7%) after subtotal thyroidectomy.

The incidence of permanent hypocalcemia was (20%) after total thyroidectomy while it was (9%) after near total thyroidectomy and only (2.9%) after subtotal thyroidectomy.

These results are agreed with those reported in other studies (Ishtiaq Ahmed et al.) and (Wingert, 2006), that showed that the extent of resection and surgical has a more significant impact on the rate of post-thyroidectomy hypocalcemia.

Regarding the ligation of the inferior artery, we found that (66.6%) of the patients who underwent bilateral ligation of that artery had post-thyroidectomy hypocalcemia, while (33.4%) of the patients who underwent a unilateral ligation of that artery had hypocalcemia, so making that procedure as an important risk factor.

These results are consent with those reported in other studies (Ishtiaq Ahmed et al.) and (Wingert, 2006). This result was due to the inadvertent excision of parathyroid gland in total thyroidectomy and for the interference of blood supply of the parathyroid gland in case of the method of inferior truncal thyroid a ligation.

Regarding the clinical and the pathological diagnosis, we found that all the patients with CA had post-thyroidectomy hypocalcemia, while (66.66%) of patients with thyroiditis had hypocalcemia and only (33.33%) of those with Graves disease had hypocalcemia and (50%) of those with toxic nodular goiter had, and only 20 of those with simple multinodular goiter had hypocalcemia.

These findings are in agreement with other studies (which is similar to Thomuusch et al. study) and (Sippel Rs.), which showed that the thyroid cancer is a risk factor for inadvertent parathyroid excision.

This was due to the radical removal of thyroid tissue, excessive dissection and truncal ligation of inferior thyroid. All of these factors might lead to unintentional removal of the parathyroid gland and subsequent hypocalcemia.

Conclusion

It was concluded that post-thyroidectomy hypocalcemia is a relatively common phenomenon, especially after extensive thyroid surgery but it is transient in the majority of the cases.

Its incidence is related to the extent of the surgical procedure especially if this was associated with ligation of the inferior thyroid artery and the use of correct surgical procedures can only reduce it.

Ethical Clearance: Taken from Tikrit Teaching Hospital.

Source of Funding: Self-Funding.

Conflict of Interest: None.

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after thyroidectomy, the Journal of Medical Investigation 2009;44:1-2.


The Correlation between Knowledge and Experience of Nurses toward Triage Decision Making at Lombok Nusa Tenggara Barat

Baiq Fitrihan Rukmana¹, Ahsan², Kuswantoro Rusca Putra²
¹Master Program of Nursing, ²Lecturer, Faculty of Medicine, University of Brawijaya

ABSTRACT

Triage is important to do at emergency unit. It is used to determine priority of emergency state action so medical team can promote treatment for patients who need urgent and accurate treatment to improve life opportunity of them. Triage process is started when a patient gets into ICU where the nurses assess based on subjective and objective findings which are done quickly and accurately. However, execution of triage needs sufficient knowledge and experience to find out priority of the patient. This research has purpose to find out the correlation between knowledge and experience toward triage decision making at emergency unit of Lombok Nusa Tenggara Barat hospital. This research is an analytic observational by using cross sectional with 135 respondents. The findings show that there is correlation between knowledge and experience toward the decision making with each p value is 0.000. Linear regression shows knowledge becomes the most correlated variable in decision making of triage. Knowledge and experience of working become the most important variables of nurses in making decision so medical service can be improved.

Keywords: Triage, Life Opportunity, Emergency Unit

Introduction

Triage is an important component to do at emergency unit(1). It is a way to classify patients based on types and levels of emergency state treatment to improve the treatment and to prioritize cases in handling emergency state condition(2). Triage assessment on patient is the first – main step in providing emergency state treatment as indicator of further action to be given(3).

Triage system is implemented in classifying priority of emergency state treatment so medical team can promote medical treatment to patients who need urgent and quick treatment in order to increase his life opportunity. Triage process is started when a patient gets into emergency unit where its nurses assess based on subjectively and objectively reviewed findings to have quick and appropriate treatment(4). Process of triage is done by one medical treatment, a nurse(5).

Nurses at triage have obligations to position the patients appropriately based on emergency level. The nurses will label the patients based on the conditions suffered from red for emergent patients, yellow for urgent patients, green for non-urgent patients, and black for death patients. After labelling, the nurses bring the patient to treatment room based on the order and emergency state priority. Then the nurses provide appropriate treatment(6).

High rate numbers of patients visiting ICU causes nurses must be able to sort its patients quickly and accurately based on injury level of emergency state condition occurred or suffered(7). Mistake in assessing patient’s condition will lead to overwhelming numbers of patients and length of inpatient at ICU(8). Ferero et al states that mistake in triage will cause to increasing number of length inpatient and waiting lists of patients at ICU(9).

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Thus, triage nurses are demanded to have sufficient experience and knowledge. They will make the nurses to be able to review and to cover complex and pressured conditions\textsuperscript{(10)}. In facing this condition, the nurses must act professionally to overcome appearing stressor in determining step related to severe condition of the patient and their families\textsuperscript{(11)}.

The interruption can be occurred due to lack of knowledge of the nurses which lead to inappropriate triage decision, incomplete symptom’s identifications, and incomplete assessment\textsuperscript{(12)}. Lack of experience and knowledge of the nurses affect toward less response of the nurses and delay of the nurses causing increasing rate of morbidity and mortality. When the nurses cannot do triage, it can decrease quality of the treatment and negative impacts for the patients\textsuperscript{(3)}. Based on the conditions, it is not easy for the nurses to do triage\textsuperscript{(13)}.

Based on preliminary study done on October 31, 2018 that at hospital Lombok has problem in decision making on triage process. Researcher observed 30 nurses directly and found that most of them did not do triage when they had new clients. Some of them did triage when the clients were in front of ICU’s door or when the patients just arrived in ICU although they were not in emergency state condition. Some of the nurses also inaccurately assessed triage when the patient categorized as green but they were categorized into yellow and incomplete documentation of triage such as lack of giving check list of the triage patient on medical record and incomplete physical checkup which affect decision making upon triage patients. It has negative impacts on giving service in emergency unit. The purpose of this research is to find out the correlation of knowledge and experience toward triage decision making at emergency unit of Lombok Nusantara Tenggara Barat Hospital.

Methods and Material

This analytic observational research with cross sectional approach. The respondents are 135 participants from five hospitals in Lombok by using total sampling. To measure knowledge and triage decision making, they are done by using questionnaire. Each questionnaire has been validity and reliability tested by using alpha Chronbach 0.806 for its knowledge variable and 0.869 for triage decision making. Working experience is gained through questionnaire related working experience of the nurses. Bivariate analysis by using spearman rank and multivariate analysis are done by using multiple linier regression. This research is done after having ethical clearance from commission of ethics of Universitas Mataram, number 13/UN18.F7/ETIK/2019.

Results

Table 1: Characteristics of the Respondents based on Age, Working Experience, Knowledge and Triage Decision Making

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>Min-Max</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>135</td>
<td>31.23</td>
<td>30</td>
<td>22-45</td>
<td>4.179</td>
</tr>
<tr>
<td>Working Experience</td>
<td>135</td>
<td>8.24</td>
<td>8</td>
<td>1-22</td>
<td>3.736</td>
</tr>
<tr>
<td>Knowledge</td>
<td>135</td>
<td>5.56</td>
<td>5</td>
<td>4-8</td>
<td>1.077</td>
</tr>
<tr>
<td>Triage decision making</td>
<td>135</td>
<td>71.23</td>
<td>73</td>
<td>48-90</td>
<td>10.46</td>
</tr>
</tbody>
</table>

Based on the table, it is known the youngest patient is 22 year old and the oldest one is 45 year old with average age 31.23 year old. The longest working experience is 22 years and the youngest one is 1 year with 8.24 years in average. Highest score of respondents’ knowledge is 8 while the lowest one is 4 with average 5.56. Highest score of decision making is 90 and the lowest one is 48 with average 71.23.

Table 2: Characteristics of the Respondents based on Sex and Education

<table>
<thead>
<tr>
<th>No.</th>
<th>Variables</th>
<th>Categories</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sex</td>
<td>Male</td>
<td>73</td>
<td>54.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>62</td>
<td>45.9</td>
</tr>
<tr>
<td>2.</td>
<td>Education</td>
<td>D3</td>
<td>61</td>
<td>45.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D4</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S1+Ners</td>
<td>71</td>
<td>52.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>135</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>


The table shows the dominant is male with 73 respondents. Meanwhile, the most dominant education is first degree + Ners with total 71.

Table 3: Correlation of Knowledge toward Decision Making of Triage

<table>
<thead>
<tr>
<th>Variable</th>
<th>Triage decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>r = 0.69, p = 0.000, n = 135</td>
</tr>
</tbody>
</table>

The table shows $p = 0.000$ ($p<0.05$) so it is concluded that there is correlation factor between knowledge toward triage decision making at the emergency unit. The $r$ score is 0.69 showing positive correlation with strong strength of the correlation where higher score of the knowledge also has higher triage decision making score of the nurses.

Table 4: Correlation between Working Experiences toward Triage Decision Making

<table>
<thead>
<tr>
<th>Variable</th>
<th>Triage decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working experience</td>
<td>r = 0.289, p = 0.000, n = 135</td>
</tr>
</tbody>
</table>

Table 4 shows $p = 0.000$ ($p<0.05$) so it can be concluded that there is correlation factor between working experience to triage decision making at the emergency unit. $R$ score is 0.298, showing positive correlation with lower correlation strength in which higher working experience has higher triage decision making of the nurses.

Table 5: Correlation of Knowledge and Working Experiences to Decision Making of Triage

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient B</th>
<th>Score p</th>
<th>R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constanta</td>
<td>34.823</td>
<td>0.000</td>
<td>0.441</td>
</tr>
<tr>
<td>Knowledge</td>
<td>6.284</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Experience</td>
<td>0.181</td>
<td>0.333</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td>0.437</td>
</tr>
<tr>
<td>Constanta</td>
<td>35.544</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>6.423</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

Table 5 shows knowledge variable can explain that variety of the decision making of triage is 43.7%. The rest of them are affected by other uninvestigated factors. Based on the table, then knowledge becomes the most dominant variable correlating to triage decision making with coefficient score B 6.423.

Discussion

Findings of the research explain correlation between knowledge to triage decision making at emergency unit of Lombok Nusa Tenggara Barat hospital with $p = 0.000$. Score of $r$ is 0.69, showing that there is strong positive correlation. It explains that higher knowledge has higher triage decision making of the nurses. Linier regression test shows variable is the most dominant to triage decision making.

This research is in line with Aloyce et al in 2014 showing that higher knowledge of nurses dealing with triage can improve nursing accuracy in triage decision making at emergency unit. Highest knowledge of the nurses can help to categorize triage appropriately according to patients’ condition so it improves nurses’ performance and better outcome (14).

Triage is autonomous nursing role focusing on patient survival and efficient treatment execution. Clinical decision made by triage nurses needs complex cognition. Triage nurses must show ability to think critically in limited, incomplete, and ambiguity data environment. Process of effective and efficient decision making depends on broad knowledge and experience dealing with various disease and patterns of injuries (15,16). In a study done by Roudbari & Mirhaghi 2010, it stated that lower ability of nurses in doing triage is caused by their lack of knowledge and incapability to review patient’s condition (17).

Emergency Nurse Association in 2011 also recommends that knowledge to be mastered by nurses in doing triage are triage taking process, triage documenting process, law of health service, abdomen emergency state, hearth emergency state, trauma, respiratory emergency state, psychiatric emergency state, fast track, musculoskeletal, special condition, and child emergency state (18). By the existence of these recommendation dealing with needed knowledge by nurses dealing with triage, then triage can be done quickly and appropriately so it improves services at the hospital.

The findings also explain that there is correlation between working experience to decision making of triage
at the emergency unit with $p = 0.000$. Score of $r = 0.289$, explaining that low positive correlation causes higher working experience to have higher triage decision making.

It is in line with Duko et al 2019, stating that nurses whose lengthy working experience decide triage decision at emergency unit. Higher experience of nurses will be something to learn for them to categorize appropriate triage according to conditions of patients so it will improve treatment performance and better outcome(19).

Benner (1982) stated that becoming expert nurses need to develop ability and understanding related to patient management at whole time in which can be learnt by having many experiences(20). Benner groups abilities into 5 levels namely novice, advance beginner, competent, proficient, and expert.

Triage nurses are expected to be competent in which they can handle and consider as well as create needed plan to face current situation in future time. This stage symbolizes that a nurse whose had similar jobs or situation for 2 or 3 years will grow when they find out that their action reach into the target, or consciously they have planning within their action. Consistency, ability to predict, and time management become description of competent stage. Competent nurses can perform their responsibilities dealing with conditions of patients, more focus, and being able to perform critical thinking ability(6,21,22).

Conclusion

It can be concluded that there is relationship between knowledge and working experience of nurses to triage decision making at Lombok Nusa Tenggara Barat hospital. The most correlative variable in decision making is knowledge. By identifying this factor, it is expected can contribute to suggest all parties of the hospital to improve knowledge and nursing experience dealing with appropriate triage decision making.

Conflict of Interest: None

Ethical Clearance: This study has passed the ethical test held at University of Mataram with no 13/UN18.F7/ETIK/2019.

Source of Funding: None

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Detection of *meca* Gene in Methicillin-Resistant *Staphylococcus hemolyticus* Isolated from Blood Cultures of Neonates in Baghdad

Butheina Mahamed Taha1, Nadheema Hammood Hussein1, Khetam H. Rasool1, Sara Ali Jasem Maliki1, Jumaah Dakel Hussein2

1Department of Biology, College of Science, Mustansiryah University; 2Medico-legal Department, Ministry of Health, Baghdad, Iraq

**ABSTRACT**

In this study 30 clinical isolates of *Staphylococcus haemolyticus* were isolated from blood cultures of neonate patients at a hospital in Baghdad and during period extended from January, 2015 to February, 2016. The of antimicrobial sensitivity test results showed the most effective antibiotics on *S. haemolyticus* isolates were linezolid, quinupristin and moxifloxacin which had 100% sensitivity rate, while the all isolates showed a high level of resistance to oxacillin and benzylpenicillin (100%). Phenotypic detection test of methicillin resistance to *S. haemolyticus* isolates showed all 30 *S. haemolyticus* isolates under test were methicillin resistance and the results of PCR assay for detection of *meca* gene showed from 30 isolates of methicillin-resistant *S. haemolyticus*, 28(93.3%) isolates were positive to *meca* gene with 258-bp, while only 2(6.7%) isolates were negative to *meca* gene.

**Keywords:** *Staphylococcus haemolyticus*, methicillin resistance and *meca* Gene.

**Introduction**

Coagulase-Negative Staphylococci (CoNS) species are the most frequent cause of nosocomial blood stream infections (1). *Staphylococcus haemolyticus* (S. *haemolyticus*), is a part of skin normal flora of the humans (2). *S. haemolyticus*, is a well-known opportunistic pathogen, and it is the second-most frequently isolated Coagulase-negative staphylococci from human blood cultures (the first is *Staphylococcus epidermidis*) (1, 4). So, it plays an important role in the hospital-acquired opportunistic infections related to implanted medical devices. Infections that caused by *S. haemolyticus* can be systemic or localized, and those infections were often associated with the insertion of the medical devices (5).

There had been a dramatic increase in the emergence of the antibiotic resistant bacterial isolates, which has made the antibiotic choices for the infection control increasingly limited and also more expensive (6). The highly antibiotic-resistant and also the ability of *S. haemolyticus* to form biofilms make *S. haemolyticus* a difficult pathogen to treat (3). *S. haemolyticus* bacteria have the highest level of antimicrobial resistance among all species of CoNS (7). Methicillin- Resistant Staphylococci (MRS) cause hard to treat infections, due to the resistant of MRS to the most types of the antibiotics such as macrolides, aminoglycosides and beta-lactam antibiotics (8). So this limits the therapeutic options available and also makes the *Staphylococcus haemolyticus* infection a serious threat (9).

The resistant to methicillin is conferred by *meca* gene, which it carried on the staphylococcal cassette chromosome mec element (SCCmec). So, the increase in the frequency of methicillin resistant *S. haemolyticus* isolates as the causal agent of hospital infections and also the possibility of the emergence of resistance to the other types of antibiotics demand trustworthy characterization of these isolates and to an investigation of clonal spreading within the hospitals (10).
The accurate and rapid diagnosis of antibiotic resistance genes in the treatment of *Staphylococci* infections is extremely important in preventing the spread of infections. For the determination of antibiotic resistance genes, the PCR-based molecular methods are often preferred (11).

This study was aimed to detect the presence of the *mecA* gene in the methicillin-resistant *Staphylococcus haemolyticus* isolates which were isolated from neonatal blood cultures. Phenotypic and molecular methods were used to study 36 methicillin-resistant *Staphylococcus haemolyticus* clinical isolates.

**Materials and Method**

**Study Period:** Thirty six clinical isolates of *Staphylococcus haemolyticus* were isolated over a period of study extended from January, 2015 to February, 2016 from blood cultures of neonatal which they were suffering from bacteremia and lying at a hospital for pediatric and obstetric in Baghdad/Iraq.

**Identification of *Staphylococcus haemolyticus***: *Staphylococcus haemolyticus* isolates were identified at species level by using the Vitek-2 system (Bio-Merieux, France) with the using ID-GP cards according to the manufacturer’s instructions.

**Antibiotic Susceptibility Test:** The antibiotic susceptibility test towards different classes of antibiotics was done by Vitek-2 system (Bio-Merieux, France), with the using AST-P580 cards and according to the manufacturer’s instructions.

**Phenotypic Detection of Methicillin Resistance:** Phenotypic detection of methicillin resistance was done by detection the resistance to methicillin which was performed with Vitek-2 automated system (Bio-Merieux, France), and according to the manufacturer’s instructions with using of AST-P580 cards that have cefoxitin screen test as methicillin resistance indicator.

**Genotypic detection of *mecA* gene**

**Extraction of DNA:** The bacterial DNA was extracted according the boiling method by suspending 2-3 colonies of each *S. haemolyticus* isolate which grown on overnight culture brain-heart infusion agar plates in (500 μL) of nuclease-free water (Promega, USA) and then heated at 90°C for 10 min using a water bath. Samples after that centrifuged at 10000 rpm for (10 min). Those samples were used as the DNA template for PCR assay (Endimiani et al., 2009).

**Detection of *mecA* gene by polymerase chain reaction (PCR):** Polymerase chain reaction (PCR) was used to amplify the *mecA* gene. Primer sequences for *mecA* (258-bp) were chosen according to the method described by (Kawano et al., 1996): the forward sequence of *mecA* gene is (5-AGATTGGGATC ATAGCGTCA-3) and the reverse sequence of *mecA* gene is (5-GAAGGTATCAT CTTGTACCC-3). The forward and reverse primers were synthesized by (Alpha DNA, Canada). PCR was performed in the DNA Thermal Cycler (Agilent (8800), USA). The mixture of PCR for the *mecA* gene was set up in total volume of 25μl included: (2X Master mix (12.5μl) (Promega, USA), 1μl of each primer, template DNA (4μl) and sterile D.W. (6.5). The negative control contained all the materials except DNA, D.W. was added instead of DNA.

The program used to amplified *mecA* gene was: The initial denaturation at 94°C for 5min; (denaturation at 94°C for 1 min, annealing at 55°C for 2 min, extension at 72°C for 3 min) for 26 cycles; and the final extension at 72°C for 7 min (12).

**Agarose Gel Electrophoresis:** The PCR products were detected by using gel electrophoresis and the visualized was done with the aid of RedSafe dye (INtRON, Korea) and UV transilluminator documentation system (13).

**Results and Discussion**

**Period of Study and Bacterial Isolates:** Thirty isolates of *Staphylococcus haemolyticus* were isolated during the period from January, 2015 to February, 2016 from the blood cultures of neonate patients at one hospital in Baghdad. All 30 *S. haemolyticus* isolates were isolated from neonate patients within the age group less than one month. The results showed that the incidence of infected with *S. haemolyticus* isolates was higher among males 18(60%) than that of females 12(40%).

**Antibiotic Susceptibility Test:** The antimicrobial sensitivity test for 30 *S. haemolyticus* clinical isolates which isolated from neonatal blood cultures to various antimicrobial drugs were shown on Table-1.
Table 1: The results of antimicrobial sensitivity test for 30 *S. haemolyticus* clinical isolates under study

<table>
<thead>
<tr>
<th>Antimicrobial drugs</th>
<th><em>S. haemolyticus</em> isolates</th>
<th>Antimicrobial drugs</th>
<th><em>S. haemolyticus</em> isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S%</td>
<td>R%</td>
<td></td>
</tr>
<tr>
<td>Benzylpenicillin</td>
<td>0(0%)</td>
<td>30(100%)</td>
<td>Levofoxacin</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>24(80%)</td>
<td>6(20%)</td>
<td>Linezolid</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>19(63.3%)</td>
<td>11(36.7%)</td>
<td>Moxifloxacin</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>12(40%)</td>
<td>18(60%)</td>
<td>Nitrofurantion</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>16(53.3%)</td>
<td>14(46.7%)</td>
<td>Quinupristin</td>
</tr>
<tr>
<td>Oxacillin</td>
<td>0(0%)</td>
<td>30(100%)</td>
<td>Tetracycline</td>
</tr>
<tr>
<td>Rifampicin</td>
<td>18(60%)</td>
<td>12(40%)</td>
<td>Tigecycline</td>
</tr>
<tr>
<td>Trimethoprim-Sulphamethoxazole</td>
<td>17(56.7%)</td>
<td>13(43.3%)</td>
<td>Vancomycin</td>
</tr>
</tbody>
</table>

The results showed that the most effective antibiotics on clinical isolates of *S. haemolyticus* were linezolid, quinupristin and moxifloxacin which had 100% sensitivity rate followed by tigecycline and levofloxacin which had 96.7% sensitivity rate then vancomycin and nitrofurantion which had 93.3% sensitivity rate. On the other hand, the isolates were shown a high level of resistance to oxacillin and benzylpenicillin (100%) followed by Erythromycin which had 60% resistant rate.

**Phenotypic detection of methicillin resistance** *S. haemolyticus* isolates: According to cefoxitin screen test that including within the cards of Vitek-2 system (AST-P580 cards), all 30 clinical isolates of *S. haemolyticus* under study were methicillin resistance (Figure-1).

**Figure 1: Positive result of Cefoxitin screen test that done by Vitek-2 system with the use of AST-P580 card**

**Genotypic detection of mecA gene by polymerase chain reaction (PCR) assay:** The results of PCR assay for detection of mecA gene showed that, out of 30 isolates of methicillin-resistant *S. haemolyticus* clinical isolates, 28(93.3%) isolates were positive to mecA gene with 258-bp band as shown in Figure-2, while only 2(6.7%) isolates were negative to mecA gene. Detection of mecA gene was done on (1%) agarose gel at 5 V/cm for 1.5 hr. which stained with RedSafe dye and visualized on UV transiluminator documentation system.

**Figure 2: Detection of mecA gene by monoplex PCR assay; Lane M, 100 bp DNA ladder; lanes 1-11, amplification of mecA (258bp); lane C, Negative control**

**Discussion**

Isolates of *Staphylococcus haemolyticus* are the second of most frequently isolated bacteria from the human blood cultures among the coagulase-negative staphylococci (CoNS) (14), and have the highest level of antimicrobial resistance (7). Methicillin resistance of *S. haemolyticus* is conferred by the mecA gene which carried on the staphylococcal cassette chromosome mec (SCCmec) (15, 16).

Our results showed that all 30 *S. haemolyticus* isolates were resistant to oxacillin and benzylpenicillin (100%) and all the isolates were susceptible to linezolid and moxifloxacin. All the *S. haemolyticus* isolates were methicillin resistance phenotypically. Our results demonstrated that the majority of *S. haemolyticus* clinical isolates under study were positive for molecular
detection of the mecA gene by PCR. Barros and his co-workers (10) determined that by PCR of the mecA gene, 87% were found to be methicillin resistant.

Acknowledgments

Thanks for Mustansiriya University [http://uomustansiriyah.edu.iq]/Baghdad, Iraq for its support to complete this work.

Ethical Clearance: The researchers already have ethical clearance Department of Biology, College of Science, Mustansiryah University

Source of Funding: Self-funding

Conflict of Interest: No conflict of interest

REFERENCES

Oko Mama Culture Betel Nut Consuming Habit in Kupang District and its Effect toward Salivary Ph and Flow Rate

Christina Ngadilah¹, Hari Basuki N.², Rika Subarniati T.³
¹Doctoral Program of Health Sciences, Faculty of Public Health, ²Faculty of Public Health, Airlangga University, Indonesia; ³Head of Public Health Department, Faculty of Medicine, Wijaya Kusuma University, Indonesia

ABSTRACT
Public health always associated to culture and lifestyle. Lifestyle itself constitutes a concept that commonly used to define “The way people live”, reflecting the whole social value, attitude, and activity. One of long-term culture that become personal habit is chewing betel nut. Oko Mama culture is the local culture of the Timorese tribe who consider it as the symbol of philosophy, dignity, enjoyment, beauty, also as a means of communication in society, political means, and delaying hunger. Several studies revealed several unbeneficial of chewing betel nut, such as acute betel nut toxicity, cardiovascular disease, respiratory disorder, and congenital defect. Besides, betel nut may also alter oral health. This study is aiming to analyse the correlation of habitual chewing betel nut toward salivary pH and flow rate. This was an observational analytic study, by means of cross sectional design involving both on male and female aging 17-50 years old in 4 sub-district, consisting of 2 remote areas and 2 urban areas. The correlation between variables was analysed using path analysis by means of Smart PLS 3.2.7. The analysis revealed a positive correlation between Oko Mama culture toward behaviour (p=0.316) and intention (p= 0.454), also a negative correlation between the culture toward oral hygiene knowledge (p=-0.185) and the effect of chewing betel nut knowledge (p=-0.111). A positive correlation also recorded toward perceived norm (p=0.931). While intention had a positive correlation toward behaviour (p=0.429). Regarding oral health, chewing betel nut had negative effect toward salivary pH (p=-0.167) and salivary flow rate (p=-0.210).

Keyword: community habit, betel nut, salivary pH, flow rate.

Introduction
Public health is an integrated matter with the local culture. The society in each region have their own concept of health, as the important part of the culture. Betel nut chewing denotes an old habit of the society in Kupang. A prior study revealed that in Oelnaineno, sub district Takari, Kupang, 94% people aged 17-60 years old chew betel nut. The betel nut usually areca nut, lime. In other country sometimes the other ingredients were added tobacco.

The Oko Mama culture, that used betel nut in various occasion in daily life, thus, it can be found in every household in Timor. Oko Mama is the Timorese tribes culture, that chew the betel nut as the symbol of philosophy, dignity, enjoyment, beauty, also as a means of communication in society, political means, and delaying hunger. This culture denotes the factor that drives the society to chew betel nut to date (2).

Studies revealed that chewing betel nut might induce oral precancerous lesion which highly tend to become cancer. The areca nut itself has been classified as class I carcinogenic agent by the International Research Agency for Research Cancer (3). Areca nut only, has significant impact toward health, thus, tobacco addition may rise worsen health consequence, even death. After chewing betel nut, several symptoms may appear, such as headache, tachycardia, hot sensation and sweating, epigastric discomfort, hyperventilation, thirst and

Corresponding Author:
Christina Ngadilah
Doctoral Program of Health Sciences, Faculty of Public Health, Airlangga University, Indonesia
Email: christinangadilah62@gmail.com
hunger diminish, relax, and overexcited \(^{(1)}\). Areca nut contain arecolin, that possibly toxic toward periodontal tissue, thus, may worsen the periodontal status \(^{(4)}\).

The betel nut is addictive to its chewers. The tint from betel nut can penetrate into oral mucosa, and teeth, yet may disappear if strongly rubbed by areca skin \(^{(5)}\). The tooth discoloration due to betel nut chewing may prevent tooth demineralization. Several studies had proved that betel nut could reduce the caries prevalence \(^{(6)(7)(8)}\).

Considering the high number of betel nut chewers and its effect toward health, thus, it is important to analyse the Oko Mama culture, related to the habit of chewing betel nut and its effect toward caries. It is expected to be able to help the attempt to reduce betel nut chewers in Kupang, East Nusa Tenggara Indonesia as it is dangerous to their health, especially their dental health. This research aiming influence someone behavior and it's effect toward salivary pH and salivary flow rate.

**Material and Method**

This observational analytic study employed a cross sectional design. The sub district South Amfoang and Takari, denotes remote areas, while the urban areas were sub district Nekamese and Kupang Centre. Those selected areas had the most population. The subject of this study were the inhabitants aged 17-50 years old. As much as 363 peoples were randomly chosen from 146.597, calculated using estimated proportion population formula.

The criteria for the respondents were male and female who chewed betel nut, and those who did not from those 4 selected areas. The respondents were asked to fill a questionnaire. The acquired data were analysed by means of path analysis by PLS 3.2.7 to find a correlation among variables. We hypothesized eleven theories; 1) there is a correlation between attitude and intention; 2) there is a correlation between perceive norm and intention; 3) self-efficacy affect the intention; 4) Oko Mama culture affect intention; 5) Oko Mama culture affect behaviour; 6) intention affect behaviour; 7) oral health knowledge affect behaviour; 8) disease knowledge affect behaviour; 9) habit affect behaviour; 10) behaviour affect salivary flow rate; 11) behaviour affect salivary pH.

**Results**

The respondents participated in this study consisted of 51.5% female and 48.5% male. The total of betel nut chewers was dominated by female (52.8%). Among the population, the betel nut chewers (79.9%) were more than those who do not chew betel nut (20.1%). Mostly respondents were aged 41-50 years old (43.8%), while the respondents aged less than 20 were the minority (11.3%). The younger the respondents, the less they chew betel nut. Most of the respondents were farmers (82.6%), with the last education was elementary school (59.2%).

The habit of betel nut chewing more than 5 times a day were done by 37.5% of the respondents. The average frequency of betel nut chewing was twice a day. A portion of 51.8% the respondents has been chewing betel nut for 10 years or more, with 58.1% of them chewed betel nut with lime and areca nut. The majority from their parent (96.9%).

<table>
<thead>
<tr>
<th>Path (X)</th>
<th>Original Sample (O)</th>
<th>Mean (M)</th>
<th>SD</th>
<th>T Statistic (O/STDEV)</th>
<th>P Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude → Intention</td>
<td>0.290</td>
<td>0.293</td>
<td>0.058</td>
<td>4.978</td>
<td>0.000</td>
</tr>
<tr>
<td>Behavior → SFR</td>
<td>-0.210</td>
<td>-0.208</td>
<td>0.053</td>
<td>3.933</td>
<td>0.000</td>
</tr>
<tr>
<td>Behavior → pH</td>
<td>-0.167</td>
<td>-0.166</td>
<td>0.046</td>
<td>3.617</td>
<td>0.000</td>
</tr>
<tr>
<td>Intention → Behavior</td>
<td>0.428</td>
<td>0.415</td>
<td>0.099</td>
<td>4.323</td>
<td>0.000</td>
</tr>
<tr>
<td>Oko Mama → Behavior</td>
<td>0.316</td>
<td>0.315</td>
<td>0.058</td>
<td>5.467</td>
<td>0.000</td>
</tr>
<tr>
<td>Oko Mama → Intention</td>
<td>0.463</td>
<td>0.453</td>
<td>0.098</td>
<td>4.739</td>
<td>0.000</td>
</tr>
<tr>
<td>Oko Mama → Perceived Norm</td>
<td>0.931</td>
<td>0.931</td>
<td>0.013</td>
<td>73.796</td>
<td>0.000</td>
</tr>
<tr>
<td>Habit → Behavior</td>
<td>0.232</td>
<td>0.246</td>
<td>0.098</td>
<td>2.378</td>
<td>0.018</td>
</tr>
</tbody>
</table>
Similar to TRA/TPB, the most important predisposing factors in Integrated Behaviour Model (IBM) is intention. Intention defined as individual decision indicator to do a certain behaviour. Without intention, behaviour will not be built. The intention itself was determined by attitude, perceived norm, and self-efficacy to start doing betel nut chewing as habit. This study used 4 variables based on the IBM that affect the intention to chew betel nut, that are attitude, perceived norm, self-confidence and Oko Mama culture. Based on the result from table 1, there were 2 rejected hypotheses, that are 1) oral health knowledge have no effect toward behaviour (p>0.05), and 2) disease knowledge have no effect toward betel nut chewing (p>0.05).

Attitude had significant correlation toward intention as much as 0.278 (p<0.05), while perceived norm also had significant correlation toward intention as much as -0.191 (p<0.05). Self-confidence significantly affect intention as much as 0.417 (p<0.05). Intention had significant effect toward betel nut chewing as much as 0.429 (p<0.05). Oko mama’s culture significantly affects the intention to consume betel nut at 0.454 (p value 0,000). The Oko mama culture significantly affects the Behavior of consuming betel nut by 0.316 (p value 0,000). The habit of consuming betel nut significantly affects the salivary pH of -0.167 (p Value 0,000). The habit of consuming betel nut significantly affects the salivary flow rate of -0.210 (p value 0,000). The Behaviour Hypothesis influences the Saliva Flow Rate in the habit of consuming betel nut analysed by looking at the Path Coefficients (table 1). This hypothesis is accepted significantly because Path Behaviour to the Saliva Flow Rate has a p-value of 0,000 and the value of t-statistics 3,933 and Path Coefficients -0,210. The hypothesis is accepted because p-value is less than 0.05 and t statistic is more than 1.96. From these results it can be concluded that the Behaviour has a negative effect of -0.210 on the salivary flow rate.

**Discussion**

The behaviour of chewing betel nut affects salivary flow rate, may possibly due to the reduce in salivary secretion or salivary properties changes while they are not chewing betel nut. This condition may contribute to several oral and dental diseases, that directly affect the quality of life. Several studies stated that the normal unstimulated salivary flow rate is 0.3-0.5 ml per minute \(^{9,10}\), while stimulated salivary flow rate is 10 ml per minute \(^{11,12}\). The significant changes of salivary flow rate affect dental and oral health \(^{12}\). The functional changes of salivary gland, is related to oral cavity, throat, oesophagus, neoplasm, nutrition metabolism, inflammation, genetic disease, auto-immune disease, and nervous system damage. The varied salivary flow rate also depends on the time of measurement. Those variations in 24 hours depends on the circadian rhythm. Besides, other factors also contribute, such as age and gender.

Several studies recorded that unstimulated normal salivary pH ranged from 5.5 to 7.9, the higher pH, the higher salivary flow rate \(^{12,13}\). Salivary pH is controlled by carbonate/bicarbonate acid system, phosphate system, and protein system. A study revealed several rate of salivary flow from chewing 4 kinds of betel nut mixture, and raw areca nut only, which resulted the highest mean of salivary flow rate recorded was 4.18ml in 10 minutes \(^{(11)}\). A decrease of salivary secretion or changes in saliva properties may also contribute to several oral and dental problems, that directly affect the quality of life. Some of those problems are speak and eat difficulty, taste perception changes, increase plaque formation, increase risk of caries, tooth erosion and periodontal disease, increase of plaque formation, mucosal irritation, halitosis, and candidiasis, also decrease the retention of full denture. Those aforementioned oral and dental problems may also affect general health, since the affected individual may experience lost appetite, that leading to malnutrition \(^{(14)}\).

There is a significant correlation between chewing betel nut with salivary flow rate. A study revealed unstimulated salivary flowrate in betel nut chewers was basically same to those who do not, yet the when stimulated, the chewer group had a higher flow rate \(^{(15)}\). This is possibly caused by the increase of sensitivity and
salivary mechanism due to areca nut and tobacco. There is an opinion, that this also probably due to salivary gland hyperplasia, and masticatory muscle hypertrophy in long-term betel nut chewer (16). Besides, oral mucosa also become more sensitive due to toxic effect of betel nut (11)(15). However, those changes do not affect masticatory efficacy (15)(17). Another study showed that the salivary flow rate and pH of the carious and free-caries subject were not significantly different (18). Also no significant differences of salivary flow rate between those subjects. Enamel demineralization may occur in pH <5.5 (19). The mean pH of the respondents chewing betel nut was 6.6, while those who don’t was 6.78 (18).

There was a significant correlation found between betel nut behaviour with the salivary pH (p=0.000; t-statistic 3.617 and path coefficient -0.167). Behaviour had negative correlation to salivary pH (-0.21). The current study found changes of salivary pH and flow rate in betel nut chewer, which may lead to various oral diseases (20). Betel nut chewing denotes socio-cultural expression (Oko Mama), which significantly affect the perceived norm (0.931). The importance of culture affect how the society will behave. Besides, betel nut chewing also noted as social identifier, to be considered as cultured and ethical individual. Some individuals do betel nut chewing in order to be recognized as the member of society (21).

That the areca nut availability promotes betel nut chewing behaviour. Since betel nut is easily found in every household, makes it easier to consume and mostly the chewer firstly learnt from their parents (22). That in several cases, betel nut chewing was done due to the social pressure, and the desire to be recognised (21). WHO summarized that betel nut is correlated to oral cancer prevalence (23). Oral carcinoma due to betel nut chewing denotes aggressive malignancy that required intensive treatments (24). While the society have not fully understood about cancer, thus, this need a long-term attempt of prevention. Betel nut chewing was not an oral and pharynx potentially malignant disorder (OPMD) only, but also may be the predisposing factors of other diseases. The high prevalence of betel nut chewing increase the incidence of hepatic cancer. Besides, betel nut chewing also affect cardiovascular, nervous system, digestive system, metabolism, respiratory system, and reproductive system (25).

To date, there has not any global policy regarding betel nut chewing. Multidisciplinary research is required to control this phenomenon, and further studies to get a better understanding in basic biology, mechanism, and epidemiology of betel nut chewing. This may encourage the prevention, also, stop the betel nut chewing for a better health. Those attempts are betel nut uses monitoring, continuous educate the society to stop the habit, by utilizing advertisement board, and increase areca nut tax.

**Conclusion**

Oko Mama culture affects intention to chew betel nut, and also affect the behaviour to chew betel nut. The betel nut chewing behaviour affects salivary pH and flow rate. The habit of betel nut chewing shows a change in salivary pH and flow rate. Those changes contribute in the occurrence of oral diseases. Complex behaviour of betel nut chewing is reflected in varied salivary pH and flow rate.

**Acknowledgements**

The authors gratefully thank to the society of Kupang, who had been willing to fill the questionnaire, and the enumerators, also the interviewees who had a big role in this study.

**Conflict of Interest:** There is no conflict of interest for every author.

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**Ethical Clearance:** All procedures performed in studies involving human participants were in accordance with the ethical standards of the Health Research Ethics Committee Faculty of Public Health Airlangga University.

**Informed Consent:** Informed consent was obtained from all individual participants included in the study.

**REFERENCES**


Determination Safe Duration of Exposure to Benzene in Workers of Petroleum Processing Industrial Laboratory in Indonesia by Using Noael of White Mice (Rattus norvegicus)

Ermita Isnaeni Putri Susyanti, Abdul Rohim Tualeka, Pudji Rahmawati, Syamsiar S Russeng, Atjo Wahyu, Ahsan, Dewi Kartikasari

1Department of Occupational Health and Safety, Public Health Faculty, Airlangga University, 60115, Surabaya, East Java, Indonesia; 2Department of Development of Islamic Society, State Islamic University Sunan Ampel, Surabaya, Indonesia; 3Department of Occupational Health and Safety, Public Health Faculty, Hassanudin University, Makassar, Indonesia; 4Faculty of Nurse, University of Brawijaya, Malang, Indonesia; 5Department of Environmental Health, Faculty of Public Health, Diponegoro University, Semarang, Indonesia

ABSTRACT

Benzene is a volatile liquid aromatic hydrocarbon. Benzene is also used in industries related to oil processing, one of which is fuel. According to the Agency for Toxic Substances and Disease Register (ATSDR), toxic chemicals contained in oil includes Polycyclic Aromatic Hydrocarbons (PAHs), Total Petroleum Hydrocarbon (TPH), benzene, ethylene and toluene. Of all these toxin substances, benzene is the most dangerous chemical and exposure to benzene has a serious impact on human health. As a form of control effort, determining the safe duration of exposure (Dt) for benzene exposure based on the value of RfC (Reference of Concentration) using NOAEL (No Observed Adverse Effect Level) of white mice (Rattus norvegicus) is needed. This study aimed to determine the value of No Observed Adverse Effect Level (NOAEL) of white mice (Rattus norvegicus), safe limits of toxin dosage for the community or Reference of Concentration (RFC), Risk Quotient (RQ) and safe duration of exposure (Dt) in laboratory workers. This was a cross sectional, observational, and descriptive study with 51 samples of PT Pertamina RU IV Cilacap laboratory workers. The object sample used in this study was the air in the work area of the main laboratory section and the petrochemical and gas laboratory of PT Pertamina RU IV Cilacap. The results of this study indicated that safe duration of exposure (Dt) was 19 years; under normal safe duration of exposure for workers. The safe duration of exposure (Dt) can be a reference for the relevant company to consider the workers’ working period and reduce the exposure duration with benzene to prevent significant health impact on workers.

Keywords: Benzene, safe duration, laboratory workers, petroleum processing industry

Introduction

Benzene, C6H6, is a volatile liquid aromatic hydrocarbon. Benzene’s properties are colorless, volatile, flammable, and distinctive odors. PT Pertamina is an industry in Indonesia that provides fuel to meet the consumption of the Indonesian people. The products include pertamax plus, pertamax, pertalite, and premium which have benzene levels of around 1% - 5%. Toxic chemicals contained in oil content include Polycyclic Aromatic Hydrocarbons (PAHs), Total Petroleum Hydrocarbon (TPH), benzene, ethylene and toluene. Of these toxins, benzene is the most dangerous chemical and exposure to benzene has a serious impact on human health.

Corresponding Author:
Abdul Rohim Tualeka
Department of Occupational Health and Safety, Public Health Faculty, Airlangga University, 60115 Surabaya, East Java, Indonesia
Phone: +62-31-5920948
Email: abdul-r-t@fkm.unair.ac.id

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A previous research by Dewi Kartikasari, Nurjazuli, Mursid Rahardjo (2016) determined the value of RfC (Reference of Concentration) based on established by IRIS (Integrated Risk Information System) of US-EPA by 0.03 mg/m³ or equivalent to 0.0085 mg/kg/day. The previous study still using references from research in America or Europe so that they cannot be used as a reference in determining risk in Indonesia so that previous study did not obtain RfC value using NOAEL (No Observed Adverse Effect Level) of white mice (Rattus norvegicus). Saridewi and Tualeka (2012) determined the value of RfC by using the formula for calculating RfC with NOAEL of white mice (Rattus norvegicus) and RfC value of 0.004mg/kg was obtained.

Based on previous studies, it is obvious the safe duration of toxin exposure in an industry cannot be taken based on the results of research elsewhere. Therefore, in this study, the determination of safe duration of benzene exposure based on RfC by using NOAEL of white mice (Rattus norvegicus) is explained. The aims of this research is to determine NOAEL benzene using of white mice (Rattus norvegicus), average height and weight of workers in Indonesia, Reference Concentration (RfC) and safe duration of exposure (Dt).

**Material and Method**

This is an observational, cross sectional and descriptive study. The subjects in this study were all 85 workers in the Laboratory section who worked in the Main Laboratory of PT Pertamina RU IV Cilacap. The object used in this study was ambient air working area Laboratory PT Pertamina RU IV Cilacap. The sample size was 51 workers, while the object sample used in this study was air in the work area of the Main Laboratory and Petrochemical and Gas Laboratory of PT Pertamina RU IV Cilacap.

The variables of this study were the concentration of benzene in the work area in the laboratory, body weight of workers, height of workers, respiratory rate of workers, duration of exposure in a day, body surface area of workers, weight of white mice (Rattus norvegicus), body surface of white mice (Rattus norvegicus), highest dose of toxin without effect on experimental animals (NOAEL), Km factor in animals (Animal Km), Km factor in human in (Human Km), safe limit of dose of toxin for the community or Reference of Concentration (RfC), Risk Quontient (RQ) and safe duration of exposure (Dt) in laboratory workers.

The RfC formula used in this study is $^5$:

$$
RfC = \frac{\text{NOAEL}}{\text{Animal Km} \times \text{Human Km}}
$$

**Explanation:**

RfC: Reference Concentration (mg/kg)

NOAEL: No Observed Adverse Effect Level (mg/kg)

Animal Km: Km factor on animal

Human Km: Km factor on human

Data analysis was carried out quantitatively to determine the safe duration of benzene exposure in laboratory workers.

**Findings**

A. Characteristics of Experimental Animal and Surface Area of the Experimental Animal (Rattus norvegicus): The general toxicity of a compound can be interpreted as a potential chemical that causes damage when entering the human body$^6$. Toxicity test was carried out using white mice (Rattus norvegicus) as the research objects or experimental animal. Based on the weight of white mice (Rattus norvegicus), the body surface area of the animal can be calculated using the following formula:

$$
\text{Animal BSA} = 0.09 \times W^{0.67}
$$

**Explanation:**

BSA: Body Surface Area (m2)

W: Weight (kg)

<table>
<thead>
<tr>
<th>Experimental animal (Rattus norvegicus)</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.0241</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.0241</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.0242</td>
</tr>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.0242</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.0242</td>
</tr>
<tr>
<td>Total</td>
<td>0.844</td>
<td>0.1448</td>
</tr>
<tr>
<td>Average</td>
<td>0.1407</td>
<td>0.0241</td>
</tr>
</tbody>
</table>
B. Characteristics, Body Surface Area and Worker’s Respiratory Rate: The characteristics of workers included in this study were body weight, height, working period and worker breathing rate in 51 workers of PT Pertamina RU IV Cilacap laboratory. Based on Table 2, the average body weight is 67 kg. The average height of workers is 159 cm. The surface area of the body and the respiration rate of the workers were 1.72 m² and the average breathing rate was 0.596 m³/hour.

Based on data on workers’ weight and height, the body surface area and worker breathing rate can be calculated using the following formula:

A. The average body surface rate of the worker

\[
BSA = \sqrt{\frac{W \times h}{3600}} = \sqrt{\frac{67 \times 159}{3600}} = 1.72 \text{ m}^2
\]

Explanation:

BSA: Body Surface Area (m²)
W: Weight (kg)
h: Height (cm)

B. Respiratory rate

\[
BR = \frac{5.3 \times \ln W - 6.9}{24} = \frac{5.3 \times \ln 67 - 6.9}{24} = 0.596
\]

Explanation:

BR: Breathing Rate (m³/jam)
W: Weight (kg)

Table 2: Distribution of Worker Characteristics, Worker’s Body Surface Area, Employee Respiratory Rate and Average Duration of Workers in the Petroleum Processing Industry Laboratory Section

<table>
<thead>
<tr>
<th>Location</th>
<th>Concentration (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation table 1</td>
<td>0.011</td>
</tr>
<tr>
<td>Observation table 2</td>
<td>0.006</td>
</tr>
<tr>
<td>Shelter D</td>
<td>0.169</td>
</tr>
<tr>
<td>KR Room</td>
<td>0.059</td>
</tr>
<tr>
<td>Observation table 3</td>
<td>0.139</td>
</tr>
<tr>
<td>Observation table 4</td>
<td>0.187</td>
</tr>
<tr>
<td>R &amp; D analysis table</td>
<td>0.073</td>
</tr>
<tr>
<td>Administration room</td>
<td>0.069</td>
</tr>
<tr>
<td>Average</td>
<td>0.09</td>
</tr>
</tbody>
</table>

D. Animal Km and Human Km

1. Animal Km: Determination of safe dosage of toxin for workers begins with the calculation of Animal Km. Animal Km is obtained by using the following formula:

\[
Animal \ Km = \frac{W}{BSA \ animal}
\]

Explanation:

Animal Km: Km factor on animal
W: Experimental animal body weight (white mice or Rattus norvegicus) (kg)
BSA: Surface area of experimental animals (m²)

Table 4: Calculation of Animal Km in Experimental Animal of White Mice (Rattus norvegicus)

<table>
<thead>
<tr>
<th>White-Mice (Rattus norvegicus)</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
<th>Animal Km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.814194082</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.814194082</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
<td>5.820914007</td>
</tr>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.024223</td>
<td>5.820914007</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024050</td>
<td>5.8004158</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
<td>5.855576247</td>
</tr>
<tr>
<td>Average</td>
<td>0.1407</td>
<td>0.024165</td>
<td>5.82</td>
</tr>
</tbody>
</table>
2. Human Km: The Human Km calculation is performed by using the following formula:

\[
\text{Human Km} = \frac{W_{\text{human}}}{\text{BSA}_{\text{human}}}
\]

Explanation:

Human Km: Km factor in humans
W: Human Weight (kg)
BSA: Body Surface (m²)

<table>
<thead>
<tr>
<th>The number of sample</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
<th>Human Km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>67</td>
<td>1.72</td>
<td>38.95</td>
</tr>
</tbody>
</table>

E. NOAEL (No Observed Adverse Effect Level):
No Observed Adverse Effect Level (NOAEL). NOAEL benzene is 0.022 mg/kg, obtained from the calculation of the following formula:

\[
\text{NOAEL Benzene} = 3 \text{ mg/m}^3
\]

\[
\text{NOAEL} = \frac{3 \times 0.00013 \times 8}{0.1405} = 0.022 \text{ mg/kg}
\]

F. Reference Concentration (Rfc): Reference concentration according to Shaw et al (2007) in Saridewi and Tualeka (2017) uses the following formula:

\[
\text{Rfc} = \frac{\text{Animal Km}}{\text{Human Km}}
\]

Explanation:

Rfc: Reference Concentration (mg/kg)
Animal Km: Km factor in white mice (Rattus norvegicus)
Human Km: Km factor on workers

Based on the formula above, the Rfc calculation results obtained from NOAEL, Animal Km averages, and the Human Km averages are:

\[
\text{Rfc} = 0.022 \times \frac{5.82}{38.9} = 0.003 \text{ mg/kg}
\]

G. Risk Quotient (RQ): Health risk characteristics are expressed as risk levels or risk quotient (RQ) for carcinogenic effects \(^8^{89}\). RQ calculations are obtained by the following formula\(^1\):

\[
\text{RQ} = \frac{\text{Ink}}{\text{Rfc}}
\]

Explanation:

Ink: Intake the amount of risk agent that an individual receives (mg/kg/day)
Rfc: Reference Concentration (mg/kg)

For the characteristics of non-carcinogenic risks, the risk agent intake received by individuals is determined by the following formula:

\[
\frac{\text{C} \times \text{Br} \times tE \times fE \times Dt}{\text{Wb} \times tAvg (\text{non carcinogen})} = 0.09 \times 0.596 \times 8 \times 265 \times 12.55 \times 67 \times 30 = 0.019 \text{ mg/kg/day}
\]

H. Safe Duration Of Exposure To Benzene:
The safe duration can be determined using the following formula:

\[
\text{Dt (safe)} = \frac{\text{Rfc} \times \text{Wb} \times \text{tavg}}{\text{C} \times \text{Br} \times tE \times fE}
\]

Explanation:

Dt (safe): Safe duration of exposure for workers (years)
Rfc: Reference Concentration (mg/kg)
T avg: Average time period (days/years)
C: Concentration in air (mg/m³)
Br: Breathing rate/working breathing rate (m³/hour)
tE: Length of exposure time (hours/day)
fE: Frequency of exposure (day/year)
Then $D_t$ (safe) calculation is as follows:

$$D_t \text{(safe)} = \frac{0.003 \times 67 \times (30 \times 365)}{0.09 \times 0.596 \times 8 \times 265} = 19 \text{ years}$$

The results of this calculation can be used as a reference for the relevant companies to control benzene exposure so that it does not have a health impact on their workers.

**Discussion**

Based on research conducted by Swan et al (2010) states that NOAEL benzene is 3.0 mg/m$^3$ or its value is equivalent to 0.022 mg/kg. Based on the results of this study, the calculation of NOAEL benzene value in white mice (*Rattus norvegicus*) is 0.022 m/kg. Thus, the results of this study are safe for human.

The present study used inhalation route that the response dose for the non-carcinogenic effect used was the Reference Concentration (RfC) value. Benzene RfC value in this study was carried out by using NOAEL of white mice (*Rattus norvegicus*). The research conducted by Tualeka AR, Wibrata DA, Ahsan A, et al (2019) indicated that NOAEL could experimentally determine doses where there was no statistically significant indications of toxic effects or biological problems. The study conducted by Saridewi and Tualeka (2012) obtained a benzene RfC value using NOAEL of white mice (*Rattus norvegicus*) is 0.004 mg/kg. Based on the results of this study, the calculation of benzene RfC values in white mice (*Rattus norvegicus*) is 0.003 mg/kg. The value of Benzene obtained in the present study was smaller than those of Rendy’s (2012) obtained a benzene RfC value is 0.01 mg/kg. It is also smaller than the results of a study conducted by Dewi Kartikasari, Nurjazuli, Mursid Rahardjo (2016) obtained a benzene RfC value is 0.0086 mg/kg. Thus results of this study are safer for humans by using NOAEL of white mice (*Rattus norvegicus*) as a calculation of RfC.

Toxins with potential to produce non-cancerous or non-carcinogenic effects, the health assessment ratio is stated by Risk Quotient (RQ) where RQ $> 1$ is categorized as unsafe or risky $^4\text{to}^\text{10}$. In the calculation, RQ less than 1 (RQ $< 1$) does not affect the body, but RQ value of more than 1 (RQ $> 1$) is dangerous.$^1\text{1}$. Therefore, it is necessary to control the effect by determining the safe duration of exposure ($D_t$) value. Based on the results of this study, the value safe duration of benzene exposure in PT Pertamina RU IV Cilacap laboratory work environment was 19 years.

**Conclusion**

a. Benzene concentration in the laboratory work area at PT Pertamina RU IV Cilacap was 0.09 ppm. This is below the threshold value that allowed in Indonesia according to Permenakertrans No.5/MEN/X/2018 on Threshold Value of Physical Factors and Chemical Factors in the Workplace of 0.5 ppm.

b. NOAEL Benzene in the laboratory work area of PT Pertamina RU IV Cilacap was 0.022 mg/kg.

c. Reference Concentration (RfC) in the laboratory work area at PT Pertamina RU IV Cilacap was 0.003 mg/kg.

d. The level of risk was unsafe with RQ value $> 1$

e. The safe duration of exposure to benzene in the laboratory work area of PT Pertamina RU IV Cilacap was 19 years.

**Recommendation**

The safe duration of exposure to benzene for non-carcinogenic laboratories at PT Pertamina RU IV Cilacap was 19 years. This figure was smaller than the normal workers safe duration of exposure of 30 years. To normalize safe duration of exposure, the concentration of toxin must be minimized to adjust the safe limit of toxin concentration for workers and daily exposure duration was also smaller than 8 hours/day.

**Conflict of Interest:** All author have no conflicts of interest to declare

**Source of Funding:** This is an article about “Determination Safe Duration Of Exposure To Benzene In Workers Of Petroleum Processing Industrial Laboratory In Indonesia By Using NOAEL Of White Mice (*Rattus Norvegicus*)” of Occupational Health and Safety Departmen that was supported by Faculty of Public Health, Airlangga University.

**Ethical Clearence:** The study was approved by the institutional Ethical Board of the Public Health, Diponegoro University.
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Assessment the Relevance of Dental Aesthetic Index, Smile and Desire for Orthodontic Treatment among Iraqi Teenagers

Esraa S. Jasim¹, Zainab M. Kadhom², Noor F.K. Al Khawaja³
¹Assistant Professor; ²Assistant Lecturer; ³Lecturer, Department of Orthodontics, College of Dentistry, University of Baghdad

ABSTRACT

Purpose: This study aims to assess the psychological effects of the malocclusion on the emotional state of Iraqi teenagers through comparison of Dental Aesthetic Index (DAI) to certain aesthetic questionnaires and assessment of the malocclusion severity for them.

Materials and Method: 248 Iraq students, of 14 and 15 years old from secondary school in Iraq were selected for this study. The students were interviewed and the clinical data of oral examination were collected by specialist orthodontist under natural day light using dental vernia taking into account the Research Ethics Committee rules. The collection of DAI parameters was performed together with aesthetic self-perception data by ten aesthetic questionnaires.

Results: Of the total sample 37.1% are highly desirable and of mandatory treatment need. The students who were satisfied with the appearance of their smile reported to be about 84%, while about (13%) of them were willing to wear braces.

Conclusions: Dissatisfaction with dental appearance has been noted to be more frequent than the desire for treatment. The DAI correlate significantly with the subjective assessment that is concerned with dental appearance and orthodontic treatment need.

Keywords: Dental Aesthetic Index; Dental appearance; Self-perception.

Introduction

The previous studies found that malocclusion is associated with the dissatisfaction with the appearance for a great extent, and negatively affect the quality of life. Moreover, the self-perception of the level of attractiveness or “The positive” feelings toward the dentofacial complex is a more important factor the contribution to self-conception in teenagers than the self-perceived severity of the malocclusion alone. Malocclusion influences the quality of life and is a highly prevalent public health problem. Particular types of malocclusion seem to affect satisfaction with one’s dental appearance, facial appearance, general appearance, and perceived attractiveness. Measuring and recording the severity and prevalence of malocclusion can be used as an epidemiological tool for preventive procedures or for training orthodontic specialists.

In the 1960s, the occlusal indices were first introduced to help epidemiological studies. DAI is one of orthodontic treatment need indices. Although the DAI indicate the relative employment and social acceptability of dental appearance, it is preferable to include the patient’s own psychosocial view. The demand for orthodontic treatment in many populations is related to their desire to improve their degree of attractiveness and their appearance. Most of the orthodontic needs questionnaires which have been developed in recent years are used as result measures. The patient’s perception in many researches has been shown to be not favored with the orthodontist’s point of view; therefore the

Corresponding Author:
Dr. Esraa S. Jasim
Assistant Professor, Department of Orthodontics, College of Dentistry, University of Baghdad, Baghdad, Iraq
Phone: 009647702999312
Email: israa_salman27@yahoo.com

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differences may be found between esthetics perceptions of laypersons and the orthodontists. The aim of this study was to assess the psychosocial influence of malocclusion on the emotional state of Iraqi teenagers through comparison of the DAI carried out by orthodontist on certain ten questionnaires answered by the individual her/himself for evaluation of dental appearance, satisfaction with smile and desire for orthodontic treatment, In addition to the assessment of the frequency and severity of the malocclusion among Iraqi teenagers.

**Materials and Method**

The sample of this study involves Iraqi students of 14 and 15 years; and the research was confirmed by the Research Ethics Committee. Ten from 260 secondary schools were chosen using simple random technique for selection. Of the total of 248 students, 148 males (60%) and 100 (40%) females were interviewed and examined. A specific privacy for each student was accomplished.

Students with mental or physical impairment, with previous history of or currently undergoing orthodontic treatment were excluded. Clinical data were collected through oral examination. The examiner used disposable mask, gloves, dental mirrors, periodontal probes and dental vernia under natural day light through the window. The subjects were asked about their self-perception of malocclusion using organized questionnaire, noting that interview agenda was piloted before. The DAI used in the assessment of the malocclusion and treatment needs. It includes ten parameters of dentofacial structures:

\[
\{\text{visible missing teeth \times 6} + \text{Crowding} + \text{Spacing} + \text{Diastema} \times 3 + \text{Anterior maxillary misalignment} + \text{Anterior mandibular misalignment} + \text{Anterior maxillary overjet} \times 4 + \text{Anterior mandibular overjet} \times 4 + \text{Anterior vertical open bite} \times 4 + \text{Anterioposterior molar relationship} \times 3 \} + 13
\]

**Table 1: Malocclusion estimation according to DAI**

<table>
<thead>
<tr>
<th>DAI</th>
<th>Male = 148</th>
<th>Female = 100</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No or Slight Treatment Need (Below 26)</td>
<td>33(22.3)</td>
<td>39(39)</td>
<td>72(29)</td>
</tr>
<tr>
<td>Elective Treatment (26-30)</td>
<td>52(35.1)</td>
<td>32(32)</td>
<td>84(33.9)</td>
</tr>
<tr>
<td>Treatment Highly Desirable (30-35)</td>
<td>24(16.2)</td>
<td>17(17)</td>
<td>41(16.5)</td>
</tr>
<tr>
<td>Treatment Mandatory (Above 35)</td>
<td>39(26.4)</td>
<td>12(12)</td>
<td>51(20.6)</td>
</tr>
</tbody>
</table>

The formula classifies dental malocclusion as mild occlusion, definite occlusion and severe or very severe occlusion as explained in Table (1). While aesthetic self-perception data was collected through ten questions regarding concerns of self-perceived oral appearance which was based upon previous researches investigating self-perception questionnaire. The questionnaires are listed in Box (1).

**Box 1: The Questionnaire**

1. Do you have a pleasant smile? Yes/No
2. How much do you like the appearance of your smile?
   i. Very much
   ii. Quite a bit
   iii. Not much
   iv. Not at all
3. Do you like the way your teeth look? Yes/No
4. How much do you like the way your teeth look?
   i. Very much
   ii. Quite a bit
   iii. Not much
   iv. Not at all
5. Are your front teeth straight? Yes/No
6. How would you consider your teeth as compared to your entire face?
   i. One of the nicest features of your face
   ii. Better than average feature of your face
   iii. Below average feature of your face
   iv. One of the poorest features of your face

Conted Box 1…
7. Are your teeth good looking?   Yes/No

8. Compared to your classmates and friends how do you think your teeth look?
   i. Among the nicest
   ii. Better than average
   iii. Below average
   iv. Among the worst

9. Do your teeth need straightening?   Yes/No

10. If it were possible would you want to wear braces to straighten your teeth?
    i. Definitely No
    ii. Probably No
    iii. Probably Yes
    iv. Definitely Yes

**Statistical Analysis:** The SPSS computer based software version 25 was used for descriptive data analysis. Comparison of males and females with DAI scores was done using t-test. Questionnaire results and DAI scores were compared by Chi-square test.

P value considered to be:
   Statistically insignificant (NS) at p > 0.05
   * Significant (S) at 0.05 ≥ P > 0.01
   **highlySignificant (HS) at p ≤ 0.01

Intra-examiner calibration to ensure the reliability of the results was accomplished, and the kappa value was 0.67, which indicating good agreement ⁶.

**Result**

As shown in figure (1): about 29% of the total sample needs no treatment, 33.9% need elective treatment and 37.1% are highly desirable and of mandatory treatment need, males of highly desirable treatment need are more than the females in response to the questions put forth in the questionnaire, 84% of the students reported to be satisfied with the appearance of their smile, almost 46% of them agree that their teeth need straightening, also 53% of them stated that they have better than average of teeth appearance when compared with their classmates, the students who felt their teeth to be better than average and who felt that their teeth to be below average feature of their face is equal (37%) and about 13% of the students were willing to wear braces in order to improve their smile. The students who were demanding orthodontic treatments were about (13%) table (3).

As Shown in table (2): no statistical difference between the answers of males and females in (Q1, Q6 and Q9) while there was a statistical difference between answers of males and females in (Q3,Q4,Q5,Q7and Q8) and very highly significant difference in (Q2) and highly significant difference in Q10. The data from table (3) Compares DAI with the questionnaire and show no statistical difference except in (Q3, Q5, Q9 and Q10). That means the DAI correlate significantly with the questions that concern the dental appearance and also with the questions that deal with orthodontic treatment need.
Table 2: Statistical Analysis of Questionnaire

<table>
<thead>
<tr>
<th>Questions</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
<th>Q7</th>
<th>Q8</th>
<th>Q9</th>
<th>Q10</th>
</tr>
</thead>
<tbody>
<tr>
<td>P VALUE</td>
<td>0.071</td>
<td>0.00**</td>
<td>0.011*</td>
<td>0.012*</td>
<td>0.013*</td>
<td>0.244</td>
<td>0.047*</td>
<td>0.031*</td>
<td>0.431</td>
<td>0.006**</td>
</tr>
</tbody>
</table>

Table 3: Comparison of levels of DAI with questionnaire

<table>
<thead>
<tr>
<th>Questions</th>
<th>No or slight Treatment need</th>
<th>Elective Treatment</th>
<th>Treatment highly desirable</th>
<th>Treatment mandatory</th>
<th>Total</th>
<th>Chi Square X²</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q 3:</td>
<td>YES</td>
<td>21%</td>
<td>18%</td>
<td>8%</td>
<td>10%</td>
<td>57%</td>
<td>9.43</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>8%</td>
<td>16%</td>
<td>9%</td>
<td>10%</td>
<td>43%</td>
<td></td>
</tr>
<tr>
<td>Q 5:</td>
<td>YES</td>
<td>23%</td>
<td>23%</td>
<td>9%</td>
<td>12%</td>
<td>67%</td>
<td>10.552</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>6%</td>
<td>11%</td>
<td>7%</td>
<td>9%</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>Q 9:</td>
<td>YES</td>
<td>13%</td>
<td>16%</td>
<td>11%</td>
<td>14%</td>
<td>54%</td>
<td>10.69</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>16%</td>
<td>18%</td>
<td>5%</td>
<td>7%</td>
<td>46%</td>
<td></td>
</tr>
<tr>
<td>Q 10:</td>
<td>i. Definitely No</td>
<td>16%</td>
<td>13%</td>
<td>5%</td>
<td>6%</td>
<td>40%</td>
<td>20.803</td>
</tr>
<tr>
<td></td>
<td>ii. Probably No</td>
<td>4%</td>
<td>5%</td>
<td>4%</td>
<td>2%</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii. Probably Yes</td>
<td>6%</td>
<td>12%</td>
<td>5%</td>
<td>9%</td>
<td>32%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iv. Definitely Yes</td>
<td>2%</td>
<td>4%</td>
<td>3%</td>
<td>4%</td>
<td>13%</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

The recommended treatment cut off point for DAI was 31; any value below it considered as minor malocclusion severity and there is no definite need for treatment. The age selected for our study are considered to be a pertinent age for perception of personal dental appearance since the realization of body image and awareness of facial aesthetics increases with the age and takes priority during late adolescence15, 23. Our results revealed that 84% of students feel comfortable and satisfied with their smiles; while it was 83.5% in India25, and about 23.3% were hiding their teeth while smiling in Turkey1. There was no significant difference between DAI and self-satisfaction with smile; this agree with Nayak et al.23 and come in contrast to the Cons et al.8. Also, there is no significant difference between DAI and self-satisfaction with dental appearance as in Yeh et al.28; but it disagree others23,24. In our study the subjects who were satisfied with the appearance of their teeth are more than of subjects who were dissatisfied, this come in agreement with many studies24,28, but in disagreement with the Mugonzibwa et al.23.

In contrast with our results, the females in some studies were more dissatisfied with the appearance of their teeth as compared with males19, 23,29. At the same time, they were more dissatisfied with their smile as compare with males as in Hamarmci et al.13 The idea is that the self-estems of females could be affected from physical injuries more than that of males30. Simultaneously, the males believe that their teeth need straightening more than the females and about 65.6% of them want to wear braces, this disagrees with Birkeland et al.5.

Our findings showed that there is no significant difference in the relationship between DAI and self-assessment of relative appearance of teeth by the subjects as compared to their entire face and between this index and self-assessment of dental appearance as compared to classmates and friends which comes in agreement with Josefsson et al.17. There was a significant correlation between DAI and all the questions concerning individual self-perception23; while the DAI correlate significantly with questions that concern dental appearance and the need for orthodontic treatment.

The cultural differences are one possible reason for different results in these studies, as well as racial factors, religion, individual characteristics, and unrealistic anticipation21.

Different studies reinforced the concept of occlusal problems effects on the adolescent’s life and the
importance of subjective measures to identify the impact of negative self-perception of dental appearance which increased a lot with the severity of malocclusion⁵,⁷; So if we compare the results of our study with previous Iraqi study², we found that 37.1% of total sample have a severe malocclusion which need mandatory orthodontic treatment while about 27% had severe malocclusion and treatment was highly desirable²⁷, in contrast to 10.3% of the previous Iraqi study results which is an unfortunate outcome after a decade of years of recent advances in dentistry. This could be due to poor health education programs by the Iraqi Ministry of Health, large displacement of people from rural areas to the capital in recent years. The demand for orthodontic treatment was 29% among United States students⁹ and 35% among Indian²³, while in our research it was 13% as shown in table (3) that is related to reduction in the level of education and health awareness about orthodontics in some Iraqi communities.

Conclusions

1. Dissatisfaction with dental appearance has been noted to be more frequent than desire for treatment.
2. The subjective assessments of dental appearance and orthodontic treatment need correlate significantly with DAI.
3. In this study the subjects’ dissatisfaction does not necessarily mean they need orthodontic treatment but they have enough conviction about their aesthetic and dental appearance with little health awareness about orthodontics.

Conflict of Interest: No conflict of interest

Ethical Clearance: Taken from University of Baghdad, Baghdad, Iraq committee

Source of Funding: Self

REFERENCES


Aerobic and Facultative Anaerobic Bacteria in Tonsils of Different Ages with Recurrent Tonsillitis

Gulbahar F. Karim¹, Siham Sh. Al-Salihi², Qanat Mahmood Atya³, Kasim Sakran Abass⁴
¹Department of Basic Nursing Sciences, College of Nursing, University of Kirkuk, Kirkuk, Iraq; ²Medical Laboratory Technical Department, Northren Technical University, Iraq; ³Department of Biology, College of Science, University of Tikrit, Tikrit, Iraq; ⁴Department of Pharmacology and Toxicology, College of Pharmacy, University of Kirkuk, Kirkuk, Iraq

ABSTRACT

Background: Tonsillitis is considered one of the most otolaryngological diseases. It might lead to tonsillectomy if not treated properly.

The Aims: The aim of the current study is to determine the prevalence of chronic tonsillitis caused by bacterial infection among different age groups of both sexes at Kirkuk City. In addition, find out the bacterial load in the tonsillitis cases, as well as their susceptibility pattern to some common antibiotics.

Method: Two hundred and ten throat swabs were taken from patients with signs and symptoms of chronic tonsillitis. The swab samples were cultured on different culture media. The isolates were diagnosed using laboratory methods for identification of bacteria.

The Results: Revealed a high prevalence of chronic tonsillitis in Kirkuk city and it was more predominant in female (55.63%). The female to male ratio was 1.2:1. The most affected age group was (1-10) years old, constitute (35%) of all participants. There are 160 samples produce positive bacterial growth. The results showed that Streptococcus pyogenes was the most infectious bacteria associated with chronic tonsillitis which constitute (41.9%) of bacterial isolates, followed by Staphylococcus aureus (35.6%), Streptococcus parasanginus (7.5%), Streptococcus mitis (6.3%), Streptococcus agalactiae (5.6%), and Streptococcus mutans (3.1%). The results of antibiotic sensitivity test, disc diffusion method revealed that the most isolates under investigation were found to be multidrug resistant. Since all isolates were resistant 100% to Ampicillin, followed by high rate resistant to penicillin (82.58%), with moderate resistance to Erythromycin (59.92%), Amoxicillin-Clavulanic acid (59.68%), and less resistant to Cefotaxime (47.70%), Ceftriaxone (38.08%). However, most of them were highly sensitive to Ciprofloxacin, and Imipenem.

Conclusion: The knowledge about the most likely local infectious microorganisms and their susceptibility to antibiotics can reduce the chance of chronic tonsillitis.

Recommendation: It is recommended to control throat infections and tonsillitis, this required the availability of primary care with adequate dose, and course of appropriate antibiotics treatment, which play important role in the prevention of chronic tonsillitis and its long term squeal.

Keywords: Tonsillitis, Antibiotics, Bacteria, Tonsillectomy, Streptococcus pyogenes.

Introduction

Tonsillitis is the term refer to inflammation of tonsils, which are organs of the immune system, this tissue naturally act as a defense against infection. The tonsillitis considers one of the most otolaryngological diseases, which might lead to tonsillectomy operation for many patients. It is usually indicated when there are six
attack or more per year for two successive years. Other indications of tonsillectomy include; obstructive sleep apnea, Quinsy, and suspicion of malignancy. It has the potential when performed for the proper requirement, as infectious indication. The etiological agents of tonsillitis might be viruses, as Epstein-Barr virus, rhinovirus, adenovirus, parainfluenza, influenza type A, and B. Most viruses likely have a role in the development of tonsillitis, crypt obstruction, and secondary bacterial infection. The most prevalent bacteria involved in tonsillitis were *Streptococcus pyogenes* that cause sore throat, *Staphylococcus aureus*, *Haemophilus influenzae*. The less frequent microorganisms encountered were different Staphylococcus species, Streptococcus species, and other oral microflora. Also some species of intestinal bacteria were detected by some investigators which might be attributed to oral fecal contamination. Multidrug resistant emerged among most of these microorganisms, which may be due to injudicious, and over use of antibacterial therapies without following proper antibiotic policy. The aims of the present study is to determine the prevalence of chronic tonsillitis caused by bacterial infection among different age groups of both sexes at Kirkuk City. In addition find out the bacterial species in the tonsillitis cases, as well as their susceptibility pattern to some common antibiotics.

**Patients and Method**

Two hundred and ten throat swabs were tacked from patients with signs and symptoms of chronic tonsillitis, who were attending Azadi Teaching Hospital at Kirkuk City during a period of the 1st of January to the end of December, 2017, their genders and ages, were recorded. The tonsillar swab was inserted into tonsils’ region for each patient, carefully rotated there, and then withdrawn avoiding contaminated with mouth and transported immediately to laboratory under aseptic condition.

**Bacteriological Study:** The swab samples were cultured on Brain heart infusion broth (transport media), Nutrient agar and MacConkey agar, then incubated at 37°C for 24 hours. Also, they were cultured on chocolate agar then incubated anaerobically in a candle jar at 37°C for 24-48 hours. The growing colonies were further cultured on other media as Mannitol salt agar. The pure colonies were tested with the gram staining, and biochemical tested for identification of bacteria according to Bergey’s manual of determinative bacteriology [8], then the results confirmed by Api, Staph. and Api Strep. System (BioMérieux, France).

**Antibiotic Susceptibility Test:** All the isolated bacterial species were submitted to eight antibiotic discs using the disc diffusion method. The antibiotics including Ampicillin (AM) 30 mg, Penicillin (P) 10mg, Amoxicillin-clavulanic acid (AMC), Cefotaxime (CTX) 30 mg, Ceftriaxone (CRO) mg, Erythromycin (E), 30mg, Ciprofloxacin (CIP) 10mg, and Imipenem (IMP) mg, (Oxoid Company). A single colony was transferred to 5ml nutrient broth then incubated at 37°C for 24hr. The inoculum was adjusted to 0.5 McFarland turbidity standard solution, then spread evenly with sterile swab on the surface of agar. The standard antibiotic discs were placed at some points in the same Petri dishes then they were stand for 45minutes. Later incubated at 37°C for 24hr. The diameter of zones of inhibition were measured and interpreted according to.

**The Results and Discussion:** Table (1) demonstrates the distribution of tonsillitis according to gender and age groups. It revealed the high rate of chronic tonsillitis in this city. Also it showed that the chronic tonsillitis was more predominant in female with frequency of 89 (55.63%) than male which include only 71(44.38%) of total participants. The male to female ratio was 1: 1.25. Regarding the age, it had been found that the most affected age group was (1-10) years old with the frequency of 56(35%) patients. While the less age group were (41-50) years old.

**Table 1:** Distribution of tonsillitis with positive bacterial culture according to gender and age groups

<table>
<thead>
<tr>
<th>Years</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>22</td>
<td>13.75</td>
<td>34</td>
<td>21.25</td>
<td>56</td>
<td>35</td>
</tr>
<tr>
<td>11-20</td>
<td>18</td>
<td>11.25</td>
<td>26</td>
<td>16.25</td>
<td>44</td>
<td>27.5</td>
</tr>
<tr>
<td>21-30</td>
<td>15</td>
<td>9.38</td>
<td>19</td>
<td>11.88</td>
<td>34</td>
<td>21.25</td>
</tr>
<tr>
<td>31-40</td>
<td>5</td>
<td>3.13</td>
<td>9</td>
<td>5.63</td>
<td>14</td>
<td>2.24</td>
</tr>
<tr>
<td>41-50</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.63</td>
<td>1</td>
<td>0.63</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>44.38</td>
<td>89</td>
<td>55.63</td>
<td>160</td>
<td>100</td>
</tr>
</tbody>
</table>


The result of present study was in agreement with Jamal who found in a study on tonsillitis including 200 patients, in which the percentage of females was higher (56.6%) than the males. Also other investigators in Baghdad reported the children under fifteen years were more susceptible to tonsillitis than other ages.

These results might be attributed to increased activity of children at this age group which enhance the exposure to infection than other ages. In addition to contacting children with each other in kinder garden and school beside, intrafameliac transmission of infectious agents that cause the disease.

Table (2) illustrates the frequency and percentages of bacterial species isolated from infected tonsils. From the two hundred and ten throat samples, 160 samples produce positive bacterial growth. Accordingly only these samples included in the study. Out of 160 samples exhibit positive bacterial growth 67(41.9 %) of isolated bacteria were S. pyogenes, followed by S. aureus 57(35.6%), S. parasanginus 12(7.5%), S. mitis 10(6.3%), S. agalactiae 9(5.6%), and S. mutans 5(3.1%). This finding indicated that Lancefield Group A Beta Hemolytic Streptococcus GABHS (S. pyogenes) was the most infectious bacterium associated with tonsillitis. These results were in accordance with that conducted by Al-Mousawi who showed that 43.69% of his total isolates were S. pyogenes from throat swabs of 250 cases of tonsillitis in Najaf governorate. While the results of current study was higher than other investigator, who were found 37.3% of their total isolates were S. pyogenes from throat infection of patients with tonsillitis in Yemen. This result might be due to many virulence factors produced by this bacteria, in addition to climate variation. More over easy transmission of these bacteria by droplet spread, thus close contact between children in school or in large families can increase the risk.

S. aureus found to be the second most bacteria isolated in the present study. This result was in accordance with that reported by Bakir and Ali who revealed that this bacteria was the most frequent microorganism, which constitute 37.7% of their total isolates from tonsillitis cases. This finding due to the fact that S. aureus were posses many virulence factors that attributed to their invasiveness and pathogenicity as well as their resistant to multiple antibiotic agents.

The percentages of S. parasanginus and S. mitis were (7.5, and 6.3)% respectively. This finding was less than that reported by [13] who diagnosed (34.3 and 11.9) % of their total isolates from children with tonsillitis in Baghdad was S. parasanginus and S. mitis respectively. The less frequent bacterial species encountered through present research were S. agalactiae and S. mutans which constitute (5.6 and 3.1) % respectively of total isolates. These finding were relatively higher than that dictated by other authors who observed only (4.2 and 0.7) % of their isolates were belong to these two species S. agalactiae and S. mutans respectively. The finding of varies bacterial species with different frequency in this study may be due to the presence of these microorganisms as normal flora in the upper respiratory tract, moreover most of them were opportunistic and can cause disease especially in immune compromised patients.

Table 2: The frequency and percentages of bacterial isolates of patient with tonsillitis

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptococcus pyogenes</td>
<td>67</td>
<td>41.9</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>57</td>
<td>35.6</td>
</tr>
<tr>
<td>Streptococcus parasanginus</td>
<td>12</td>
<td>7.5</td>
</tr>
<tr>
<td>Streptococcus mitis</td>
<td>10</td>
<td>6.3</td>
</tr>
<tr>
<td>Streptococcus agalactiae</td>
<td>9</td>
<td>5.6</td>
</tr>
<tr>
<td>Streptococcus mutans</td>
<td>5</td>
<td>3.1</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100</td>
</tr>
</tbody>
</table>

Table (3) demonstrates the results of antibiotic sensitivity (disk diffusion method. It showed the most isolates under investigation were found to be multidrug resistant because they were resistant to more than three antibiotics. All isolates were resistant 100% to Ampicillin, followed by high rate resistant to Penicillin with moderate resistant rate to Erythromycin and less resistant to Amoxicillin-Clavulanic acid, Cefotaxime, and Ceftriaxone. Furthermore, there are some resistant of isolates were emerged to the other aminopenicillin as Amoxicillin despite its combination with inhibitor agent called clavulanic acid which increase its activity. These results were consistent with previous study conducted by Bakir and Ali who showed that the most Gram positive bacterial isolates from tonsillitis cases were highly resistant to Penicillin, and Ampicillin, more over most of these bacteria were β-lactamase producers. These results revealed the that the bacterial isolates under investigation were confer resistant to Beta-lactam (β-lactam) antibiotics which include Penicillin, Ampicillin, Amoxicillin, Cefotaxim, and ceftriaxone.
This finding might be due to the production of β-lactamase enzymes which hydrolyze β-lactam ring of β-lactam antibiotics. In contrast other investigators reported that there were no β-lactamase enzymes had been produced by their isolates which include 67 bacteria belong to β-hemolytic group C and F streptococci from patients with acute pharyngitis at Hilla city. They suggested the resistant of their isolated bacteria to antibiotics attributed to other causes as Alteration of β-lactam target enzymes, especially penicillin binding proteins. Moreover, Penicillin less effective in eradicating GABHS which found to be the most frequent bacteria in the current study because Penicillin have the capacity to eradicate the normal oropharyngeal flora, especially α-hemolytic Streptococci which provide an ecological barrier to GABHS infection by producing bacteriocin.

Concerning the moderate resistant of the studied isolates to Erythromycin in the present study, it might due to irregular and overuse of this drug without performed routine culture and sensitivity of microbes to the drug. This might lead to genetic mutation and acquire resistant gens to antibiotic. Other researchers investigated the molecular screening of erythromycin gene of seven strains of S. pyogenes. They improved all isolates did not contain the resistant genes, so they concluded that the resistant to erythromycin could be due to other causes as structural modification of erythromycin by glycosylation, phosphorelation, or lacton ring cleavage by erythromycin esterase.

There are many mechanisms by which bacteria confer resistance to the antibiotic agents including intrinsic impermeability, as well as acquired resistance as mutations, plasmids, and transposons. Furthermore, the tonsils with chronic inflammation, and adenoid contain more scar tissues following each infection. In turn causing an impairment of antibiotic penetrating into the core and become more resistant to antibiotic therapies.

Regarding the Ciprofloxacin and Imipenem, most isolates were found to be sensitive to these drugs with resistant rate of (2.49 and 2.92) % respectively. This finding was in agreement with other researchers who found the most effective antibiotics, and less resistant against his isolates from tonsillitis cases were Ciprofloxacin and Imipenem with resistant of (14.9 and 17.5) % respectively. Hence they could be used as drugs of choice for treating tonsillitis.

### Table 3: Illustrates antibiotic susceptibility pattern of all tested isolates

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>S. pyogenes</th>
<th>S. aureus</th>
<th>S. parasanginus</th>
<th>S. mitis</th>
<th>S. agalactiae</th>
<th>S. mutans</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td>67/100</td>
<td>57/100</td>
<td>12/100</td>
<td>10/100</td>
<td>9/100</td>
<td>5/100</td>
</tr>
<tr>
<td>P</td>
<td>55/82.09</td>
<td>45/78.94</td>
<td>8/66.67</td>
<td>9/90</td>
<td>7/77.78</td>
<td>5/100</td>
</tr>
<tr>
<td>AMC</td>
<td>37/55.22</td>
<td>20/35.08</td>
<td>6/50</td>
<td>8/80</td>
<td>7/77.78</td>
<td>3/60</td>
</tr>
<tr>
<td>CTX</td>
<td>37/55.22</td>
<td>49/85.96</td>
<td>5/41.67</td>
<td>7/70</td>
<td>3/33.33</td>
<td>0/0</td>
</tr>
<tr>
<td>CRO</td>
<td>41/61.19</td>
<td>45/78.94</td>
<td>1/8.33</td>
<td>8/80</td>
<td>0/0</td>
<td>0/0</td>
</tr>
<tr>
<td>E</td>
<td>32/47.76</td>
<td>33/57.89</td>
<td>7/58.33</td>
<td>6/60</td>
<td>5/55.56</td>
<td>4/80</td>
</tr>
<tr>
<td>CIP</td>
<td>10/14.92</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
</tr>
<tr>
<td>IMP</td>
<td>0/0</td>
<td>10/17.54</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
<td>0/0</td>
</tr>
</tbody>
</table>

It have been concluded that the disease was predominates among female, and (1-10) years old age group. The major pathogenic bacteria was S. pyogenes. Furthermore Most isolates were multidrug resistant. It is recommended to control throat infections and tonsillitis, this required the availability of primary care with adequate dose, and course of appropriate antibiotics treatment, which play important role in the prevention of chronic tonsillitis and its long term squeal.

### Conclusion

The chance of chronic tonsillitis can be reduced by increase the knowledge about the most likely local infectious microorganisms and their susceptibility to antibiotics.
Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: Not required.

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Estimation of Heritability for Reproductive Traits and Newborn Mortality in Iraqi Buffaloes through the Relationship of Dams with Daughters

Hamza M. AL-Khuzai¹, Makki K. H. AL-Dulaimi², Zaid E. H. Zaini¹
¹Department of Animal Production, College of Agriculture, University of Kufa, Iraq; ²Technical College of AL-Mussaib, University of AL-Furat AL-Awsat, Iraq

ABSTRACT

Study was conducted in Um-Khashim region (middle of Iraq) during the year 2018 by using 360 local buffaloes (180 daughters and 180 dams) in different parity to determine the relationship of daughters performance with their dams for reproduction and newborn mortality. Regression coefficient was estimate by determine the daughters regression on their dams for number of insemination, abortion rate, dystocia and mortality rate at first three months after calving. Heritability was also calculated depending on regression coefficient. Results showed that vary heritability estimates of the traits that studded, the highest heritability of the insemination number was in the 1st parity (0.38) while the least heritability was in the 4th parity (0.07). Due to the abortion rate, the highest heritability was noticed in 4th parity (0.39) compared with the least heritability which noticed in 7th parity (0.12). Dystocia heritability estimate was 0.38 in the 2nd parity while decreased to reach to 0.07 in 6th parity. Heritability of mortality rate in 1st month after calving was also differed by parity, the highest estimation was noticed in 1st parity (0.42) and decreased gradually to reach 0.08 in 5th parity.

Keywords: Buffalo, heritability, reproduction performance.

Introduction

Buffalo is characterized as the main source of dairy in many countries especially in Asia because more than 95% of global buffalo are found in this continent. Buffalo were found since a very ancient time in Mesopotamia region (Iraq) and was domesticated by Sumerians and Assyrians people, nowadays there are two species (Reverine and Marshes buffalo) which differ morphologically, milk production ability and chromosomes number¹². There are many challenges that prevent the buffalo breeding to blossom in Iraq such as the deficiency of food and absence of governmental supporting³.

Many studies around the world mentioned to reproductive difficulties in buffalo such as silent estrous, dystocia and early or late abortion, ⁴⁵ indicated that the reproductive problems in buffalo caused by varied environmental factors and lead to heavy economic losses. One of reproductive problems is abortion which classified as ovular and fetal. Dystocia is the other important problem which caused by many factors and lead to fetus lose⁶. Some of studies referred that the reproductive problems are resulted from maternal effects, ⁷ indicated that the maternal effects are more important than direct gene effects especially in postnatal period. ⁸ indicated that the buffalo are known to have grater incidence of maternal dystocia than the other ruminants while ⁹ referred to the poor reproductive efficiency of buffalo daughters depending on their dams performance. The major aim of this study is to focus on the maternal effects on reproductive problems in Iraqi buffalo such as high number of service per conception and abortion or dystocia through estimation the regression coefficients and heritability of these traits for daughters on dams and exploit the results as a guidelines in the improving of reproductive performance under farming conditions.
Maternal and Method

Data were made available from 360 buffaloes (180 daughters and 180 dams), in different parity and reared in classical system in the year 2018. The region of study is known Um-Khashim which is located in AL-Najaf province –middle of Iraq.

Experimental Animals: Animals were reared under farming conditions as a herds with different size. Natural insemination is used and the herds are fed on concentrate rations contains from wheat barn and quern cereals. Roughage food contains mainly from rice hay in addition to green food such as alfa alfa or clover according season. In summer, animals were fed on water plants such as cane and bulrush as a cheap and bulk food. Vaccines and veterinary process were made routinely and the milking buffaloes were milked manually twice a day.

Number of inseminations per conception, abortion rate, dystocia rate and mortality rate in first three months after calving were determined for both dams and daughters. Statistical Analysis System was used to estimate the regression coefficients of daughters performance on dams performance were calculated by the formula:

\[ b = \frac{\sum XY - (\sum X)(\sum Y)}{n} \]

\[ \frac{\sum X^2 - (\sum X)^2}{n} \]

where :
- \( x \): Dams performance
- \( y \): Daughters performance

Heritability for all traits that studded was estimated:

\[ h^2 = \frac{2b}{\sum Y - (\sum X)} \]

Results

Results represented in (table -1) showed a significant estimates (P<0.05) of regression coefficient of insemination number during the first three parities namely, 0.19, 0.17 and 0.13 respectively while the regression coefficients were not significant in 4 th – 7 th parity.

<table>
<thead>
<tr>
<th>Parity</th>
<th>Regression coefficient (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of inseminations</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1 st</td>
<td>0.19*</td>
</tr>
<tr>
<td>2 nd</td>
<td>0.17*</td>
</tr>
<tr>
<td>3 rd</td>
<td>0.13*</td>
</tr>
<tr>
<td>4 th</td>
<td>0.04</td>
</tr>
<tr>
<td>5 th</td>
<td>0.07</td>
</tr>
<tr>
<td>6 th</td>
<td>0.09</td>
</tr>
<tr>
<td>7 th</td>
<td>0.06</td>
</tr>
</tbody>
</table>

* (P<0.05)

Regression of abortion rate was significant in the first four parity namely 0.18, 0.15, 0.19 and 0.20 respectively while no significant regression in the 5 th, 6 th and 7 th parity. Regression of dystocia of daughters on their dams was significant in 1 st and 2 nd only (0.16 and 0.19) compared with the other parities. Results showed that a significant regression coefficients (P<0.05) of mortality rate the 1 st month after calving in 1 st, 2 nd, 3 rd, 4 th and 7 th parity namely, 0.21, 0.20, 0.18, 0.15 and 0.14 respectively and a significant regression in the 2 nd month after calving for all parities except 7 th parity (0.18, 0.15, 0.18, 0.20, 0.18 and 0.16 respectively) while a significant coefficient in 3 rd month after calving in the 1 st to 5 th parities namely, 0.17, 0.19, 0.15, 0.18, 0.16 respectively. Results in (Table -2) shoed the heritability estimates of the traits studded, the highest heritability of the insemination number was in the 1 st parity (0.38) while the least heritability was in the 4 th parity (0.07). Due to the abortion rate, the highest heritability was noticed in 4 th parity (0.39) compared with the least heritability which noticed in 7 th parity (0.12). Dystocia heritability estimate was 0.38 in the 2 nd parity while decreased to reach to 0.07 in 6 th parity. Heritability of mortality rate in 1 st month after calving was also differed by parity, the highest estimation was noticed in 1 st parity (0.42) and decreased gradually to reach 0.08 in 5 th parity.
Table 2: Heritability estimates for many traits in Iraqi buffaloes

<table>
<thead>
<tr>
<th>Parity</th>
<th>No. of inseminations</th>
<th>Abortion (%)</th>
<th>Dystocia (%)</th>
<th>Mortality after calving (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st month</td>
<td>2nd month</td>
<td>3rd month</td>
<td>1st month</td>
</tr>
<tr>
<td>1st</td>
<td>0.38</td>
<td>0.36</td>
<td>0.31</td>
<td>0.31</td>
</tr>
<tr>
<td>2nd</td>
<td>0.33</td>
<td>0.30</td>
<td>0.38</td>
<td>0.39</td>
</tr>
<tr>
<td>3rd</td>
<td>0.25</td>
<td>0.37</td>
<td>0.12</td>
<td>0.36</td>
</tr>
<tr>
<td>4th</td>
<td>0.07</td>
<td>0.39</td>
<td>0.15</td>
<td>0.29</td>
</tr>
<tr>
<td>5th</td>
<td>0.14</td>
<td>0.19</td>
<td>0.17</td>
<td>0.08</td>
</tr>
<tr>
<td>6th</td>
<td>0.17</td>
<td>0.14</td>
<td>0.07</td>
<td>0.15</td>
</tr>
<tr>
<td>7th</td>
<td>0.11</td>
<td>0.12</td>
<td>0.22</td>
<td>0.28</td>
</tr>
</tbody>
</table>

In 2nd month after calving, heritability estimate of mortality rate was 0.39 in 4th parity compared with 0.24 in 7th parity. The heritability estimates of mortality rate in the 3rd month after calving was in the same direction, the highest value was noticed in 2nd parity compared with the 7th parity namely 0.38 and 0.10 respectively.

**Discussion**

The results of present study indicated that the genetic relationship of dams and daughters are strong in the beginning of life and trend to decline with the progress of age. The results came hormonal with others past studies that referred to the decrease of maternal effect with age progress. 11reported that the estimate of heritability based on daughters regression on dams performance for reproductive traits were high in early parity compared with late parity in Egyptian buffalo. 12,13showed that the regression estimation is an efficient tool to estimate the genetic effect of dams on daughter performance. 14,15reported that the maternal effect are modulate offspring performance through the causal influence of dam genotype on her daughters. Results showed a that the abortion rate and newborn mortality in daughters are correlated with dams status therefore, we can predict of daughters status depending on their dams and select the best individuals to be dams in next generation. Most of studies referred that the abortion or calve mortality are resulted from environmental causes such as diseases, poor food and bad management16 and ignore the genetic relationship between dam and daughter. Many studies reported that we can exploit the genetic parameters such as heritability for selection and improving but the accuracy of estimation depends on the amount and quality of primary data17. Therefore, we can find a vary estimates of heritability in different studies for the same traits.

**Conclusion**

The results of current study providing the link between maternal effect and some of reproduction problems in Iraqi buffalo and we can exploit this relationship to improve animals under farming conditions.

**Conflict of Interest:** None

**Source of Funding:** Self

**Ethical Clearance:** Not required.

**REFERENCE**


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Effect of Thyroid Hormone Abnormalities on Hemoglobin A1c in Hemodialysis Patients Taking Erythropoietin

Hanan L. Al-Omary¹, Zainab M. Alawad², Buraq Husseini³
¹PhD, Assistant Professor; ²MSc, Assistant Lecturer; Physiology Department, College of Medicine, University of Baghdad; ³MSc, Assistant Lecturer, Doctor; Department of Anesthesia Techniques, Al-Nisour University College

ABSTRACT

Background: Hemoglobin A1c (HbA1c) is a widely used test for glycemic control. It is done for chronic kidney disease (CKD) patients. Renal disease is accompanied by thyroid abnormalities, which affect HbA1c, especially in those taking erythropoiesis-stimulating agents (ESAs). We aimed to find the effect of thyroid dysfunction on HbA1c in hemodialysis patients taking ESAs and those who do not.

Materials and Method: Fifty six patients were included in this study, which was done between September 2017 and June 2018, in Baghdad Teaching Hospital. Thyroid stimulating hormone, free T3, free T4 and HbA1c measurements were done. The patients were divided into 2 groups; those who took ESAs and those who did not, then they were subdivided into those with hypothyroidism and hyperthyroidism according to the Body mass index (BMI).

Results: Comparing HbA1c levels in hemodialysis patients taking ESAs and those who did not, showed no significant difference (5.79 ± 1.91 vs. 6.19 ± 1.64, \( P = 0.09 \)). The difference was also not significant in both hypothyroid and hyperthyroid patients in both high and low BMI patients. The only significant difference in HbA1c was between hyperthyroid and hypothyroid patients in those not taking ESAs, and having low BMI (4.97 ± 1.36 and 7.51 ± 0.87 respectively, \( P = 0.02 \)).

Conclusion: There is no significant influence of thyroid hormone changes on HbA1c levels in hemodialysis patients taking and not taking ESAs.

Keywords: Hemoglobin A1c, Chronic kidney disease, Thyroid dysfunction, Hemodialysis, Erythropoiesis-stimulating agents.

Introduction

Chronic kidney disease (CKD) is a universal problem causing great burden on the health system.¹ It is a prevalent state that influence more than fifty million people worldwide.² A lot of endocrinological deviations followed it, although pathogenesis is not settled yet.³ Thyroid hormones (THs) are mandatory for kidney development and for preserving water and electrolyte homeostasis. The kidney is responsible for THs metabolism and excretion.⁴ In CKD, level of thyroid hormones is usually aberrant.³ Different changes occur in the thyroid gland, these involve decreased thyroid hormone levels in the circulation, changed metabolism of peripheral hormone, reduced attaching to carrier proteins, potential decrease in hormone content in tissues, and a rise in iodine storing in the thyroid gland. Iodine excretion in urine decreases in CKD, which increasing inorganic iodine in the presence of iodine in the thyroid gland, which then makes the gland larger.⁵

Although the occurrence rate of hyperthyroidism is nearly the same in end stage renal disease (ESRD) patients and normal individuals, hypothyroidism is noticed in 3.4% of ESRD patients and 0.6% of normal individuals. This increased occurrence of hypothyroidism in ESRD
illustrates that searching for thyroid abnormal function, must be taken into account in assessing ESRD patients.\textsuperscript{5}

Thyroid hormones encourage erythrocyte formation, and hypothyroidism generally leads to hypoproliferative erythropoiesis. Moreover, thyroid hormones stimulate albumin metabolism, and its destruction is decreased in hypothyroidism. The cases which influence erythrocyte production cause incorrect increase or decrease in HbA1c.\textsuperscript{6, 7}

HbA1c is made up by the permanent attachment of glucose to hemoglobin across the lifetime of the red blood cells,\textsuperscript{8} and it constitutes about 60\% to 80\% of the glycated hemoglobin. In a hyperglycemic state, beta-chain of the hemoglobin increases glycation, making the assessment of HbA1c beneficial.\textsuperscript{9}

The American Diabetes Association (ADA) suggested the measurement of HbA1c for diagnosing diabetes and pre-diabetic state. It is the most approved method for evaluating chronic glycemia in diabetic patients.\textsuperscript{10} Low HbA1c levels, which are not because of lack of proper nutrition or anemia, were related to better survival in hemodialysis patients.\textsuperscript{8} An updated study found that HbA1c levels may show an underestimated glycemic control results in diabetic patients on hemodialysis.\textsuperscript{11}

Although some studies reported that erythropoietin intake might influence HbA1c in hemodialysis patients, this condition is not proved in people with CKD not on hemodialysis schedule.\textsuperscript{12}

We aimed to find the effect of thyroid dysfunction on HbA1c in hemodialysis patients taking erythropoiesis-stimulating agents (ESAs) and those who do not.

**Materials and Method**

Fifty six participants were included in this prospective study during the period between September 2017 and June 2018. They were thirty four females aged \(36.82 \pm 14.46\) years and twenty two males aged \(47.39 \pm 14.17\) years. The data were collected from the dialysis unit of Baghdad Teaching Hospital.

The patients enrolled were those with ESRD on regular hemodialysis, some of them were taking ESAs for at least four months.

Exclusion criteria: Diabetic patients, patients having hemoglobinopathy, and patients taking treatment for thyroid dysfunction.

The research was in accordance with the ethical standards of Helsinki Declaration of 1975, as revised in 2000. Informed consents were taken from the participants.

Demographic data, height, weight, smoking condition, and medications history were recorded.

The body mass index (BMI) was measured, a patient with BMI of \( \geq 25\) was considered obese, and a patient with BMI of \(< 25\) was considered non obese.\textsuperscript{13}

Blood (ten ml) was withdrawn, 5 ml was sent for HbA1c measurement and 5 ml was centrifuged and the serum was frozen then analyzed for free T3, free T4 and TSH.

HbA1 was analyzed within 24 hours of collection (refrigerated when not measured directly) by an automated high-performance liquid chromatography analyzer (ion-exchange chromatography) (HLC-723 G7; Tosoh Corporation, Tokyo, Japan or the Menarini HA-8160 A1C analyser). Free T3 (FT3) and free T4 (FT4) were determined by fluorimmunoassay method and TSH by immunoradiometric assay (IRMA).

All patients were on hemodialysis for 4 hours/3 times a week. The participants were divided into two groups, those who were on ESAs treatment (number=27) and those who were not (number=29), then they were subdivided into high BMI patients (number=30), and low BMI patients (number=26) and into hypothyroid (number=31) and hyperthyroid (number=25) patients.

All participants taking ESAs had hemoglobin \( \leq 10.5\) g/dl and were considered iron, vitamin B12, and folate replete before starting the treatment. Patients were considered iron replete after a serum ferritin level of \( > 200 \) \( \mu \)g/l or have taken intravenous iron at least 6 weeks before ESAs treatment. Darbepoetin \( \alpha \) (Aranesp) was given at 750 nanograms/kg (or 60 U/kg as intravenous bolus injection after each dialysis session) every two weeks and continued during study duration. ESAs dose was adjusted every month till reaching hemoglobin value of 10.5–12 g/dl.

Measurement of HbA1c in those taking ESAs was done after at least 4 months of the treatment.

The guidelines of the 2005 National Kidney Foundation Kidney Disease Outcomes Quality Initiative
did not obviously confirm a target HbA1c level for diabetic and ESRD patients, but levels of 6-7% was accepted.\textsuperscript{14} The ADA considered HbA1c levels <5.7% as normal, 5.7-6.4% as the pre-diabetic level and ≥6.5% as the diabetic level.\textsuperscript{15} \textbf{Statistical Analysis:} Statistical analysis was done by SPSS 20.0. Values were in mean ± standard deviation and using Independent samples T test where appropriate. A \textit{P} value less than 0.05 was considered significant.

\textbf{Results}

There were no significant differences between males and females regarding age and BMI (Table 1).

\textbf{Table 1: Age and BMI of hemodialysis patients}

<table>
<thead>
<tr>
<th></th>
<th>Males (number = 22)</th>
<th>Females (number = 34)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>47.39 ± 14.17</td>
<td>36.82 ± 14.46</td>
<td>0.13</td>
</tr>
<tr>
<td>BMI (Kg/m$^2$)</td>
<td>26.14 ± 8.81</td>
<td>26.72 ± 10.30</td>
<td>0.08</td>
</tr>
</tbody>
</table>

BMI = Body mass index

Regarding HbA1c level, it was non-significantly higher in patients who did not take ESAs (Table 2).

\textbf{Table 2: HbA1c in patients taking ESAs and patients not taking ESAs.}

<table>
<thead>
<tr>
<th></th>
<th>Patients taking ESAs (number = 27)</th>
<th>Patients not taking ESAs (number = 29)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c (%)</td>
<td>5.79 ± 1.91</td>
<td>6.19 ± 1.64</td>
<td>0.09</td>
</tr>
</tbody>
</table>

ESAs= Erythropoiesis-stimulating agents

Table 3 shows the differences in HbA1c level between hyperthyroid patients taking and not taking ESAs with high and low BMI, HbA1c is higher in patients not taking ESAs in both groups of patients with high and low BMI, but these differences are not statistically significant. Patients with hypothyroidism who were taking ESAs had less HbA1c levels than those not taking ESAs in both high and low BMI groups, but the difference was also not significant (Table 3).

\textbf{Table 3: HbA1c in hypothyroid and hyperthyroid patients in those taking ESAs and those who were not in both high BMI and low BMI groups}

<table>
<thead>
<tr>
<th></th>
<th>High BMI patients (number = 30)</th>
<th>Low BMI patients (number = 26)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patients taking ESAs (number = 8)</td>
<td>Patients not taking ESAs (number = 9)</td>
</tr>
<tr>
<td>HbA1c (%) in hypothyroid patients (number = 31)</td>
<td>5.93 ± 2.03</td>
<td>8.14 ± 1.06</td>
</tr>
<tr>
<td></td>
<td>Patients taking ESAs (number = 6)</td>
<td>Patients not taking ESAs (number = 7)</td>
</tr>
<tr>
<td>HbA1c (%) in hyperthyroid patients (number = 25)</td>
<td>6.32 ± 2.40</td>
<td>7.34 ± 1.84</td>
</tr>
</tbody>
</table>

ESAs= Erythropoiesis-stimulating agents; BMI= Body mass index

No significant differences were found in HbA1c between hyperthyroid and hypothyroid patients taking ESAs or not with high BMI although it was slightly higher in hypothyroid patients not taking ESAs, Table 4.
Table 4: The differences of HbA1c between hypothyroid and hyperthyroid high BMI patients in those taking ESAs and those who were not

<table>
<thead>
<tr>
<th></th>
<th>Patients with high BMI not taking ESAs (number = 16)</th>
<th>Patients with high BMI taking ESAs (number = 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hyperthyroid (number = 7)</td>
<td>Hypothyroid (number = 9)</td>
</tr>
<tr>
<td>HbA1c (%)</td>
<td>7.34 ± 1.84</td>
<td>8.14 ± 1.06</td>
</tr>
</tbody>
</table>

ESAs = Erythropoiesis-stimulating agents; BMI = Body mass index

A statistically significant difference was shown in HbA1c in participants not taking ESAs with low BMI between hypothyroid and hyperthyroid patients being higher in hypothyroid group ($P=0.02$) whereas this difference was not significant in patients taking ESAs (Table 5).

Table 5: The difference of HbA1c between hypothyroid and hyperthyroid low BMI patients in those taking ESAs and those who were not

<table>
<thead>
<tr>
<th></th>
<th>Patients with low BMI not taking ESAs (number = 13)</th>
<th>Patients with low BMI taking ESAs (number = 13)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hyperthyroid (number = 6)</td>
<td>Hypothyroid (number = 7)</td>
</tr>
<tr>
<td>HbA1c (%)</td>
<td>4.97 ± 1.36</td>
<td>7.51 ± 0.87</td>
</tr>
</tbody>
</table>

ESAs = Erythropoiesis-stimulating agents; BMI = Body mass index

Discussion

HbA1c may be influenced by the severity of kidney malfunction. This study found that HbA1c level is lower in patients taking ESAs than those who did not, however the difference was not significant.

In hemodialysis patients, blood loss during treatment and multiple blood tests cause reduction of erythrocytes survival. Shortened red blood cell survival, the transfusion of blood and erythropoietin also decrease HbA1c. This agrees with Ng et al, who found a reduction of HbA1c in patients treated with ESAs and iron therapy. The decrease of the HbA1c after ESAs or iron has been thought to be due to the production of new erythrocytes, leading to disturbance of young to old cells percentage, in addition to a change in red-cell glycation rates. Nakao and team mentioned a decrease in HbA1c in non-diabetic patients with CKD on hemodialysis after ESAs treatment. This reduction was higher compared with our results, which could be explained by the fact that iron therapy when given at the same time, most likely stimulated HbA1c lowering action.

Blood sugar binds with the hemoglobin to pinpoint a level for HbA1c. But, HbA1c results are only correct when erythrocytes have normal lifespan. Patients on dialysis have shorter red cell survival; which reduces the needed time for sugar to bind with hemoglobin, and resulting in lower HbA1c levels. It was shown that hemodialysis patients treated with erythropoietin have a transient reduction in HbA1c.

No significant differences were found in HbA1c between hyperthyroid patients taking ESAs and those who were not whether they have high or low BMI, although the level is higher in patients not taking ESAs. The same results were obtained in hypothyroid patients. HbA1c was higher in those with high BMI, this was in accordance with other researchers. However, Iso et al, and Koga et al, found no association between BMI and HbA1c.

Hypothyroidism and hyperthyroidism, cause changes in kidney function, and reticulocyte production. HbA1c was non-significantly different between hyperthyroid and hypothyroid patients in high BMI group whether in those taking ESAs or not. But the difference was significant between hyperthyroid and hypothyroid patients in the group of low BMI and was not taking ESAs, where it was higher in hypothyroid patients. This agrees with Kim and co-workers who...
found that HbA1c is spuriously high in non-diabetic patients with overt hypothyroidism.\(^6\) HbA1c was higher in hypothyroid patients than control subjects, and its levels were reduced by thyroid hormone treatment. THs potentiate erythrocyte formation, and hypothyroidism mostly causes hypoproliferative erythropoiesis.\(^{22}\) THs replacement increases erythropoietin, reticulocyte count, and mean corpuscular hemoglobin (MCH). The change in HbA1c value has a significant negative correlation with the change in reticulocyte count or MCH. All the above suggests that thyroid hormone treatment is accompanied by a reduction of HbA1c.\(^{6,23}\) Whereas, Ford and team reported a significant increase in HbA1c in the hyperthyroid group due to alterations of glycemic regulation in most hyperthyroid patients.\(^{24}\)

The limitation is a relatively small sample size as it was hard to find patients with thyroid problems especially hyperthyroid ones who have renal problems.

**Conclusion**

There is no significant difference in HbA1c level between hemodialysis patients who were taking ESAs and those who were not, in the hyperthyroid and hypothyroid patients having high and low BMI although it was lower in the treatment groups. The only significant difference in HbA1c was found between hyperthyroid and hypothyroid patients who were not taking ESAs and with low BMI being higher in the hypothyroid group.

**Conflict of Interest:** None.

**Source of Funding:** None.

**Ethical Clearance:** All experimental protocols were approved by the College of Medicine, University of Baghdad, Iraq, and all experiments were carried out in accordance with approved guidelines.

**REFERENCES**


Efficacy of the Health Promotion Model-Based Intervention in Enhancing the Health Responsibility of Middle School Female Student: A Randomized Controlled Trial

Hiba Abdul-Wahid Dawood¹, Afifa Ridah Aziz²
¹MSc, ²PhD, Professor; Pediatric Nursing Department, College of Nursing, University of Baghdad, Iraq

ABSTRACT

A randomized controlled trial (RCT) was conducted by applying the Health Promotion Model (HPM) to (1) determine the effect of the Health Promotion Model-based intervention in promoting the health behaviors for students, (2) identify the association between students’ age, family’s socioeconomic status (SES), body mass index (BMI), and the health behaviors, and (3) investigate the differences in the health behaviors between the groups of grade, SES, birth order, and BMI. The study included a simple random sample of (180) female students (90 students for the study group and 90 students for the control group), who aged 11-16-years who were selected from the middle school of “Al-Ahwaz “ in Al-Rusafa side in Baghdad City. Data were collected through a self-report instrument that used the Health-Promoting Lifestyle Profile.

The study results revealed that the HPM-based intervention has positive effects on students’ Health Responsibility, Physical Activity, Nutrition, Spiritual Growth, Interpersonal Relations, and Stress Management. Younger students demonstrated poorer Health Responsibility, poorer Nutrition, and poorer Spiritual Growth. The better the socioeconomic status, the better the Stress Management. Except for obese students, students with greater BMI enjoy greater the Physical Activity level. The researcher recommends the need to implement interventions based on the health promotion models; particularly the Health Promotion Model in improving adolescents’ health-related behaviors, the need to conduct similar studies on larger sample size in different areas across Iraq, and the need to include other factors that can have an influence on students’ health behaviors in future studies.

Keywords: Health Promotion Model; Health Responsibility

Introduction

Adolescents constitute 1.2 billion of the world’s population, about 90% of those adolescents live in low and middle-income countries. Promoting healthy practices during adolescence is considered an investment in countries’ future health and social infrastructure. Many risk or protective factors for future adult disease either start or are reinforced during this critical period of life (¹).

In Iraq, the total number of girls who age 10-14-years is estimated to 1.9 million; which constitutes 6 percent of total population (²). According to Iraq woman integrated social and health survey (I-WISH), girls who age 10-14-years-old reported that they need information about girls’ family right and duties (61.7%), dealing with adults (61.4%), free self-expression (61.1%), right nutrition (58.5%), dealing with the disabled (57.8%), child abuse and its combating (52.8%), dealing with males (51.1%), and sport activities (49.7%).

Health promotion is defined as the process of enabling people to increase control over, and to improve, their health, enables people to increase control over their own health (³).

Moreover, health promotion covers a wide range of social and environmental interventions that are designed...
to benefit and protect individual people’s health and quality of life by addressing and preventing the root causes of ill health, not just focusing on treatment and cure (6). For children and adolescents, health promotion is defined as those strategies that promote child and young people’s health, prevent disease in children and young people, and foster equity for children and young people, within a framework of sustainable development (5). This involves advocating for children and enabling their voices to be heard, promoting a broad sense of health and wellbeing, assessing health needs, implementing a range of public health interventions, seeing children in the context of their families and communities, and cooperating between a wide network of individuals and organizations (6).

Adolescence is a transition from childhood to adulthood and includes rapid developmental, physical, psychological, cognitive, and behavioral changes (7). Adolescence is viewed as an appropriate time to establish healthy habits and prevent future health complications (8).

Health-related values, beliefs, and behavior patterns that are typically formed during adolescence ultimately affect health outcomes in adulthood (9). Furthermore, the behavioral patterns during these developmental periods help determine young people’s current health status and their risk for developing chronic diseases.

Health Responsibility: Health responsibility involves an active sense of accountability for one’s own wellbeing. It includes paying attention to one’s own health, educating oneself about health, and exercising informed consumerism when seeking professional assistance (10-12). Adolescence is a transitional period accelerated by physical, psychological, social, cultural, emotional and cognitive changes (13). Throughout the adolescent years, the body and brain grow and change, and while trying to become adjusted to these changes, the adolescent must learn to negotiate new responsibilities and establish a new sense of self-identity and autonomy which is essential for independence (14-15). With this transition, opportunities and challenges present for improving health and preventing disease. As adolescents progress from childhood to adulthood, they take on increasing individual responsibility for their daily health habits. Trying to emulate adult roles and behaviors is normal and healthy in these adolescent years, but some adolescents experiment in ways that endanger their health and safety and contribute to the development of chronic disease in adulthood (16).

Purpose Statement: This study aims to determine the effect of the Health Promotion Model-based intervention in promoting the health behaviors for students; particularly health responsibility.

Material and Method

Study Design: The research design for this study was an experimental, randomized controlled trial design, control occurs to decrease the possibility of error and thus increase the probability that the study’s findings are an accurate reflection of reality and the researcher can reduce the influence or confounding effect of extraneous variables on the study variables, also controlling extraneous variables enable the researcher to identify relationships among the study variables accurately and examine the effects of one variable on another.

Study Population: The study population included middle school female students. The target population for this study was drawn from adolescents. The total number of students in this school was 780 who aged from 11-17-years-old, who were living in Baghdad City, who met the inclusion criteria mentioned below.

The researcher distributed (200) copies of the study questionnaire to the accessible students. The returned questionnaires were 190; 10 of them were incomplete. So, they were excluded from the data analyses. The final sample size was 180. Thus, the response rate was 95%.

Ethical Considerations: The research proposal was first reviewed and approved by the Department of Pediatrics Nursing. Thereafter, the student researcher (SR) obtained the approval of the Ministry of Planning and Development/The Central Organization of Statistics, and the Ministry of Education, Al-Rusafa II Directorate of Education.

The Health-Promoting Lifestyle Profile II (HPLP) was used to measure the health behaviors (12). The HPLP is a 4-point Likert type scale that is composed of 9 items. These items were measured on a 4-point Likert scale. Responses on this scale range from 1 (Never) to 4 (Routinely). Total scores range from 9 to 36, with a higher score means better health responsibility.

The study sample were randomly and equally selected from each grade (seventh, eighth, ninth). The simple random sample method was used to recruit study subjects.
The study questionnaire was given to participants to complete (self-reporting). Distributing questionnaires in person allow the researcher to explain the instructions before the participants start answering the questions. The questionnaires were also used to collect the data in three time points (pre-intervention, post-intervention I 6-weeks after intervention, post-intervention II 6-weeks after post-intervention I) in middle school. After completing the pretest phase, the researcher initiated intervention that is based on the six constructs of the Health Promotion Model. This intervention included 12 lectures about health responsibility. This intervention emphasized the behavior-specific cognition and attitudes that include: Perceived Benefits, Perceived Barriers, Perceived Self-Efficacy, Activity-related affect or feeling states related to each health behavior to oneself or to the situation, and Interpersonal and situational influences. These lectures were presented for students for each grade separately by data show. Each lecture lasted for 45 minutes.

The descriptive statistical measures of frequency, percent, mean, and standard deviation were used to describe participants’ demographics. The repeated measures analysis of variance (RM-ANOVA) was used to measure the difference in the Health Responsibility over time.

Study Findings

Table 1: Participants’ Sociodemographic Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Study (N = 90)</th>
<th>Control (N = 90)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td>2.2</td>
</tr>
<tr>
<td>12</td>
<td>11</td>
<td>12.2</td>
</tr>
<tr>
<td>13</td>
<td>33</td>
<td>36.7</td>
</tr>
<tr>
<td>14</td>
<td>29</td>
<td>32.2</td>
</tr>
<tr>
<td>15</td>
<td>11</td>
<td>12.2</td>
</tr>
<tr>
<td>16</td>
<td>4</td>
<td>4.4</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>13.53 ± 1.07</td>
<td></td>
</tr>
<tr>
<td>Socioeconomic Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper lower class</td>
<td>23</td>
<td>25.6</td>
</tr>
<tr>
<td>Lower middle class</td>
<td>46</td>
<td>51.1</td>
</tr>
<tr>
<td>Upper middle class</td>
<td>20</td>
<td>22.2</td>
</tr>
<tr>
<td>Upper class</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>BMI:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>14</td>
<td>15.5</td>
</tr>
<tr>
<td>Normal range</td>
<td>52</td>
<td>57.8</td>
</tr>
<tr>
<td>Overweight</td>
<td>16</td>
<td>17.8</td>
</tr>
<tr>
<td>Class I Obesity</td>
<td>7</td>
<td>7.8</td>
</tr>
<tr>
<td>Class II Obesity</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>22.59 ± 5.2</td>
<td></td>
</tr>
</tbody>
</table>

The age mean for participants in the study group is 13.53 ± 1.07; more than a third age 13-years-old (n = 33; 36.7%), followed by those who age 14-years-old (n = 29; 32.2%), those who age 12 and 15-years-old (n = 11; 12.2%), those who age 16-years-old (n = 4; 4.4%), those who age 11-years-old (n = 2; 2.2%). For the control group, the age mean is 13.64 ± 1.3; more than a quarter age 13 and 14-years-old (n = 24; 26.6%), followed by those who age 15-years-old (n = 16; 17.8%), those who age 12-years-old (n = 14; 15.6%), those who age 16-years-old (n = 8; 8.9%), and those who age 11-years-old (n = 4; 4.4%).
Concerning the SES, more than two-fifth in the study group are of the lower middle class \((n = 46; 51.1\%\), followed by those who are of the upper lower class \((n = 23; 25.6\%\), those who are of the upper middle class \((n = 20; 22.2\%\), and one who is of the upper class \((n = 1; 1.1\%\). For the control group, more than two-fifth are of the lower middle class \((n = 38; 42.2\%\), followed by those who are of the upper middle class \((n = 32; 35.5\%\), those who are of the upper lower class \((n = 14; 15.6\%\), and those who are of the upper class \((n = 6; 6.7\%\).

Regarding the BMI, the BMI mean for participants in the study group is \(22.59 \pm 5.2\); more than a half are of normal range \((n = 52; 57.8\%\), followed by those who are overweight \((n = 16; 17.8\%\), those who are underweight \((n = 14; 15.5\%\), those who have class I obesity \((n = 7; 7.8\%\), and one who has class II obesity \((n = 1; 1.1\%\).

For the control group, the BMI mean is \(22.6 \pm 3.6\); more than a half are of normal range \((n = 48; 53.3\%\), followed by those who are underweight \((n = 22; 24.4\%\),

Table 2: Descriptive Statistics for the Values of the Health Responsibility over Time

<table>
<thead>
<tr>
<th>Health Responsibility</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Pretest</td>
<td>19.23</td>
<td>4.38</td>
<td>90</td>
</tr>
<tr>
<td>Study Posttest I</td>
<td>26.25</td>
<td>4.27</td>
<td>90</td>
</tr>
<tr>
<td>Study Posttest II</td>
<td>26.53</td>
<td>4.30</td>
<td>90</td>
</tr>
<tr>
<td>Control Pretest</td>
<td>19.63</td>
<td>4.90</td>
<td>90</td>
</tr>
<tr>
<td>Control Posttest I</td>
<td>19.43</td>
<td>5.34</td>
<td>90</td>
</tr>
<tr>
<td>Control Posttest II</td>
<td>19.66</td>
<td>4.84</td>
<td>90</td>
</tr>
</tbody>
</table>

The values of the Health Responsibility for the study group noticeably increase by time compared to the control group (Pretest = 19.23 vs. 19.63, Posttest II = 26.25 vs. 19.43, Posttest II = 26.53 vs. 19.66) respectively. Higher score means better Health Responsibility.

Table 3: Tests of Within-Subjects Effects for the Health Responsibility

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR (Study) Sphericity Assumed</td>
<td>3080.363</td>
<td>2</td>
<td>1540.181</td>
<td>146.896</td>
<td>.000</td>
<td>.623</td>
</tr>
<tr>
<td>HR (Study) Greenhouse-Geisser</td>
<td>3080.363</td>
<td>1.123</td>
<td>2741.946</td>
<td>146.896</td>
<td>.000</td>
<td>.623</td>
</tr>
<tr>
<td>HR (Study) Huynh-Feldt</td>
<td>3080.363</td>
<td>1.128</td>
<td>2731.280</td>
<td>146.896</td>
<td>.000</td>
<td>.623</td>
</tr>
<tr>
<td>HR (Study) Lower-bound</td>
<td>3080.363</td>
<td>1.00</td>
<td>3080.363</td>
<td>146.896</td>
<td>.000</td>
<td>.623</td>
</tr>
<tr>
<td>Error (HR Study) Sphericity Assumed</td>
<td>1866.304</td>
<td>178</td>
<td>10.485</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error (HR Study) Greenhouse-Geisser</td>
<td>1866.304</td>
<td>99.985</td>
<td>18.666</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error (HR Study) Huynh-Feldt</td>
<td>1866.304</td>
<td>100.375</td>
<td>18.593</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error (HR Study) Lower-bound</td>
<td>1866.304</td>
<td>89.000</td>
<td>20.970</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR (Control) Sphericity Assumed</td>
<td>2.867</td>
<td>2</td>
<td>1.433</td>
<td>2.255</td>
<td>.108</td>
<td>.025</td>
</tr>
<tr>
<td>HR (Control) Greenhouse-Geisser</td>
<td>2.867</td>
<td>1.021</td>
<td>2.809</td>
<td>2.255</td>
<td>.136</td>
<td>.025</td>
</tr>
<tr>
<td>HR (Control) Huynh-Feldt</td>
<td>2.867</td>
<td>1.021</td>
<td>2.807</td>
<td>2.255</td>
<td>.136</td>
<td>.025</td>
</tr>
<tr>
<td>HR (Control) Lower-bound</td>
<td>2.867</td>
<td>1.000</td>
<td>2.867</td>
<td>2.255</td>
<td>.137</td>
<td>.025</td>
</tr>
<tr>
<td>Error (HR Control) Sphericity Assumed</td>
<td>113.133</td>
<td>178</td>
<td>.636</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error (HR Control) Greenhouse-Geisser</td>
<td>113.133</td>
<td>90.840</td>
<td>1.245</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error (HR Control) Huynh-Feldt</td>
<td>113.133</td>
<td>90.903</td>
<td>1.245</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error (HR Control) Lower-bound</td>
<td>113.133</td>
<td>89.000</td>
<td>1.271</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

HR: Health Responsibility

There was a (a priori \(p = 0.01\)) significant difference \((F(1.123, 99.985) = 146.896, p = 0.01\)) in the Health Responsibility over time for participants in the study group. The omnibus effect (measure of association) for this analysis is .695, which indicates that approximately 69% of the total variance in the Health Responsibility values is accounted for by the variance in the administered intervention.
For the control group, there was no significant difference ($F(1.021, 90.840) = 2.255, p = 0.136$) in the Health Responsibility over time. The omnibus effect (measure of association) for this analysis is .025, which indicates that approximately 14% of the total variance in the Health Responsibility values is accounted for by the chance.

**Discussion of Findings**

This RCT used the Health Promotion Model as a theoretical framework to enhance female students’ health behaviors. There was a noticeable increase in the values of the Health Responsibility for the study group over time with a statistically significant difference. Moreover, approximately 69% of the total variance in the Health Responsibility values is accounted for by the variance in the administered intervention. This finding indicates the positive influence of the HPM-based intervention in enhancing students’ Health Responsibility.

**Conclusions**

The HPM-based intervention has positive effects on students’ Health Responsibility. The younger the student, the poorer the Health Responsibility.

**Implication for Practice:** There is a need to implement interventions based on the health promotion models; particularly the Health Promotion Model in improving adolescents’ health-related behaviors.

**Implications for Research:** There is a need to conduct similar studies on larger sample size in different areas across Iraq. There is a need to include other factors that can have an influence on students’ health behaviors in future studies.

**Implications for Education:** It is crucial to incorporate teaching materials that focus on promoting individuals’ health behaviors; particularly among adolescents into the curricula of different nursing programs.

**Conflict of Interest:** The researchers declare that there is no conflict of interest.

**REFERENCES**


Detection of Rotavirus Genotypes with Conventional PCR in a Group of Iraqi Children with Acute Viral Gastroenteritis

Hiba Sabah Jasim
Department of Microbiology, College of Medicine, University of Baghdad

ABSTRACT

Rotaviruses are one of the major causes of acute viral gastroenteritis in children under 5 years old worldwide, the highest mortality is observed in developing countries. The genome of the rotavirus is composed of 11 segments of ds RNA, according to the antigenic characteristics of the middle layer protein VP6 the virus can be classified into A to I serogroups, the most common serogroup that can cause more than 90% of the rotavirus infections in human is the rotavirus A. This study aimed to detect the rotavirus genotypes in the children with acute viral gastroenteritis as this disease causes many deaths and cost the country a lot of money for treatment, additionally if the diagnosis of the virus is early the disease will be under control. Methodology: This study was conducted during March to September 2017; included 200 stool samples collected from hospitalized children. Samples were of two groups, 150 sample of patient with acute viral gastroenteritis, the other 50 samples were collected from healthy children also under 5 years old. The result considered positive if ELISA and/or PCR gave positive result, while considered negative if both of them gave negative result. Findings: The incidence of the rotavirus in the patient group was (70/150) while only two cases (2/50) of the control group showed positive result, the most prevalence serotype was G2P4 with (40/150) in the patient group, additionally this serotype was the only serotype that was detected in control group in both two cases that showed positive result with rotavirus. Conclusion: Rotavirus genotyping is a major risk factor of viral gastroenteritis in children as the percentage of the virus was high. Recommendation: Prophylaxis and treatment of children under 5 years old is very important especially for children that attend hospitals.

Keywords: Rotavirus, genotyping, ELISA, Conventional PCR.

Introduction

Rotaviruses are the major cause of acute viral gastroenteritis in children under five years old (1, 2). These viruses are the common cause of gastroenteritis in the world especially in developed countries (3, 4), rotaviruses infections result in an estimated of 400,000 to 500,000 deaths in young children (5).

Rotaviruses are nonenveloped viral capsid containing a genome of 11 double stranded RNA (6, 7). The outer layer of the virus is formed by VP4 and VP7 proteins. While the intermediate layer consists of VP6, a conserved region, which is useful in the genotyping.

The inner layer of is formed by VP2, VP1 and VP3 (8, 9), additionally the virus consist of nonstructural proteins with diverse functions, such as NSP1 play a role in the modulation of the immunity, NSP3 regulates the viral gene expression, and NSP4 play important role in the induction of diarrhea in infected cells (10, 11).

The virus enters the cells by receptors then form endosome. The viral protein in the third layer damage the membrane of the endosome, this will create a differences in the calcium concentration causing breakdown of VP7 into its subunits, then VP2, and VP6 accumulate around the dsRNA forming the double layer particle (DLP), which is transcriptionally active (12). The RNA is replicated and the DLPs are assembled, then the progeny of the virus released by lysis (13).

Serotypes of the virus are defined by using antisera to purified virus particles prepared in hyperimmunized
animals. By measure the reactivity of antibody with the two proteins (VP4 and VP7), which induce antibodies with neutralizing activity\(^{(14,15)}\). In most cases the antibody reactivity is against VP7. Because VP7 makes up a greater percentage, also induces more specific antibodies than VP4 does, possibly because VP4 is lost during preparation of virus. The serotypes of viruses, defined by ELISAs, also confirmed by molecular techniques, which greatly simplified virus characterization, additionally the early diagnosis and treatment of the disease\(^{(16,17)}\).

**Material and Method**

This study was included 200 stool samples, 150 was obtained from children with acute viral gastroenteritis attend to the pediatric department of Al-Emamain Medical City at Baghdad, Iraq from March to September 2017, the other 50 samples was collected from healthy children as control group.

All samples were diagnosed by latex agglutination detection of rotavirus using the Diralex Rota-Adeno Kit (Finland), another diagnosis of the virus by ELISA technique.

**RNA Extraction:** Extraction of RNA from stool samples was done using QIAamp® RNA Mini Kit (USA) according to the manufacture instruction.

Reverse transcriptase PCR was done in order to convert the nucleic acid RNA to cDNA, and the integrity was checked by PCR amplification of GAPDH which was performed according to Rameshkumar\(^{(18)}\). After cycling, the PCR products were electrophoresed in 2% agarose gel. Presence of 240 bp band means positive result, and this means that the quality of cDNA is good, all samples in this study were of good quality. Then concentration and purity of cDNA of each sample was measured using Nanodrope instrument.

Rotavirus antigen was detected by ELISA by removable well strips plates (USA), 90 µl of each sample was add to two wells of the plate coated with pre and post immunization serum, incubated in the optimum conditions of the reaction (37°C, 2 hours, washing 5 times), rotavirus antigen was detected by adding HRP conjugated to anti SA-11 antibody, then incubated for 90 minutes in humid conditions, TMB substrate was added and incubate in the room temperature for 15 minutes, the reaction was stopped by adding 1 M phosphoric acid (USA), the results was read at 450 nm.

**Rotavirus G and P genotyping:** For the genotyping of rotavirus, G and P typing methods were used; PCR was carried out separately for the VP7 and VP4 genes, using the products of the first PCR of VP7 and VP4 genes as templates. For G genotyping G1, G2, G3, G4, G8, and G9 specific primers, and for P genotyping, P4, P6, P8, and P9 specific primers were used in the PCR, the sequence of these genotypes was shown in table 1 and 2.

A negative control consisting of buffer only was included also non template control was added; finally electrophoresis amplicon visualization was performed using an UV light transluminator.

**Table 1:** This table shows the primer sequences for P genotype of rotavirus\(^{(19)}\)

<table>
<thead>
<tr>
<th>Type Primer</th>
<th>sequences 5'-3'</th>
<th>Size Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>First amplification</td>
<td></td>
<td>876 bp</td>
</tr>
<tr>
<td>VP4 Forward TGGCTTCGCTCATTATAGACA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VP4 Reverse ATTTCGGACCATTTATAACC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second amplification genotyping primers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P4</td>
<td>CTATTGTTAGAGGTTAGAGTC</td>
<td>483 bp</td>
</tr>
<tr>
<td>P6</td>
<td>TGTTGATTAGTTGGATAA</td>
<td>267 bp</td>
</tr>
<tr>
<td>P8</td>
<td>TCTACTTGGATAACGTGC</td>
<td>345 bp</td>
</tr>
<tr>
<td>P9</td>
<td>TGAGACATGCAATTGGAC</td>
<td>391 bp</td>
</tr>
</tbody>
</table>

**Table 2:** This table shows the primer sequences for G genotype of rotavirus\(^{(19)}\)

<table>
<thead>
<tr>
<th>Type Primer</th>
<th>sequences 5'-3'</th>
<th>Size Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>First amplification</td>
<td></td>
<td>897 bp</td>
</tr>
<tr>
<td>VP7 forward TAGCTCCTTTTAATGTATGG</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conted…

<table>
<thead>
<tr>
<th>Primers</th>
<th>Sequence</th>
<th>Length (bp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>CAAGTACTCAAATCAATGATGG</td>
<td>158</td>
</tr>
<tr>
<td>G2</td>
<td>CAATGATATTAAACATTATTCTGTG</td>
<td>244</td>
</tr>
<tr>
<td>G3</td>
<td>ACGAACTCAACACGAGARG</td>
<td>464</td>
</tr>
<tr>
<td>G4</td>
<td>CGTTTCTGGTGAGAGTTG</td>
<td>403</td>
</tr>
<tr>
<td>G8</td>
<td>GTCACACCATTGTAAATTGG</td>
<td>651</td>
</tr>
<tr>
<td>G9</td>
<td>GTTGATGTGACTAYAAATAC</td>
<td>110</td>
</tr>
</tbody>
</table>

**Results**

This study showed the relationship between ELISA, and conventional PCR for detecting rotavirus 70 (46.7%) by PCR, while the percentage of the rotavirus with ELISA was 50 (33.3%). The incidence of diarrhea was more in the female group as 90 patients, while the number of male patients was 60, in control group the number of female was more than male, female samples were 30, while male samples were 20, as shown in table 3.

**Table 3: This table shows the classification according to age groups and sex**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Male Patients</th>
<th>Female Patients</th>
<th>Male Control</th>
<th>Female Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 weeks- 2 months</td>
<td>14</td>
<td>20</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>2 - 6 months</td>
<td>22</td>
<td>30</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>6 months- one year</td>
<td>14</td>
<td>22</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>One - 5 years</td>
<td>10</td>
<td>18</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>90</td>
<td>20</td>
<td>30</td>
</tr>
</tbody>
</table>

Results shows the highest incidence in the group of children with bottle feeding with 57.14%, also the incidence of rotavirus infection was high in the mixed type feeding with 28.57%, the lowest percentage of the infection was in breast feeding with 14.28%, as shown in table 4.

**Table 4: This table shows the distribution of rotavirus according to kind of feeding:**

<table>
<thead>
<tr>
<th>Kind of feeding</th>
<th>Patient number</th>
<th>%</th>
<th>Control number</th>
<th>%</th>
<th>Total number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottle feeding</td>
<td>40</td>
<td>57.14</td>
<td>2</td>
<td>100</td>
<td>42</td>
<td>58.8</td>
</tr>
<tr>
<td>Breast feeding</td>
<td>10</td>
<td>14.28</td>
<td>0.00</td>
<td>0.00</td>
<td>10</td>
<td>13.9</td>
</tr>
<tr>
<td>Mixed feeding</td>
<td>20</td>
<td>28.57</td>
<td>0.00</td>
<td>0.00</td>
<td>20</td>
<td>27.8</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100</td>
<td>2</td>
<td>100</td>
<td>72</td>
<td>100</td>
</tr>
</tbody>
</table>

The highest positive results were in the age group two to six months 42.3%; the lowest incidence was in the age group one to five years 17.9 %, by ELISA, while the results using PCR shows the highest percentage in the age group two to six months 61.5%; the lowest incidence was in the age group one to five years which was 21.4% as shown in table 5 and 6.

**Table 5: This table shows the frequency of rotavirus by ELISA**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Patients</th>
<th>Control</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+ve</td>
<td>%</td>
<td>-ve</td>
<td>%</td>
<td>+ve</td>
<td>%</td>
</tr>
<tr>
<td>2 weeks- 2 months</td>
<td>10</td>
<td>29.4</td>
<td>24</td>
<td>70.6</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2 - 6 months</td>
<td>22</td>
<td>42.3</td>
<td>30</td>
<td>57.7</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Conted…

<table>
<thead>
<tr>
<th>Age group</th>
<th>Patients</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+ve</td>
<td>%</td>
</tr>
<tr>
<td>2 weeks-2 months</td>
<td>14</td>
<td>41.2</td>
</tr>
<tr>
<td>2-6 months</td>
<td>32</td>
<td>61.5</td>
</tr>
<tr>
<td>6 months-One year</td>
<td>18</td>
<td>50</td>
</tr>
<tr>
<td>One -5 years</td>
<td>6</td>
<td>21.4</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>46.7</td>
</tr>
</tbody>
</table>

Table 6: This table shows the frequency of rotavirus by conventional PCR

PCR was used for genotyping of both VP4 and VP7, revealed G2P4 was detected (57.14%) in patients samples followed by G9P8 (7.14%), G2P8, G3P9, G4P4 (5.71%), G1P9 (4.29%), G1P4, G1P6, G8P4 (2.86%) and G3P4, G4P6, G4P9, G8P8 (1.43%), as shown in table 7.

<table>
<thead>
<tr>
<th>Genotypes of</th>
<th>P4</th>
<th>%</th>
<th>P6</th>
<th>%</th>
<th>P8</th>
<th>%</th>
<th>P9</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotavirus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>2</td>
<td>2.86</td>
<td>2</td>
<td>2.86</td>
<td>0</td>
<td>0.00</td>
<td>3</td>
<td>4.29</td>
</tr>
<tr>
<td>G2</td>
<td>40</td>
<td>57.14</td>
<td>0</td>
<td>0.00</td>
<td>4</td>
<td>5.71</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>G3</td>
<td>1</td>
<td>1.43</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>4</td>
<td>5.71</td>
</tr>
<tr>
<td>G4</td>
<td>4</td>
<td>5.71</td>
<td>1</td>
<td>1.43</td>
<td>0</td>
<td>0.00</td>
<td>1</td>
<td>1.43</td>
</tr>
<tr>
<td>G8</td>
<td>2</td>
<td>2.86</td>
<td>0</td>
<td>0.00</td>
<td>1</td>
<td>1.43</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>G9</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>5</td>
<td>7.14</td>
<td>0</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 7: This table shows the frequency of the rotavirus genotypes by conventional PCR

Discussion

Rotaviruses are with high diversity and can be differentiated into several different groups according to the antigenicity and gene composition of their VP6 (6, 7). The genome of rotavirus shows typical features which found in all rotaviruses regarded encoded proteins and conserved sequences at the genome segment ends. Each segment was found to encode one protein, with the exception of segment 10, which possesses two open reading frames (20, 21), for that reason this study was demonstrated to detect 24 different genotypes by PCR.

Rotavirus is a major cause of viral gastroenteritis in human especially children (22) using ELISA a good method for detection, additionally it’s of low cost and need simple experiences. However rapid and specific diagnostic method to detect the virus is needed to facilitate treatment of the disease (23).

This study detect the virus in 33.3% (50/150) from patients samples by ELISA, this result is similar to other Iraqi study which detect the virus in 37% (24), also other studies in neighboring countries such as in Jordan the prevalence of the virus was 33% (25), in Iranian study the incidence was 35% (26), while in Turkey the prevalence of the virus was 37% (27). While the detection of the virus by conventional PCR in this study was 70/150 which represented 46.7%, this result was similar to another Iraqi study which detect the virus in 42.45% (28), also these results similar to result in Kuwait as the prevalence was 44% (29), but the result of this study in the detection of the virus by PCR is less than the results in Oman which was 50% (30), also in Syria as the virus was detect in 61% of the samples (31).

The main objective of this study was to design a simple and sensitive PCR method for detection of a
broad range of rotavirus genotypes to be applied to routine monitoring of stool samples.

The method detect the presence of rotavirus in 70/150 isolates from patients group, also detect the virus in 2/50 isolates from control group as shown in (Table 7), involving 13 different G-P types from the 24 genotypes that was used in this study. The most prevalence was G2P4 which was detected in 57.14%, this result was similar to another Iraqi study as the detection was 53.33% (24).

In conclusion, this work reports the development, and application of PCR for the rapid detection of rotavirus genotypes. The results reported in this study highlight the inadequacies of non-molecular methods used for the routine detection of viruses and emphasize the importance of application of molecular to clinical services in hospital laboratories to provide definitive diagnoses, molecular methods could provide valuable information on the incidence of currently circulating viral strains, therefore lending itself to surveillance of viral transmission.

Ethical Clearance: The researcher already has ethical clearance from College of Medicine, University of Baghdad

Source of Funding: Self funding

Conflict of Interest: No conflict of interest

REFERENCES


Effect of Adding Medicinal Plant Extracts to The Broiler Diets on Productive Performance

Huda Q. Al-Himdany¹, Fadhil R. Abbas², Ahmed A. Allaw³

¹College of Agricultural Engineering Sciences, University of Baghdad, Iraq; ²College of Agriculture, University of Al Qasim Green, Iraq; ³College of Agriculture, University of Tikrit, Iraq

ABSTRACT

Considering approaches to efficiently produce broiler, Therefore, this study was conducted to demonstrate the effect of adding some extracts to medicinal plants (Oleobiotec®) in increasing the efficiency of production performance of broiler, for the period from 12 February to 18 March 2016. In this study, 192 chicks (Ross 308) one day old were randomly distributed to four treatments, each including three replicates of 16 birds, which were: Control group T1 (without addition) and the treatments T2, T3 and T4 which received extracts to medicinal plants (Oleobiotec®) at concentrations 100, 150 and 200 mg/kg feed respectively. The results of this study indicated that the addition of Oleobiotec® to the broiler diet, particularly T3 and T4 enhance the production performance of broiler especially in body weight and weight gain. Also, the results showed a significant improvement in the feed conversion ratio for T3 (150 mg Oleobiotec®/kg feed). Also, the results revealed no significant effect in feed consumption rate in all treatments and for all periods except two week. Its was concluded from the results of this experiment that’s adding different levels of Oleobiotec® to the broiler diet enhance the productive traits of birds especially for the treatment T3 (150 mg Oleobiotec®/kg feed).

Keywords: extracts to medicinal plants (Oleobiotec®), Broiler, Productive performance

Introduction

The continuous use of industrial antibiotics as growth promoters in poultry diets led to the emergence of resistant bacteria, which prompted Europe Union countries to ban their use in 2006. The researchers encouraged the selection of many alternatives, including probiotics, prebiotics, Organic acids, enzymes, herbs and medicinal plants. Most of these substances are natural sources that work towards enhancing the environment of digestive tract and enhance immunity through its role as antifungal and antibacterial. Using of medicinal plants as additives to the broiler diets has great importance due to their containment of effective substances such as flavins, glycosides, polyphenols, terpenoids and saponens. Plant oils or extracts can be used as an alternative to antibiotics because these plants have antibacterial efficacy as well as their beneficial effect on the digestive system and improve immune status and support growth and public health without toxic residues that may be caused by drugs and antibiotics.

The Oleobiotec®, extracted from a number of medicinal plants and spices, has been used for nearly 12 years of research and experiments which contain effective substances that increase the metabolic rate of food and supply the body with oxygen and nutrients. It also contains phenolic compounds such as Thymol and Carvacrol, which are highly effective antioxidants and thus protect red blood cells from damage caused by oxidation as antioxidant activity improves through the transport of oxygen needed to form hemoglobin as well as contains both terpenoids and flavonoids within essential oils and spices which acts as anti-inflammatory and work to maintain the level of white blood cells within the normal range, also it contains an active substances as Cinnamaldehyde which has a significant role in enhancing the function of the immune system in the bird body. Furthermore, the Oleobiotec® contain Shogaol and Zingerone that’s act as antibacterial agents. Oleobiotec® product is a mixture of extracts of six medicinal plants, three of which are essential oils of each of the plants of Marjoram, Thyme, Cinnamon and the other three components are powder of spices for each of the Ginger, Turmeric and Pepper plants, this product specialized for poultry nutrition is a fine yellow powder added to the broiler diets by 100 g/ton.
Therefore, the aim of this study was to know the effect of adding the Oleobiotec® product to the diets on the production performance of the broiler chicks.

**Materials and Method**

This study was conducted in the poultry field of the Department of Animal Production at the College of Agriculture/Al-Qasim Green University for the period from 12 February to 18 March 2016 to investigate the effects of adding different levels of Oleobiotec® products to the diets on the production performance of broiler. In this study, 192 chicks (Ross 308) of one day old were randomly distributed to four treatments with 48 chicks per treatment, each treatment included three replicates of 16 birds. Chicks were weighed and distributed to the treatments which were: T1 control group (without addition) and the treatments T2, T3 and T4 received Oleobiotec® at concentrations 100, 150 and 200 mg/kg feed respectively. The chicks were bred in ground cages its dimensions are 2x2 m covered with sawdust, water introduced to the chicks ad libitum while diet was given to the chicks as starter and finisher diets (table 1). The experiment continued for 35 days and the productivity traits were measured for each week of the experiment which included body weight, weight gain, Feed consumption and Feed Conversion Ratio (FCR). Complete Randomized Design were used to study the effect of treatments on the studied traits and comparing the significant differences between the means using Duncan test 14, while the Statistical Analysis System (SAS) was used to analyze the data statistically15.

**Table 1: Ingredient composition and chemical analysis of the basal diet**

<table>
<thead>
<tr>
<th>Feed ingredient</th>
<th>Starter (1-21 d)</th>
<th>Finisher (22-35 d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow corn</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Wheat</td>
<td>27.7</td>
<td>35.5</td>
</tr>
</tbody>
</table>

**Table 2: Effect of adding different levels of Oleobiotec® to the broiler diets on average live body weight (g/bird) (mean ± standard error)**

<table>
<thead>
<tr>
<th>Treatments</th>
<th>1w</th>
<th>2w</th>
<th>3w</th>
<th>4w</th>
<th>5w</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>169.00 ± 0.00 a</td>
<td>446.00 ± 4.00</td>
<td>856.33 ± 12.81</td>
<td>1404.00 ± 18.01</td>
<td>1963.67 ± 18.01 b</td>
</tr>
<tr>
<td>T2</td>
<td>161.33 ± 2.72 ab</td>
<td>458.67 ± 10.33</td>
<td>846.00 ± 24.55</td>
<td>1422.00 ± 21.00</td>
<td>2015.33 ± 15.33 ab</td>
</tr>
<tr>
<td>T3</td>
<td>160.33 ± 1.33 b</td>
<td>462.67 ± 6.33</td>
<td>864.67 ± 14.67</td>
<td>1374.67 ± 32.62</td>
<td>2083.00 ± 27.15 a</td>
</tr>
<tr>
<td>T4</td>
<td>167.67 ± 3.71 a</td>
<td>454.33 ± 8.98</td>
<td>862.33 ± 15.14</td>
<td>1383.00 ± 29.14</td>
<td>2070.33 ± 4.63 a</td>
</tr>
</tbody>
</table>

Significant: * N.S N.S N.S N.S

a,bMeans within the same column with different letters are significantly different p<.05.

N.S: no significant
The results of effect adding different concentration of Oleobiotec® to the broiler diet on weekly weight gain (g) are summarizing in table (3). The result shows a significant increase (P <0.05) in weight gain (g) for the treatment T1 at one week of experiment compared with T3 which were 126.3 and 118.3 g, respectively. While the results revealed no significant differences between the treatments at, 3 and 4 weeks of experiment. Whereas, the treatments T3 and T4 indicate to a significant increasing (P <0.05) in the weight gain compared with the treatment T1 at 5 week of experiment which were 708.3, 687.3 and 559.6 g, respectively. Also, the cumulative weight gain revealed to a significant increasing (P<0.05) for the treatments T4 and T3 compared with control treatment T1.

**Table 3: Effect of adding different levels of Oleobiotec® to the broiler diet on Body weight gain (g/bird) (mean ± standard error)**

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Body weight gain (g/bird)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1w</td>
</tr>
<tr>
<td>T1</td>
<td>127.00 ± 0.33 a</td>
</tr>
<tr>
<td>T2</td>
<td>119.33 ± 2.64 ab</td>
</tr>
<tr>
<td>T3</td>
<td>118.33 ± 1.33 b</td>
</tr>
<tr>
<td>T4</td>
<td>125.67 ± 3.71 ab</td>
</tr>
<tr>
<td>Significant</td>
<td>*</td>
</tr>
</tbody>
</table>

*abMeans within the same column with different letters are significantly different p <.0.05.
N.S: no significant

The results of table (4) manifest the effect of the addition of Oleobiotec® to broiler diet on the weekly and accumulative feed consumption rate. The results of Table (4) showed that there were no significant differences between the experimental factors in the feeding consumption rate at the first, third, fourth and fifth week of the experiment.

The treatments T2, T3 and T4 appeared a significant decrease (P <0.05) in the feed consumption rate during the second week compared with control group T1. Also, the results revealed no significant differences between the experiment treatments in the accumulative feed consumption rate (1-35 day).

**Table 4: Effect of adding different levels of Oleobiotec® to the broiler diet on Feed consumption rate (g/bird) (mean ± standard error)**

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Feed consumption rate (g/bird)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1w</td>
</tr>
<tr>
<td>T1</td>
<td>155.33 ± 3.92</td>
</tr>
<tr>
<td>T2</td>
<td>152.67 ± 2.02</td>
</tr>
<tr>
<td>T3</td>
<td>155.00 ± 2.64</td>
</tr>
<tr>
<td>T4</td>
<td>162.66 ± 6.17</td>
</tr>
<tr>
<td>Significant</td>
<td>N.S</td>
</tr>
</tbody>
</table>

*abMeans within the same column with different letters are significantly different p <.0.05.
N.S: no significantly

Table 5 shows the effect of supplementation different levels of Oleobiotec® product to the broiler diet on feed conversion ratio (FCR). At 1 week of experiment the results appeared a significant increase (P <0.05) in the FCR for the treatment T3 compared with T1 which were 1.3 and 1.22 respectively. while the results indicate to a significant decrease (P <0.05) in the FCR for the treatments T2 and T3 compared with control group T1 for the period 2 week which recorded 1.46, 1.44 and 1.69 respectively. No significant differences were found
between all treatments at the third and fourth week of age, while in the fifth week the results observed a significant decrease (P < 0.05) for the treatments T3 and T4 which reached 1.9 for each compared with the control treatment T1 which reached 2.29. As well as, accumulative FCR for the period from 1 to 35 days, showed a significant decrease (P < 0.05) for the treatment T3 compared with control group which were 1.68 and 1.79 respectively.

From the results of the present study, it was concluded that all enhancements observed in the productive traits for the treatments T2, T3 and T4 may be due to containing the previous treatment on different levels of Oleobiotec® product and its containing a number of medicinal plants and its active compounds improved the taste of diet and improve appetite and health of birds, then improved digestion and absorption, which had a positive effect on the qualities of productivity.

Table 5: Effect of adding different levels of Oleobiotec® to the broiler diet on feed conversion ratio (g feed/g gain) (mean ± standard error)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>1w</th>
<th>2w</th>
<th>3w</th>
<th>4w</th>
<th>5w</th>
<th>(1-5)w</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>1.22 ± 0.02b</td>
<td>1.69 ± 0.05a</td>
<td>1.55 ± 0.06</td>
<td>1.66 ± 0.06</td>
<td>2.28 ± 0.11a</td>
<td>1.79 ± 0.03a</td>
</tr>
<tr>
<td>T2</td>
<td>1.27 ± 0.02ab</td>
<td>1.46 ± 0.04b</td>
<td>1.69 ± 0.09</td>
<td>1.55 ± 0.05</td>
<td>2.06 ± 0.11ab</td>
<td>1.70 ± 0.01ab</td>
</tr>
<tr>
<td>T3</td>
<td>1.31 ± 0.02a</td>
<td>1.44 ± 0.02b</td>
<td>1.58 ± 0.05</td>
<td>1.70 ± 0.06</td>
<td>1.89 ± 0.11b</td>
<td>1.68 ± 0.03b</td>
</tr>
<tr>
<td>T4</td>
<td>1.29 ± 0.01ab</td>
<td>1.53 ± 0.06ab</td>
<td>1.55 ± 0.05</td>
<td>1.72 ± 0.17</td>
<td>1.90 ± 0.12b</td>
<td>1.69 ± 0.02ab</td>
</tr>
<tr>
<td>Significant</td>
<td>*</td>
<td>*</td>
<td>N.S</td>
<td>N.S</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

a,bMeans within the same column with different letters are significantly different p < 0.05.
N.S: no significant

The birds that fed diet supplemented by 150 and 200 mg Oleobiotec®/kg feed enhanced the amount of feed consumed then improve the FCR which increased the birds weight and this significant enhancement in productive parameters may be due to containing the Oleobiotec® product to many effective compounds that acts as antioxidan316,17,18. The oils found in the Oleobiotec® formula are rich in essential fatty acids that enough the needs of body for growth. These ingredients also improve the nutritional value of nutrients trough stimulation the secretion of a number of digestive enzymessuch as Lipase, Amylase and Protease which has an important role in the process of digestion and absorption through its prominent role in the analysis of fat, carbohydrate and protein components19,20. The Oleobiotec® product contains aromatic oils that contain an active ingredients as Carvacrol, Thymol and Eugenol, which in turn stimulates digestion and increases the digestibility of nutrients as well as its role as antimicrobial, antiviral, antifungal and gas expeller, and these active substances promote metabolism of proteins, carbohydrates and fats, and thus increase the rate of growth21,22,23. These factors were reflected in the improvement of the productive parameters of the birds. These results agreed with Noaman and Allaw7, that’s confirmed the existence of a significant enhancement in the productive parameters when fed the broiler chicks on capsules containing different levels of Oleobiotec® at 50, 100 and 150 ppm three times per week.

Conclusion

The results of current study shows that supplementing 150 mg of Oleobiotec® per kg feed enhanced the productive performance traits of the broiler.

Conflict of Interest: None

Source of Funding: self

Ethical Clearance: Not required.

REFERENCES


Structural Behavior Analysis of Building Environment Automation System in Pharmaceutical Industries

Jacky Chin¹, Lin Shu-Chiang², Satria Fadil Persada³, Ilma Mufidah⁴, Choensul Jaqin¹

¹Department of Industrial Engineering, Mercu Buana University, Jakarta, Indonesia; ²Department of Business Management, Texas Health and Science University, Texas, USA; ³Department of Business Management, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia; ⁴Department of Industrial Engineering, Telkom University, Bandung, Indonesia

ABSTRACT

An automation system in industry is evolving significantly over recent years. Beside the quality of the system, one of the aspects determining the success of acceptance a new system is user’s perception. This research examines influential factors of user’s behavioral intention in building environment automation system practical use. A development model of the Theory of Planned Behavior (TPB) with three internal factors, Attitude (ATT), Subjective Norm (SN), and Perceived Behavioral Control (PBC), was developed to predict the behavior of managerial level when deciding whether to implement a new system, which was the Building Automation System (BAS) in pharmacy industry. The study found statistically significant support for the hypothesized model, indicating that the tested relationships between the factors and behavioral intentions to use BAS were positively significant. These findings can be served for explaining the behavior intention for users within the context of a building automation system.

Keywords: behavioral intention, theory of planned behavior, building environment automation, attitude, perceived behavioral control.

Introduction

In the past, less automation systems for building used towards energy and environmental management, primarily for monitoring of energy consumption, with insufficient control functions and high dependence on the human factor. Nowadays, Building Automation Systems (BAS) becomes increasingly popular to use in many types of building. In an industrial building, BAS was applied to control supply of electricity, lighting, cooling system, heating system, ventilation, etc.

In southeast Asia, Indonesia was the largest energy consumer, with 36% of the region’s total primary consumption (1). As of 2013, the country’s industrial sector was the sector with the highest share of total energy consumption by the amount of 33% (1). In order to respond to the competitive energy environment, in the current global economic crisis, Indonesia faces numerous challenges associated with growing energy demand and high-energy cost. To accomplish this advantage, many ASEAN countries have adopted the energy-efficiency programs, which focus on automation system in industries (2).

The current study aims to explore factors that influence user’s acceptance in building automation system that has been implemented in the industries. Several literatures exposed that the performance of the smart Building Automation System (BAS) benefits reduce energy expense expressively for electricity consumption, especially in commercial buildings (3-10). Similar studies that observed the users’ behavior in BAS or smart grid through structural equation modelling concentrated on residential housing, commercial housing and general-purpose use of energy (11-13) instead in industrial sector (10).
Materials and Method

Nowadays, BAS are currently being developed to be applied in buildings, namely the “green buildings”, for environmental and energy controlling \(^{(3)}\). Indeed, the application of these systems has become increasingly popular, revealing the ongoing interest of the scientific community on this topic \(^{(14)}\). The submission of a traditional quantitative control method based on the preset continuous values of physical parameters is not enough for users’ response in the indoor environment \(^{(10, 15)}\). The checking items contain of observing of consumption in lighting, production electricity supply for machines, heating ventilation air conditioning in building and several others \(^{(5, 8, 16)}\).

Theory of Planned Behavior (TPB) is able to investigate the factors of user’s behavior towards using information technology or in adoption new technology. Similar with TPB, Technology Acceptance Model (TAM) shows that users’ intention directly affects their actual behavior \(^{(10, 16-20)}\). The research uses an extension of TPB model by including TAM external factors, PEOU and PU. Behavior intention can be affected by perceived behavioral control, subjective norm, and attitude \(^{(21)}\). Attitude (A) can be described as the degree of which the users follows their negative or positive emotion to use new technology \(^{(16, 22)}\). Subjective Norm (SN) can be described as the perceived public burden to complete or not to complete the behavior \(^{(17, 21)}\). Perceived Behavioral Control (PBC) can be described as difficulty of control the behavior, which is assumed to “reflect past experience as well as predicted impediments and obstacles” \(^{(17, 21, 23)}\). PU means a degree to which a person accepts as true that using a certain system would enrich his or her job performance and PEOU means a degree to which a person accepts that using a certain system would be free of struggle. According to Davis, the perceived ease of use and perceived usefulness have direct correlations to the factor attitude and have associations with the behavior intention to use \(^{(24)}\). TAM is able to determine the perceived ease of use and perceived usefulness of technology applications can affect users’ utilization efficacy of system \(^{(12, 25)}\). Furthermore, in BAS behavior study, PEU and PU are reflected as the key factors that impact user intention to use smart monitoring. PU has a relationship to ATT \(^{(10)}\), while PU is a factor that was proposed by the authors, as proven in previous research has indirect relationship with PEOU \(^{(26)}\).

In addition to TPB model, this research also observes the correlation between the two constructs PEOU and PU. These relationships are not being investigated in previous studies that employed TPB as the theoretical framework. Following their illustration, we hypothesized that ATT, SN and PBC will influence BI, respectively. Finally, our study contributes to this gap literature by discovering the correlation between two core TAM variables and the three core TPB variables. The findings of these studies show that internal factors and external factors are crucial elements of user’s acceptance and adoption of new system. Therefore, our study examines the important role of those factors in understanding user participation intention. In summary, six hypotheses in Table 1 are assembled based on extension of TPB model in predicting adoption behavior of BAS usage.

<table>
<thead>
<tr>
<th>Item</th>
<th>Hypothesis</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Perceived Usefulness (PU) is positively affecting Attitude (ATT) of users to use BAS (^{(31, 32)}).</td>
<td>(^{(10, 16, 24, 33)})</td>
</tr>
<tr>
<td>H2</td>
<td>Perceived Expected Ease of Use (PEOU) is positively affecting Attitude (ATT) of users to use BAS (^{(31, 32)}).</td>
<td>(^{(10, 16, 24, 33)})</td>
</tr>
<tr>
<td>H3</td>
<td>Perceived Expected Ease of Use (PEU) is positively affecting Perceived Expected Usefulness (PU) of users to use BAS (^{(31, 32)}).</td>
<td>(^{(10, 16, 24, 33)})</td>
</tr>
<tr>
<td>H4</td>
<td>Attitude (ATT) is positively affecting Behavioral Intention to Use (BI) of users to use BAS (^{(31, 32)}).</td>
<td>(^{(10, 16, 22, 24, 33)})</td>
</tr>
<tr>
<td>H5</td>
<td>Perceived Behavioral Control (PBC) is positively affecting Behavioral Intention to Use (BI) of users to use BAS.</td>
<td>(^{(20, 23, 34)})</td>
</tr>
<tr>
<td>H6</td>
<td>Subjective Norm (SN) is positively affecting Behavioral Intention to Use (BI) of users to use BAS.</td>
<td>(^{(17, 21-23)})</td>
</tr>
</tbody>
</table>

The sample of this research is from Indonesia, which was considered as the biggest country in Southeast Asia. To assess our research model, we employed the online questionnaire survey from December 2014 to April 2015. The
respondents who have used BAS for building monitoring for more than 6 months were asked to join in the survey. Among the 157 respondents, 86% of the respondents are between 18 and 28 years old and 14% were between 29 and 38. All respondents filled out the same questionnaire, which are represent of six latent of behavior technological adoption factors in BAS. All the observed item was measured on a 5-point Likert-type scale with anchors ranging from “1 = strongly disagree” to “5 = strongly agree”\(^{(27)}\).

**Results and Discussion**

The confirmatory factor analysis was conducted to test a measurement all factors based on reliability and validity. next, a structural equation modelling (SEM) was used to examine the structural relationships among the factors in our model\(^{(10)}\). As displayed in Table 2, The result of the model shows positive values for six path correlations for both external factors and internal factors of TPB. Furthermore, most hypothesized path of the influencing factors to behavior intention of use BAS are statistically significant except for one paths, which is SN to BI (Hypothesis 5). PU positively correlated with ATT (Hypothesis 1), PEOU positively correlated with ATT (Hypothesis 2), and PEOU positively correlated with PU (Hypothesis 3). Moreover, in basic internal factors of TPB, ATT positively correlated with BI (Hypothesis 4), and PBC positively correlated with BI (Hypothesis 6).

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Relationship</th>
<th>Estimate (β)</th>
<th>Significance (p)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>ATT ← PU</td>
<td>0.784</td>
<td>0.004***</td>
<td>Supported</td>
</tr>
<tr>
<td>H2</td>
<td>ATT ← PEOU</td>
<td>0.503</td>
<td>0.006***</td>
<td>Supported</td>
</tr>
<tr>
<td>H3</td>
<td>PU ← PEOU</td>
<td>0.341</td>
<td>0.005***</td>
<td>Supported</td>
</tr>
<tr>
<td>H4</td>
<td>BI ← ATT</td>
<td>0.624</td>
<td>0.02**</td>
<td>Supported</td>
</tr>
<tr>
<td>H5</td>
<td>BI ← SN</td>
<td>0.014</td>
<td>0.13</td>
<td>Rejected</td>
</tr>
<tr>
<td>H6</td>
<td>BI ← PBC</td>
<td>0.561</td>
<td>0.007***</td>
<td>Supported</td>
</tr>
</tbody>
</table>

This study used AMOS software for the reliability and the convergent validity statistical test of the questionnaire, as presented in Table 3. All the value of our factor loadings exceeded the recommended minimum measurement (0.7)\(^{(28)}\). The second measurement was Cronbach’s α, and each questionnaire item exceed the minimum measurement of the Cronbach’s α value (0.7)\(^{(29)}\). As shown in Table 3, the measure of composite reliability exceeds the minimum requirement (>0.6), and the last measurement, the six factors exceed the minimum measurement for the AVE measures (>0.5)\(^{(30)}\).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Item</th>
<th>Factor Loadings</th>
<th>Cronbach’s α</th>
<th>CR</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PU</td>
<td>PU1</td>
<td>0.83</td>
<td>0.79</td>
<td>0.80</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>PU2</td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEOU</td>
<td>PEOU1</td>
<td>0.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PEOU2</td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PEOU3</td>
<td>0.81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATT</td>
<td>ATT1</td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ATT2</td>
<td>0.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN</td>
<td>SN1</td>
<td>0.96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SN2</td>
<td>0.93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SN3</td>
<td>0.89</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
All the model fit parameter results meet four criteria for the recommendation of model fit, namely Root Mean Square Error of Approximation (RMSEA), Goodness-of-Fit Index (GFI), Comparative Fit Index (CFI), and Normed Fit Index (NFI), as described in the measurement model fit testing in Table 4.

**Table 4: Model Fit Test Results**

<table>
<thead>
<tr>
<th>Model fit parameters</th>
<th>Minimum value</th>
<th>Model Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMSEA</td>
<td>&lt; 0.05</td>
<td>0.041</td>
</tr>
<tr>
<td>GFI</td>
<td>&gt; 0.90</td>
<td>0.922</td>
</tr>
<tr>
<td>CFI</td>
<td>&gt; 0.90</td>
<td>0.914</td>
</tr>
<tr>
<td>NFI</td>
<td>&gt; 0.90</td>
<td>0.918</td>
</tr>
</tbody>
</table>

**Conclusions**

Our research model focuses on explaining the fundamentals how the attitude is formed and how it leads to the eventually adopting behavior intention of use BAS in pharmacy manufacturing. Therefore, the research framework integrates TPB with two external factors of TAM, in a complementary manner to completely predict system use of BAS in organizations. Past research which only reported part of this framework, focused on the social and technical factors affecting adoption behavior of smart grid. The validation of this framework is crucial in terms of developing a new research approach in a similar application.

The result explained the R2 and path correlation for all hypotheses. The relationships between PU (β = 0.784, p < 0.01), PEOU (β = 0.503, p < 0.01), and ATT were positive and significant. Next, PEU (β = 0.341, p < 0.01) has a significant influence on PU. The model testing results explained 63.8% of the variance in ATT. SN (β = 0.014, p > 0.05) was not significant affected BI, then hypothesis 5 were not supported. ATT (β = 0.624, p < 0.01) and PBC (β = 0.561, p < 0.05) positively and significantly affected BI, explaining the variance of BI (R2 = 56%). Finally, our study results demonstrate that ATT and PBC had a significant influence on BI. Hence, Hypothesis 4 and Hypothesis 6 were supported.

The latent variables of perceived ease of use and perceived usefulness were integrated as external factors into TPB. Those factors influence user’s intention through the attitude, perceived ease of use and perceived usefulness. The result from the framework model of extended TPB is very useful to provide an understanding of aspects of the user’s adoption of BAS technology in manufacturing. Finally, according to the result of path correlations, the final model contributes 56% (R2 = 56%) to the real situation, indicating that the research factors can represent 56% of total intention to use of BAS.

We expect the outcomes of this research to deliver insight for future study on enhancing the theoretical of TPB in BAS by collaborating with other related factors. The results from our study support that PU, PEOU, ATT, and PBC are become as an important role in predicting technology adoption behavior of BAS. Therefore, the system must be considered to distribute various controlling tasks in order to reduce the usefulness, and enhance ease of use of the system.

**Conflicts of Interest:** The authors declare no conflict of interest.

**Source of Funding:** Self

**Acknowledgments**

The authors would like to thank companies in Indonesia and individuals for their assistance and support during the planning and execution of this research. Laurensia Mei Lie for support to edit and run the software.

**Ethical Clearance:** Taken from Mercu Buana University committee, and based on COPE’s Best Practice Guidelines.
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The Impact of Radiation on Total Thrombocyte of Hospital Radiology Workers in Kupang

Jannes Bastian Selly1,2, Andreas Umbu Roga2, Noorce Christiani Berek2, Luh Putu Ruliaty2, Jacob M. Ratu2

1Master Student Program in Public Health Sciences, 2Faculty of Public Health, University of Nusa Cendana, NTT Indonesia; 3University of Citra Bangsa Kupang, NTT Indonesia

ABSTRACT

Ionizing radiation that used in diagnosis and treatment process in hospital is not only providing the benefits, but also has negative impact on health. The officer in radiology installation of hospital has high risk of decreased number of thrombocyte, due to exposure experienced countinously during the work. The previous study using mice as object of research, found that exposure to ionizing radiation resulting in a decrease in the number of thrombocytes. Decreased total thrombocytes caused by the damage to cell. Thrombocytes destruction post-irradiation is 15 times faster than the recovery. This study aimed to analyze the effects of radiation exposure on the total thrombocyte of workers in radiology installation in hospital of Kupang. Subjects in this study were 20 workers from 3 hospitals selected by purposive sampling technique. This research was an observational analytic with cross sectional approach. Data used are exposure doses and blood examination results carried out together within a period of 1 year. The result was shown that the average dose of radiation exposure received by the officer during working for 1 year was 0.776 mSv. This value was still relatively safe because it was below the dose limits set by International Commision for Radiation Protection (ICRP). However the result of the analysis was shown that there was significant effect between radiation exposure dose received by the officer with total thrombocytes p-value 0.05. The regression equation was shown that the increase of 1 unit dose would decrease the number of thrombocytes was 10.3. The regression coefficient $R^2 = 0.197$ shown that the effects of radiation exposure dose against the decrement of total thrombocytes was 19.7%. It was recommended for the workers and hospital management to increase the efforts against radiation protection, thus the stochastic effects of exposure could be minimized.

Keywords: Thrombocyte, exposure doses, ionizing radiation, radiology installation

Introduction

The type of radiation used in the radiodiagnostic process is ionizing radiation. Interaction of ionizing radiation with the body’s cells can cause free radicals that harm the health (1). Radical compounds in the body form bonds within cells, causing cells to become abnormal and potentially become cancerous (2).

Workers at radiological installations have high risk affected by the ionizing radiation. This can happen because radiation exposure can occur continuously during the work (3). To control the activity of radiation workers, International Commission of Radiation Protection (ICRP) has set a radiation dose threshold for radiation workers at 20 mSv per year (4). These regulations apply to all the countries in the world, including in Indonesia. In addition to limiting the value of doses, radiation officers are also required to carry out periodic health checks to determine changes that occur in the body due to exposure to ionizing radiation (5).

The effects of ionizing radiation are grouped into two, namely the deterministic and stochastic effects (6). The deterministic effect occurs when the dose threshold value is exceeded. This effect will cause damage and cell death whose symptoms can be directly observed such as reddish skin and blistering. High doses, for example $\geq 100$ mSv, can cause central nervous system damage, followed by death within a few hours or days (6). Stochastic effect, there is no definite dose threshold

Corresponding Author:
Jannes Bastian Selly
Master Program in Public Health Sciences,
University of Nusa Cendana, NTT Indonesia
Email: bastian.jannes04@gmail.com
value. A small radiation dose even if it does not kill cells, but can turn cells into abnormal. These abnormal cells have the possibility to continue to divide and develop into cancer\(^6\). Stochastic effects of radiation exposure are known as the silent killer, therefore health checks for radiology workers must be carried out so that the initial symptoms or signs of initial damage to cells due to radiation exposure can be identified early and anticipatory steps can be taken to ensure the safety and health of radiology workers\(^4,5\).

Blood is a biological component that is sensitive to exposure to ionizing radiation\(^7\). Blood is composed of a combination of approximately 55% of blood plasma and 45% blood cells (erythrocytes, leukocytes and thrombocytes). Blood plasma is composed of approximately 90% water. Water (H\(_2\)O) is molecule highly susceptible to ionizing radiation. When it is exposed to radiation, free radicals will form\(^8,9\). Free radicals are atoms or molecules that have a free electron unstable. Free radicals will bind to other atoms or molecules on cells to become stable\(^9\). These ties make abnormal molecules formed in the body. This will provide a change in blood components\(^9\).

Bone marrow, especially the red marrow as a place of blood production, is also a tissue that is very sensitive to ionizing radiation as seen from the radiation coefficients for each tissue and organ shown in Table 1 below\(^10\).

<table>
<thead>
<tr>
<th>Type Organ/Tissue</th>
<th>(W^*_T)</th>
<th>(W^*_T)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genital (gonads)</td>
<td>0,25</td>
<td>0,20</td>
</tr>
<tr>
<td>Bone marrow</td>
<td>0,12</td>
<td>0,12</td>
</tr>
<tr>
<td>The large intestine (colon)</td>
<td>-</td>
<td>0,12</td>
</tr>
<tr>
<td>Lungs</td>
<td>0,12</td>
<td>0,12</td>
</tr>
<tr>
<td>Gastric</td>
<td>-</td>
<td>0,12</td>
</tr>
<tr>
<td>Kidney</td>
<td>-</td>
<td>0,05</td>
</tr>
<tr>
<td>Breast (mammary)</td>
<td>-</td>
<td>0,05</td>
</tr>
<tr>
<td>Liver (liver)</td>
<td>-</td>
<td>0,05</td>
</tr>
<tr>
<td>Gullet (esophagus)</td>
<td>-</td>
<td>0,05</td>
</tr>
<tr>
<td>Thyroid (thyroid)</td>
<td>0,03</td>
<td>0,05</td>
</tr>
<tr>
<td>Skin</td>
<td>-</td>
<td>0,01</td>
</tr>
<tr>
<td>The bone surface</td>
<td>0,03</td>
<td>0,01</td>
</tr>
<tr>
<td>Chest</td>
<td>0,15</td>
<td>-</td>
</tr>
<tr>
<td>Other organs</td>
<td>0,03</td>
<td>0,05</td>
</tr>
</tbody>
</table>

Source: BATAN 2005

*According to a Decree No. 01/Ka. BAPETEN/V-1999

**According to the ICRP No. 60 (1990)

The radiation coefficient of an organ or tissue shows the sensitivity of the organ or tissue to radiation exposure\(^10\). With the level of sensitivity of blood cells, this can be an indicator to evaluate the health of radiology workers\(^11\).

Thrombocytes are a component of blood that plays a role in the process of blood clotting when a wound occurs. The previous study in mice as experimental animals, it was found that the high-energy ionizing radiation, resulting in a decrease in the number of thrombocytes. Thrombocytes count decreased linearly with increasing doses of radiation. Thrombocytes recovery after radiation exposure occurs 15 times slower than the damage suffered\(^12\). Other studies have also found that high-dose radiation exposure in cancer patients undergoing radiotherapy impacts decreased thrombocytes count up to 29.96%\(^13\). Normal total thrombocytes were in the range of 150 to 400. Lower thrombocytes count is 150, identified as thrombocytopenia. Thrombocytopenia that is lower than 100 have a high chance of bleeding to cause death\(^14-16\). Therefore, this study was conducted in order to analyze the impact of radiation doses to the blood profile, especially thrombocytes.

**Methodology**

This research is an observational analytic research with cross sectional approach. The total respondents in this research are 20 workers from 3 hospital, they are Hospital of Prof. Dr. W. Z. Johannes, Wirasakti and Naibonat. Independent variable in this study was a dose of radiation exposure, while the dependent variable is the number of thrombocytes. The data in this research is secondary data dosimeter readings on individuals and the results of routine blood tests workers every year. Data radiation exposure dose for 1 year juxtaposed with the data results of blood tests in the same year.

**Findings**

**a. Characteristics of Respondents:** Respondents in this study were 20 workers consisting of 14 men (70%) and 6 women (30%). A total of 10 respondents (50%) aged between 25 and 35 years, 4 respondents (20%) aged 36 to 45 years and 6 respondents (30%) aged over 46 years. Based on the background of expertise, as many
as 16 respondents (80%) is radiographer, two respondents (10%) are specialists of radiology, and two other respondents (10%), respectively nurses and administrative personnel. Before working on the installation of radiological, every officer has conducted a complete medical examination and declared healthy. Furthermore, regular health check, including blood, for every workers. The type of individual dosimeters used by the respondents is the TLD (thermoluminesence dosimeter) badge. The reading of the radiation dose values in the TLD is done every 3 months. The results of exposure dose readings will be archived by the hospital management, so as to get a dose for 1 year, it will be accumulated value of the dose every 3 months for 1 year.

b. Dose Radiation Exposure: Based on the data search results is known that the average value of the exposure dose received by an officer for one year was 0.78 mSv. The highest dose received by the officer of 0.87 mSv, while the lowest dose of 0.73 mSv. Radiation exposure dose received by any officer for a year is still relatively safe, because it is below the limit values specified dose of 20 mSv per year\(^4\). Although the radiation exposure dose every officer did not show a high value, remain aware of the possibility of stochastic effects can occur\(^6\).

c. The Total Thrombocyte: The search results and tabulation of data showed that the average number of thrombocytes officer is 282.6 \(\times\) 10\(^3\)/mL. This value is still in the normal range of thrombocytes counts. But individually there are two workers who had abnormal thrombocytes count is 603 \(\times\) 10\(^3\)/mL, exceeding the normal value (thrombocytosis) and below the normal value (thrombocytopenia) is 63 \(\times\) 10\(^3\)/mL.

d. The Impact of Radiation Exposure Dose to Thrombocyte Amount: The analysis showed that the dose of radiation exposure have a significant influence on the number of thrombocytes in the radiation officer hospital radiology installations in Kupang. Linear curve effects of radiation exposure dose of the thrombocytes count is shown in Figure 1

**Figure 1: Linear curve effects of radiation exposure dose to the number of thrombocytes**

Regression equations to estimate the number of thrombocytes workers due to radiation exposure dose in accordance with the curve above is

\[
\hat{Y} = 178.3 - 188.6X,
\]

The above equation explains that the coefficient for the variable thrombocytes count officer was 178.3, while the coefficient for the radiation exposure dose is variable (-188.6). This value indicates that, when there is no radiation exposure or radiation dose is 0 mSv, then estimated the number of thrombocytes of officer is 178.3 \(\times\) 10\(^3\)/\(\mu\)L. When a dose of radiation exposure and the value is not zero, then the thrombocytes count will be amended. An increase of 1 unit dose radiation exposure, resulting in a decrease of thrombocytes by 10.3 \(\times\) 10\(^3\)/\(\mu\)L (17). Regulations set by the ICRP that the dose of radiation exposure to the workers should not be above 5 mSv every three months makes sense, because if the exposure dose of radiation received by the officer by 5 mSv, the thrombocytes amount is expected to decline by 51.5 \(\times\) 10\(^3\)/\(\mu\)L of 178.3 \(\times\) 10\(^3\)/\(\mu\)L becoming 126.8 \(\times\) 10\(^3\)/\(\mu\)L. This amount is below the normal amount of thrombocyte, that is 150 \(\times\) 10\(^3\)/\(\mu\)L and categorized by thrombocytopenia\(^{14}\).

In this study, a total of 2 workers have abnormal total thrombocytes, each thrombocytosis and thrombocytopenia. The person who experienced thrombocytopenia, is not the worker who received the highest dose of exposure. Likewise, respondent who experience thrombocytosis, was not workers who get the lowest dose. Therefore, according to the researchers, there are factors other than the dose of radiation exposure, causing the officer had thrombocytopenia. Need to do a
more complete examination by a doctor to both of these officials. This equation model can explain the effect of the radiation exposure dose to thrombocytes count at 19.7% ($R^2=0.197$). This means that there are factors other than exposure dose which causes a decrease in thrombocytes count by 80.3%.

Decreased thrombocytes count at the workers in this study amounted to 5.78%. This value is relatively lower when compared with previous studies that found that a decrease in the number of thrombocytes due to radiation exposure reached 29.96%\(^{(13)}\). Researchers assume that this occurs because of differences in the dose received by the study subjects. Radiation exposure dose in this study was only 0.776 mSv, whereas in the previous study it was 500 mSv. In addition, the respondents in this study are the workers who was in a healthy condition, while respondents in the earlier study are cancer patients undergoing radiotherapy process.

**Conclusion**

Although the radiation exposure dose received by workers is below the ICRP-determined threshold, it has a significant effect on changes in platelet count. Increased radiation exposure dose of 1 mSv predicted to reduce the number of thrombocyte at. Therefore, it is expected that the efforts of protection for personnel is maintained and even increased to minimize the radiation dose received. Health checks including routine blood tests also should be closely monitored, given in some hospitals have not done routinely. The results of monitoring and health checks can be a prognosis that can be anticipatory efforts in ensuring the health and safety of workers at hospitals radiology installation in kupang.

**Conflicts of Interest:** The author is a student of public health sciences and did not have a relationship with the respondents in this case are workers on the hospital radiology installation in Kupang. Therefore, any data and analytical results in this study show it is in accordance with the actual data obtained during the research.

**Statement of Informed Consent:** Before conducting the study, the authors explained about the process that will be conducted during the study. Things that are described include research procedures, benefits, and things that should be conducted by the respondents during the study. Furthermore, the authors give the informed consent sheet to the radiology workers. Statement in the informed consent sheet states the willingness of workers as respondents in voluntary research.

**Ethical Clearance:** This study using human as research subjects, therefore, before obtaining the permission, the author submitted ethical clearance to Health Research Ethics Committee, Faculty of Medicine Nusa Cendana University. This research had been permitted with ethical approval recommendation number 05/UN15.16/KEPK/2019 dated January 30, 2019.

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Importance of Collaborative Intervention of Preconception Nutrition in Suppressing the Stunting Case in East Nusa Tenggara, Indonesia

Jeffrey Jap¹, Sri Sumarmi², Nyoman Anita Damayanti³
¹Doctoral Student, Program of Public Health, ²Lecturer, Department of Health Nutrition, ³Lecturer, Department of Health Administration and Policy, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia

ABSTRACT

The result of Basic Health Research (Riskesdas) in 2013 on stunting case (short stature) in Indonesia reaches 37.2%. The basic cause of this stunting is due to anemia on women in pregnancy (37.1%). Malnutrition cases become one essential threat for women in pregnancy in Indonesia and East Nusa Tenggara in particular. In East Nusa Tenggara province, this stunting case is still a problem that requires immediate treatment. This can be seen from the proportion of stunted toddlers which is more than 50%. The purpose of this research was to find a form of collaborative intervention in order to cope with the stunting issues with specific targets for preconception mothers.

The type of descriptive research was literature study with qualitative approach.

The result indicated that the collaborative intervention related to preconception nutrition was to prevent the occurrence of anemia on women in pregnancy which endedup in stunting. Therefore, it was necessary to collaborate on all parties to intervene, especially during the preconception period.

Keywords: Collaboration, Preconception Nutrition, Stunting, Malnutrition

Introduction

Nutrition is a very important thing in life. Humans can perform all the works optimally if all the nutritional needs are fulfilled. Nutrition becomes the determinant of the quality of Human Resources (HR) of a nation.⁴ Indonesia itself has been dealing with nutritional problems for a long time and has been included in 17 countries out of 117 countries with high prevalence of stunting (37.2%), wasting (12.1%) and overweight (11.9%) on toddlers.²

Basic Health Research Results (Riskesdas) in 2013 shows that the most case of nutritional problems on toddlers in Indonesia is stunting (short stature) that reaches 37.2%. This is in line with the number of anemia case on women in pregnancy that reaches 37.1%. Stunting case becomes one threat for women in pregnancy in Indonesia and East Nusa Tenggara in particular. In East Nusa Tenggara Province, the number of stunted children is even higher, which is 51.77%. In fact, one of the districts in East Nusa Tenggara, namely South Central Timor (TTS) has stunting prevalence of 70.5%.³ This figure is above Afghanistan, which ranks highest in the world with the stunting prevalence of 59%.⁴ This is directly proportional to the economic condition of East Nusa Tenggara which is in the order of the three respectively poorest provinces in Indonesia; Papua 28.40 percent, West Papua 25.73 percent, and East Nusa Tenggara 22.58 percent.²

In other words, the quality of the baby born depends on the mother’s nutritional status before and during
pregnancy or preconception. A pregnant woman will give birth to a healthy baby if the level of health and nutrition are in good status. However, there are still many pregnant women who have nutritional problems, especially malnutrition such as Chronic Energy Deficiency (CED) and nutrition anemia.

Pregnant women who suffer from CED and anemia have greater risk of illness, especially in the third trimester of pregnancy compared with normal pregnant women. As a result, they have a greater risk of having a baby with Low Birth Weight (LBW), death during bleeding, laborious postpartum delivery for being weak and they are also vulnerable to have health problems. Generally, infants born with Low Birth Weight (LBW) cannot absorb new environmental stresses optimally, which may result in stunted growth and development, and it is considered as stunting.

### Material and Method

This research was a descriptive research type of literature study with qualitative approach. The use of qualitative method aimed to obtain data not only measured mathematically but explored its meaning. The main data sources in qualitative research were documents and journals. Journals taken based on titles with keywords; collaboration between LBW preconception nutrition. Inclusion criteria: 1) Related to collaboration, LBW and preconception nutrition, 2) International journals indexed by schopus. Exclusion criteria: 1) Year published from 2013 - 2018, 2) Having complete journal access. The number of journals can be as many as 75 journals and after passing the inclusion and exclusion criteria of 35 filtered journals.

### Findings

**Stunting and Nutrition Issues in the Preconception Period:** The cause of nutritional problems was very complex. Mothers’ preconception nutrition had a significant contribution in cases of malnutrition and stunting in children. The table 1 shows that Chronic Energy Deficiency (CED) in those who are pregnant tends to be higher than those who are not pregnant. This condition will affect the growth and development of the fetus in the womb. Therefore, the mother should be prepared as well as possible in order not to encounter CED during the pregnancy. If it is not anticipated as early as possible, then it will end up in Low Birth Weight (LBW) as in the table 2.

<table>
<thead>
<tr>
<th>Age</th>
<th>CED proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pregnant</td>
</tr>
<tr>
<td>15-19</td>
<td>38.5</td>
</tr>
<tr>
<td>20-24</td>
<td>30.1</td>
</tr>
<tr>
<td>25-29</td>
<td>20.9</td>
</tr>
<tr>
<td>30-34</td>
<td>21.4</td>
</tr>
<tr>
<td>35-39</td>
<td>17.3</td>
</tr>
<tr>
<td>40-44</td>
<td>17.6</td>
</tr>
<tr>
<td>45-49</td>
<td>20.7</td>
</tr>
</tbody>
</table>

Source: Riskesdas 2013

<table>
<thead>
<tr>
<th>Baby’s weight</th>
<th>LBW percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
</tr>
<tr>
<td>&lt; 2500 g</td>
<td>11.1</td>
</tr>
<tr>
<td>2500-399 g</td>
<td>82.0</td>
</tr>
<tr>
<td>&gt; 4000 g</td>
<td>6.4</td>
</tr>
</tbody>
</table>

Source: Riskesdas 2013

The central and local governments have made many breakthroughs to fix this problem, and after tracing it turned out that the intervention was much more focused at the time of conception and afterwards, such as; with PMT program, complementary feeding, improvement of posyandu service and community empowerment. PMT program denotes a program done by the government to improve children’s nutrition status by giving additional food to the children with malnutrition status or less nutrition status. Posyandu constitutes a regular program for family planning and integrated health, to give optimal health service for children under 5 years old. The result indicated that the stunting prevalence was still high and tendency of reduction was still very slowly. Basic Health Research (Riskeesdas) results in 2013 put East Nusa Tenggara in the position far above the national average with 51.77% of stunting prevalence. Not to mention, one of the districts in East Nusa Tenggara which is South Central Timor (TTS) has 70.5% of stunting prevalence. This figure is above Afghanistan which ranks highest in the world with 59% of Stunting prevalence.

### Discussion

The relationship between Micronutrients and Maternal Nutrition Status in Preconception will be presented below.
Micronutrients are the nutrients needed by the humans’ body in small amounts, but have a very important role in the formation of hormones, enzyme activity and regulate the function of the immune system and reproductive system\textsuperscript{11}. Micronutrients are vitamins (both water soluble and fat soluble) and minerals. Minerals are divided into two groups: macro-minerals and micro-minerals. Macro-minerals are minerals that the body needs at least 100 mg per day (e.g. calcium, phosphorus), whereas micro-minerals (trace elements) are minerals that the body needs which less than 100 mg per day (e.g. zinc, iron).\textsuperscript{10}

There are also micro-minerals which are needed only a few micrograms per day, such as cuprum and molybdenenum. Micronutrients are obtained from outside the body such as from food or supplements, because the body is unable to produce it in sufficient amount in accordance with the needs of the body. Micronutrients are extremely needed by the body, even though the body only needs very small amount of it.\textsuperscript{11}

For breastfeeding mothers, micronutrient status will determine the health, growth and development of infants who are breastfed, especially at the age of the first 6 months after the baby was born. Therefore, it is necessary to prepare before the conception period.\textsuperscript{12} The things which are prepared include preparing the prospective mother by providing nutritious nutritional intake so that there will be no micronutrients deficiency during the conception.\textsuperscript{13}

Here are some essential micronutrients that must be met during preconception; 1) **Vitamin A**; Vitamin A has really important roles in the preconception period, such as, boosting immunity, cell differentiation (cell shape and function changes), reproduction (keeping fertility to enter the conception), preparation of embryo growth, and growth and development of cells, including bones and teeth.\textsuperscript{11} 2) **Iron**; Iron is an essential mineral for the formation of haemoglobin which serves to carry oxygen from the lungs to all body tissues, electrons into cells, and form the necessary iron nutrient enzymes for cellular energy production, immune system, and brain function. During this preconception, iron has extremely important role to prevent iron deficiency during pregnancy and birth. If this is done, then there will be no baby stunting 3) **Zinc**; This is very important to be noticed by prospective mothers especially during the preconception period.\textsuperscript{12} 4) **Iodine**; Iodine is an important component in thyroid hormone synthesis, a hormone that regulates body temperature, basic metabolism, reproduction, growth and development, red blood cell formation and muscle and nerve function.\textsuperscript{14}

The results of research conducted by Sumarmi et al (2017) provide an illustration that there is a relationship between the mother’s body mass-index with micronutrient intake. So, the intake is necessary to prevent the occurrence of anemia on the mothers.\textsuperscript{15}

Solutions directly, nutrition problems are caused by low nutrient intake and health problems.\textsuperscript{16} In addition, nutrient intake and health problems are two things that affect each other.\textsuperscript{17} The indirect effect is the availability of food, the pattern of care and the availability of clean water, sanitation and health services.

Actually, East Nusa Tenggara already has the authorized capital to make a total revolution both for the micro and macro level. At the micro level, East Nusa Tenggara has REVOLUSI KIA program, which is a program to decrease the number of both mother and baby’s death during childbirth. This program has clearly decreased maternal mortality from 330 deaths (2008) to 128 (2015) and infant mortality from 1274 (2008) to 965 (2015). However, this program has not pressed the number of stunting.\textsuperscript{18}

One thing that causes why the mentioned figures is difficult to decrease because there is no maximum intervention in preconception.\textsuperscript{19} Preconception must be intervened not only by all health workers but all parties within the range of human life.\textsuperscript{3} Health workers should be the leaders in this matter. Quality nutrition services to women in preconception can be realized if all the existing professions in the Community Health Center (Puskesmas) and their networks and the public are able to perform collaborative health services by implementing six strategic steps as stated by Previous study describes the role of each health worker in the hospital is an effort to overcome the problem of nutrition through six things, namely; 1) creating work culture in the workplace, 2) affirming the role of nutrition in health, 3) determining diagnosis, 4) doing quick and precise intervention, and follow-up monitoring; 5) communicating and planning related nutrition issues well, 6) developing further handling of post-intervention and continuing education related to nutrition. In addition, collaboration is also needed from other parties outside the health sector.\textsuperscript{16} Collaboration with all other related sectors, either directly or indirectly, can provide a positive contribution.\textsuperscript{20} The Community Health Center (puskesmas) is necessary to
create a preconception period that is fully prepared and well-done towards conception.21

Another factor that should be well considered is the state of the family itself, one of them is the level of education. An improved level of education will have an opportunity to get better jobs where income is also more regular and in greater amount.22 In addition, if low levels of education do not improve the socio-economic conditions, that will end up in stunting (short stature) and malnutrition.23 Then the intervention of the government and all the people is necessary, especially the environment in which the mother lives. Another study on 115 families with toddlers in 2014 with household-level food diversity. The result shows that there is a relationship between food diversity and income (number and type).24 The poor are often able to survive and even rise again, especially when they have a network or social order that protects and saves them.22

The role of government in community empowerment becomes one of the alternative solutions. The bottom line is on improving the family economy.25 Government through various policies should pay more attention to improve family nutrition. With the presence of village funds and village-focused development, it is expected to boost the improvement of specialized micro-nutrients in the preconception period.15

Conclusions

Based on the exposure in the analysis and discussion in the preceding section, here are the main conclusions of the study. That preconception nutrition was very important to prevent stunting in children in East Nusa Tenggara. Therefore, it is necessary to have collaboration among the health professions and other related sectors to improve nutrition in the preconception period.

Conflict of Interest: There is no conflict of interest for every author.

Source of Funding: This research funded by self-funded

Ethical Clearance: There are no human participants involved in this research. However the procedure of this research had already gotten ethical approval of Health Research Ethics Committee, Faculty of Public Health, Univeritas Airlangga.

Informed Consent: This research used secondary data. No informed consent needed.

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Evaluation of Folic Acid Content in the Pregnant Women

Jinan Hussein Mutlag
Karbala Hospital for Gynecology and Obstetrics, Karbel, Iraq

ABSTRACT

Folic acid is a naturally available nutrient which is found in various foods like egg yolk, vegetables, legumes etc. It is involved in de novo DNA’s biosynthesis in growing cells and in transmethylation reactions. The present study aim to evaluate the correlation of folic acid content and pregnancy outcome in the Iraqi women. This case-control study (n=30 each) includes a pregnant women enrolled in Karbala maternity teaching hospital with 23rd to 25th gestational week. About 33.33%, 53.33% and 41.67% women were included in the age group of less than 20, 1-30 and 30-40 years, respectively. Folate deficient women showed significant decreased in the fetus weight as compared to the healthy women. The Folate deficient women showed lower serum folate (112.93 ± 22.18pmol/ml) as compared to healthy control (164.13 ± 31.38pmol/ml). The fetus birth weight is positively correlated with the presence of folic acid supplementation. From this study, we can conclude that folic acid supplementation is necessary for the child development. It should be taken before planning the pregnancy.

Keywords: Folic acid, gestational week, folic acid supplementation, Folate, birth weight

Introduction

Folic acid is an essential micronutrient for the fetal body development in the pregnant women, which human body cannot biosynthesize and from the diet, it must be obtained as a supplements. Folic acid is a naturally available nutrient which is found in various foods like egg, vegetables, legumes etc. It is involved in denovo DNA’s biosynthesis in growing cells and in transmethylation reactions. It also serves as enzymatic reaction’s substrate, involved in the biosynthesis of amino acid and vitamin metabolism. Neither folic acid nor folate is metabolically active so as to participate in metabolism both of them must be reduced. On absorption, folic acid is reduced to tetrahydrofolic acid (THFa) by dihydrofolate reductase (DHFR)\. The THFa is also called as folic acids, active form. From the gastrointestinal tract it is rapidly absorbed, mainly from the jejunum and duodenum. The natural folates bioavailability is reduced to 25-50% with respect to synthetic folates. It is seen in various clinical studies that there is increased demand of folate in pregnant women which lead to serum folates average reduction, due to uteroplacental organs and fetus growth, and perhaps to increased urinary folate excretion and catabolism.

Folate metabolism and pathways critical components are affected by number of genetic polymorphisms, and are associated with increased risk of neural tube defect (NTDs). Metabolism of folic acid generates the structure blocks of nucleic acid, and is important in the repair and synthesis of DNA. DNA destabilization may lead to aberrations in chromosome and potentially malignant transformations. A study was showed in pregnant women, as compared to the maternal serum, the THFa levels are higher in cord blood which may be for accumulation in fetus. Numerous studies have suggested that the risk of NTD’s may be reduced by folic acid supplementation.

There is also observational and clinical trial based concern that high levels of folic acid increase some diseases risk, like autism spectrum disorder, colorectal cancer and infant bronchitis. The world health organization recommends concentration of RBC folate>400ng/ml (906nmol/L) in reproductive age
women so as to achieve NTD’s greatest reduction\(^\text{16}\). Dietary folates good sources which are often cited includes leafy green vegetables, whole grains, broccoli, orange juice and legumes\(^\text{17}\).

Deficiency of folate is relatively common, even though it can be corrected easily by folic acid administration or supplementation. The human and animal studies have shown that the folates plays an essential role during brain and nervous system development\(^\text{18}\). Especially, women are predisposed to deficiency of folate during pregnancy, due to a rapid fetal growth period, and cell divisions high rates\(^\text{19}\). The maternal folate content is also associated with other outcomes of adverse pregnancy, such as malformation like fetal death, restriction of fetal growth, preterm delivery, preeclampsia, although detail these results remains inconclusive\(^\text{20}\). With this background, the present study aims to evaluate the correlation of folic acid content and pregnancy outcome in the Iraqi women.

**Material and Method**

This study included 60 pregnant women enrolled in Karbala maternity teaching hospital January 2019 to April 2019. The pregnant women with 23rd to 25th gestational week were included in the present study. The test was performed at Karbala maternity teaching hospital.

Fasting blood (n=60) was collected by a single puncture form the folate deficient group (FD group) and healthy participants after obtaining informed consent. The parameters like child birth weight, type of delivery and duration of pregnancy was recorded. Some socio demographic characteristics such as monthly income, education level, marital status, previous number of pregnancies etc. were also recorded.

The fasting blood was collected (2ml) in the plain vacutainers from the vein after getting participant oral consent. The samples were kept at room temperature for 30min. Followed by the centrifugation at 3000rpm for 15min. The serum was separated and kept at 20°C for further study. Serum folate content was estimated by commercially available kits (Sigma, USA).

**Statistical Analysis:** Results were presented as Mean ± Standard Error (SE). Obtained data were subjected to statistical analysis using GraphPad Instat (3.0, Trial Version). Unpaired t-test was done to estimate the statistical significance.

**Results**

A pregnant women attending at Karbala maternity teaching hospital were enrolled in the present study. About 97.3% response rate was observed. The average respondent age was 28.55 years. About 33.33%, 53.33% and 41.67% women were included in the age group of less than 20, 1-30 and 30-40 years, respectively.

**Folate deficient women showed decreases in the fetus weight:** Folate deficient women showed significant (p=0.0259) decreased in the fetus weight as compared to the healthy women. The birth weight of the fetus is shown in the Figure 2. This decrease in the fetus birth weight and due to other complications, about 76.67% women undergone the C-section delivery. While only 23.33% normal delivery occurs.

![Figure 1: The birth weight of the fetus delivered by FD group and healthy women](image)

Average weeks of child delivery were found to be about 37.73 and 39.51 weeks in women with folic acid supplementation and healthy women, respectively. The presence of folic acid deficiency leads to the premature delivery. However, the women are on folic acid supplementation, none of the women showed NTD. The fetus birth weight is positively correlated with the presence of folic acid supplementation. The folate content of enrolled women were depicted in the Figure 2.
Figure 2: The folate content of FD group and healthy women

Discussion

In the present study, we have done the evaluation of folic acid content in the pregnant women. Some studies from Iraq, Nigeria, and Sudan no one of NTD’s mothers was having periconceptional supplementation of folic acid. For the prevention of neural tube disease supplements of folic acid are generally essential means. For a childbearing age woman it is almost impossible to achieve the recommended external intake of folate 100% only from the natural folate food sources, and to achieve they have to drastically increase the utilization of pulses, vegetables, fruits, legumes in their diet. The natural folate absorption is not efficient like folic acid.

There is no any consensus regarding the folic acid correct daily dose needed in NTD prevention. The US institute of medicine’s current recommendation has considered 400 mcg of folic acid per day to be sufficient to get folates optimum cellular concentration at least after daily intake for 8-12 weeks. Many clinical studies regarding folate have demonstrated that supplementation of folate reduces the recurrence and occurrence of the neural tube defects.

In some parts of the India poor knowledge and low awareness was found concerning the deficiency of folic acid among pregnant women. Katre et al found that vitamin B12 increased dose, but not folic acid was found to be linked with lower levels of plasma total homocysteine in pregnancy. However, closure of the neural tube occurs by gestations 28 days much before the woman knows about the pregnancy and addresses an antenatal clinic these studies are important. Many of the countries are bringing policies to increase the prepregnancy folate status in ladies, by enhancing supplementation, utilization of foods which are folate rich and their fortification.

Women showing placental abruption or recurrent loss of pregnancy are reported to show mild hyperhomocysteinemia. Maternal use of folic acid with multivitamins is reported in the risk reduction of cleft lip without or with palate of cleft lip. The center for disease control and prevention (1991) have suggested that women with history of NTD affected pregnancy should ingest daily folic acid (approximate 4gm) before planning the pregnancy. Consequently, the U.S. Public Health Service (1992) have recommended approximately 0.4gm daily folic acid consumption to childbearing age women through diet, supplementation and fortification to prevent NTD’s.

During the period of pre-conception, stillbirths risks secondary to neural tube defect were about 41% lowered with supplementation of folic acid. Therefore, it was suggested that, for the benefit of public and reduction in recurrent NTDs risk, that targeted counseling of folic acid should be given to previous NTD affected pregnancy. On the constant supplementation of folic acid, there are several controversies in prevention of NTD’s during the 2nd and 3rd trimester of pregnancy, unlike its supplantations well recognized beneficial effects before and shortly after conception. Charles et al found supplementation of folic acid when from initial antenatal appointment time and onwards it is given is of no difference and no benefit in birth and gestational age of pregnancy and placental weight was observed, in contrast to the review of the Cochrane, which has reported that folic acid supplantations high doses may reduce the low birth weight risk. Similarly, Fekete et al reported folic acid supplantations no beneficial effect on either on gestational length or on placental weight. Hence, it is very necessary to do more research on the effect of folic acid supplantations in pregnancy, which is useful and necessary in the expand the further guidelines and recommendations for pregnant women.

In 2006, the world health organization and food and agricultural organization (united nations) have published guidelines for helping countries in setting the level of target fortification and their maximum and minimum levels, the legal minimum level etc. to be used for flour fortification of folic acid. The folic acid enriched cereal grain products mandatory fortification was authorized in 1996 and 1998, in US, it was fully implemented. Although, folic acid intake is increased by mandatory flour fortification programs, it is shown by research that
to all women of reproductive age, it does not reaches adequately\(^4\). For maximum benefit and to reach all population groups effectively additional food products with folic acid fortification might be needed\(^4\).

**Conclusion**

The Folate deficient women showed lower serum folate as compared to healthy control. Perhaps, this leads to lower birth weight of the child. The women are on folic acid supplementation, hence none of the women showed NTD. The fetus birth weight is positively correlated with the presence of folic acid supplementation. From this study, we can conclude that folic acid supplementation is necessary for the child development. It should be taken before planning the pregnancy.

**Ethical Clearance:** The blood was collected from the Karbala maternity teaching hospital after their investigation. Oral consent was taken before enrolled the patients in the study.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**REFERENCES**


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Isolation, Identification and Antibiotic Susceptibility Testing of Bacterial Pathogens Causing Seminal Fluid Infection in Human Males Admitted to the Infertility Centers in Najaf Province

Jinan Mohammed Hussein1, Anaam Jawad Alabbasy1, Suhair Abdul Kareem Al-Rammahi1, Ahmed Abdulridha Ameen Shlash2

1Department of Biology, University of Kufa, Girl of Education Collage; 2M.Sc in Medical Microbiology

ABSTRACT

Bacterial infections have been identified as one of the causes of infertility, bacteria can cause immobilization and agglutination of spermatozoa. The aim of research was to detect the bacterial pathogens in seminal fluid culture from infertile men and determine the antibiotic sensitivity pattern in vitro. Seminal fluid samples were collected for culture and antibiotic sensitivity testing and were processed according to the standard techniques of microbiology. A total of 120 seminal fluid samples collected from human males admitted to the infertility centers in Najaf province, 74 (61.66%) of samples revealed positive significant growth of bacteria, while 46 (38.33%) samples were with no growth. Eleven species of different bacterial organisms were isolated.

Keywords: Staphylococcus, Infertility, Semen, E-coli.

Introduction

Urogenital tract infection in male is one of the important causes of infertility, worldwide since genital tract inflammation and infection have been associated with (8-35%) cases of male infertility4. Seminal fluid infection by bacteria refers to the presence of bacteria in seminal fluid samples2. Bacterial infection of seminal fluid may play a major role in infertility5. Male accessory sex glands infection is a major risk factor in infertility6. The direct effect on sperm function (movement, morphological form), deterioration of sperm formation, autoimmune processes resulting from inflammation and dysfunction of the attached sex glands6. Thus, the microbiological investigation of the male partners in the two contractile populations can be useful for detecting urogenital tract infection in males, especially non-symptomatic infection. The isolation of microorganisms from seminal fluid especially of infertile men had been widely reported4-6. It is always recommended that microbiological study of semen can be performed in asymptomatic infertile men with leukocytospermia. The most widely studied genital microorganism in relation to male infertility is Escherichia coli, which is the principal microorganism that causes prostatitis and epididymitis10. Infections have been recognized in the reproductive system of male infertility for decades11-14.

Materials and Method

Seminal Fluid Samples and Collection: A total number of 120 samples were collected from human males having urogenital tract infection through a period of 6 months (from Feb to July 2018). The specimens were collected from patients who referred to infertility centers in Holly Najaf. The samples have been labeled according to the sex and age of all patients and without delay cultivation. Seminal fluid specimens were collected from human male patients suffering from urogenital tract infection. The patient should not have a sexual activity for 3 days before collecting a semen sample, also asked to pass urine first, wash, rinse hands, penis before the specimens were collected, then start the sample collection. The specimens were collected into clean wide-mouthed 15 ml sterile plastic vials and incubated at 37 °C for 30 minutes for liquefaction, then seminal fluid analysis (SFA) was done to diagnose asthenospermia and leukocytospermia. Swabs were inserted into the specimens and then directly inoculated on
blood agar, chocolate agar and MacConkey agar. All plates were incubated aerobically at 37°C for 48 hrs.

Seminal Fluid Culture: All growing isolates on surface of blood agar, chocolate agar and macConkey Agar were identified according to some biochemical test including Oxidase test, Urase test, Citrate test, Indole test and motility test\textsuperscript{(15)}. Then all isolate streaked on CHROMagar\textsuperscript{TM} Orientiation medium (CHROMagar\textsuperscript{TM}, France), finally, the diagnosis was confirmed using Vitek2 compact system (Biomerieux, France) using ID cards to detect gram positive and gram negative bacteria.

Antibiogram Profile using Disk Diffusion Method: Antibiotic susceptibility test of different isolates were carried out according to the criteria of the Clinical and Laboratory Standards Institute\textsuperscript{(16)} using disk diffusion method by Kirby-Bauer method\textsuperscript{(17)}, developing cells were suspending then adjusted to a 0.5 McFarland standard tube and spread on surface of Mueller Hinton Agar by using disks commercially obtainable antibiotics(Bioanalyse, Turkey) including Amoxicillin(10µg), Amoxicillin + Clavulanic acid (30µg), ceftriaxone (30µg), cefepime (30µg), imipenem (10µg), meropenem (10µg), amikacin (30µg), ciprofloxacin (5µg), levofloxacin (5µg), and Doxycycline (30µg).

Results

Out of 120 seminal fluid samples collected from human males admitted to the infertility centers in Najaf province,74 (61.66%) of samples revealed positive significant growth of bacteria on culture media, while 46 (38.33%) with no growth (Figure-1-A). The bacterial isolates of the predominant growth from the clinical samples were considered in the study. Additionally, only one positive culture per a patient was included. Duplicate isolates from the same infective episode in the same patient were also excluded. The samples were collected from patients with different age groups started with the age of 20 years old reaching to 60 years old. The highest number of patients having seminal fluid infection was in the age group (31-40) years old 33 (44.59%) followed by the age group (20-30) years old 21 (28.37%) and the lowest number in age group (51-60) years old 8 (10.81%) (Figure-1-B). The distribution of gram positive and negative among the bacterial culture positive cases revealed that the gram positive isolates were 42 (56.75%), while gram negative bacterial isolates were 32 (43.24%) (Figure-1-C).
The distribution of pathogens causing seminal fluid infection, out of 42 gram positive bacterial isolates, the most predominant pathogen was *Staphylococcus aureus* 18 (24.32%) followed by *Enterococcus faecalis* 9 (12.16%), *Staphylococcus saprophyticus* 7 (9.45%), *Staphylococcus epidermidis* 5 (6.75%), *Streptococcus pyogenes* 2 (2.70%) and *Streptococcus pneumoniae* 1 (1.35%) (Table-1). While out of 32 gram negative bacterial isolates, the most predominant pathogen was *Escherichia coli* 15 (20.27%) followed by *Klebsiella pneumoniae* 7 (9.45%), *Neisseria gonorrhoeae* 5 (6.75%), *Pseudomonas aeruginosa* 3 (4.05%) and *Proteus mirabilis* 2 (2.70%) (Table-1).

### Table 1: Species wise distribution of semen pathogens

<table>
<thead>
<tr>
<th>Pathogens</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gram positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. <em>Staphylococcus aureus</em></td>
<td>18</td>
<td>24.32%</td>
</tr>
<tr>
<td>2. <em>Enterococcus faecalis</em></td>
<td>9</td>
<td>12.16%</td>
</tr>
<tr>
<td>3. <em>Staphylococcus saprophyticus</em></td>
<td>7</td>
<td>9.45%</td>
</tr>
<tr>
<td>4. <em>Staphylococcus epidermidis</em></td>
<td>5</td>
<td>6.75%</td>
</tr>
<tr>
<td>5. <em>Streptococcus pyogenes</em></td>
<td>2</td>
<td>2.70%</td>
</tr>
<tr>
<td>6. <em>Streptococcus pneumoniae</em></td>
<td>1</td>
<td>1.35%</td>
</tr>
<tr>
<td>Gram negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. <em>Escherichia coli</em></td>
<td>15</td>
<td>20.27%</td>
</tr>
</tbody>
</table>

Among gram positive organism, *S. aureus* was found (83.33%) sensitive to Imipenem followed by Meropenem (66.66%) and Ciprofloxacin (50.0%). In case of *S. saprophyticus* Imipenem was the drug of choice showed (85.71%) sensitive followed by Ceftriaxone, Meropenem and Doxycycline in percentage (57.14%). The effective antibiotics on *S. epidermidis* were Imipenem and Levofloxacin reaching to (80%) followed by Ciprofloxacin and Doxycycline reaching to (60%). *Enterococcus faecalis* was (100%) sensitive to imipenem followed by Meropenem (88.88) and Amikacin (77.77%). Also *S. pyogenes* antibiotic sensitivity showed that Imipenem antibiotic was most affective with percentage of (100%) followed by Ceftriaxone, Ciprofloxacin, Levofloxacin and Amikacin with percentage reached to (50%). The pathogen *S. pneumoniae* showed sensitivity to the antibiotics Imipenem, Ceftriaxone, Ciprofloxacin, Levofloxacin, Amikacin in percentage reaching to (100%), (Table-2). Among over all gram positive bacterial isolates, Imipenem was found to be (88.09%) sensitive, followed by Meropenem (73.33%), Amikacin (52.38%) and Ciprofloxacin (50.0%). Among gram negative bacterial isolates, *E. coli* was found highly susceptible to Imipenem (86.66%), followed by Meropenem (73.33%) and Doxycycline (60%). *K. pneumoniae* was highly susceptible to Imipenem (86.66%), followed by Meropenem (73.33%) and Ciprofloxacin (50.0%).
sensitive for Imipenem (85.71%) and equally sensitive to Ceftriaxone, Meropenem and Amikacin (57.14%). In case of *N. gonorrhoeae*, Imipenem was the drug of choice showed (100%) sensitive followed by Amikacin (80%) and Ceftriaxone, Ciprofloxacin and Meropenem in percentage of (60%) *P. aeruginosa* showed (100%) sensitivity to both Imipenem and Meropenem followed by Ciprofloxacin in percentage (66.66%). *P. mirabilis* showed sensitivity for all Meropenem, Levofloxacin and Doxycycline in percentage (100%) (Table-3). In overall gram negative bacterial isolates, Imipenem was found to be (87.50%) sensitive, followed by Meropenem (71.87%), Doxycycline (56.25%) and Amikacin (53.12%) (Table-4).

**Table 2: Antibiotic sensitivity pattern of overall gram positive bacterial organisms**

<table>
<thead>
<tr>
<th>Antibiotic disk</th>
<th>Sensitive</th>
<th>Percentage</th>
<th>Intermediate</th>
<th>Percentage</th>
<th>Resistant</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>1</td>
<td>2.38</td>
<td>2</td>
<td>4.76</td>
<td>39</td>
<td>92.85</td>
</tr>
<tr>
<td>Amoxicillin clavulanic acid</td>
<td>4</td>
<td>9.52</td>
<td>4</td>
<td>9.52</td>
<td>34</td>
<td>80.95</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>20</td>
<td>47.61</td>
<td>2</td>
<td>4.76</td>
<td>20</td>
<td>47.61</td>
</tr>
<tr>
<td>Cefepime</td>
<td>10</td>
<td>23.80</td>
<td>3</td>
<td>7.14</td>
<td>29</td>
<td>69.04</td>
</tr>
<tr>
<td>Imipenem</td>
<td>37</td>
<td>88.09</td>
<td>4</td>
<td>9.52</td>
<td>1</td>
<td>2.38</td>
</tr>
<tr>
<td>Meropenem</td>
<td>25</td>
<td>59.52</td>
<td>11</td>
<td>26.19</td>
<td>6</td>
<td>14.28</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>22</td>
<td>52.38</td>
<td>5</td>
<td>11.9</td>
<td>15</td>
<td>35.71</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>21</td>
<td>50</td>
<td>10</td>
<td>23.80</td>
<td>11</td>
<td>26.19</td>
</tr>
<tr>
<td>Amikacin</td>
<td>24</td>
<td>57.14</td>
<td>4</td>
<td>9.52</td>
<td>14</td>
<td>33.33</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>18</td>
<td>42.85</td>
<td>13</td>
<td>30.95</td>
<td>11</td>
<td>26.19</td>
</tr>
</tbody>
</table>

**Table 3: Antibiotic sensitivity pattern of gram negative bacterial organisms**

<table>
<thead>
<tr>
<th>Antibiotic disk</th>
<th><em>E. coli</em> (N = 15)</th>
<th><em>K. pneumoniae</em> (N = 7)</th>
<th><em>N. gonorrhoeae</em> (N = 5)</th>
<th><em>P. aeruginosa</em> (N = 3)</th>
<th><em>P. mirabilis</em> (N = 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S (%)</td>
<td>I (%)</td>
<td>R (%)</td>
<td>S (%)</td>
<td>I (%)</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Amoxicillin clavulanic acid</td>
<td>0</td>
<td>13.33</td>
<td>86.66</td>
<td>0</td>
<td>28.57</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>35.29</td>
<td>20</td>
<td>40</td>
<td>57.14</td>
<td>14.28</td>
</tr>
<tr>
<td>Cefepime</td>
<td>26.66</td>
<td>6.66</td>
<td>60</td>
<td>42.85</td>
<td>0</td>
</tr>
<tr>
<td>Imipenem</td>
<td>86.66</td>
<td>0</td>
<td>13.33</td>
<td>85.71</td>
<td>14.28</td>
</tr>
<tr>
<td>Meropenem</td>
<td>73.33</td>
<td>0</td>
<td>26.66</td>
<td>57.14</td>
<td>28.57</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>46.66</td>
<td>6.66</td>
<td>46.66</td>
<td>42.85</td>
<td>14.28</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>33.33</td>
<td>26.66</td>
<td>40</td>
<td>42.85</td>
<td>28.57</td>
</tr>
<tr>
<td>Amikacin</td>
<td>35.33</td>
<td>0</td>
<td>64.66</td>
<td>57.14</td>
<td>28.57</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>60</td>
<td>6.66</td>
<td>33.33</td>
<td>71.42</td>
<td>0</td>
</tr>
</tbody>
</table>

**Table 4: Antibiotic sensitivity pattern of overall gram negative bacterial organisms**

<table>
<thead>
<tr>
<th>Antibiotic disk</th>
<th>Sensitive</th>
<th>Percentage</th>
<th>Intermediate</th>
<th>Percentage</th>
<th>Resistant</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3.12</td>
<td>31</td>
<td>96.87</td>
</tr>
<tr>
<td>Amoxicillin clavulanic acid</td>
<td>2</td>
<td>6.25</td>
<td>6</td>
<td>18.75</td>
<td>24</td>
<td>75.00</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>14</td>
<td>43.75</td>
<td>6</td>
<td>18.75</td>
<td>10</td>
<td>31.25</td>
</tr>
<tr>
<td>Cefepime</td>
<td>9</td>
<td>28.12</td>
<td>4</td>
<td>12.50</td>
<td>19</td>
<td>59.37</td>
</tr>
</tbody>
</table>
Conted…

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Imipenem</td>
<td>28</td>
<td>87.50</td>
<td>2</td>
<td>6.25</td>
<td>2</td>
</tr>
<tr>
<td>Meropenem</td>
<td>23</td>
<td>71.87</td>
<td>5</td>
<td>15.62</td>
<td>2</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>15</td>
<td>46.87</td>
<td>5</td>
<td>15.62</td>
<td>12</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>11</td>
<td>34.37</td>
<td>8</td>
<td>25.00</td>
<td>13</td>
</tr>
<tr>
<td>Amikacin</td>
<td>17</td>
<td>53.12</td>
<td>3</td>
<td>9.37</td>
<td>12</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>18</td>
<td>56.25</td>
<td>5</td>
<td>15.62</td>
<td>9</td>
</tr>
</tbody>
</table>

Discussion

Bacterial infection of the reproductive system can weaken the production of sperms or cause scarring and obstruction of the tubules that transport sperms and causing infertility. Testicular infection can stop sperm production by blocking the small testicular tubules in which sperms are produced called seminiferous tubules. The newly produced sperm are stored temporarily in the epididymis, a member alongside the testis that consists of coiled sperm ducts where semen final maturity as it slowly moves through sperm channels. Infections in the epididymis may interfere with the proper maturation of sperm and can block sperm transport. In this study 61.66% of seminal fluid culture was found significant bacterial growth. The commonest isolates were *S. aureus* (24.32%) followed by *E. coli* (20.27%), *Enterococcus faecalis* (12.16%), *K. pneumoniae* and *S. saprophyticus* (9.45%), both *S. epidermidis* and *N. gonorrhoeae* (6.75%), *P. aeruginosa* (4.05%), both *S. pyogenes* and *P. mirabilis* (2.70%), and *S. pneumoniae* (1.35%).

Similar studies conducted by other researchers, a local study in Babylon by (16) revealed that out of 70 bacterial isolates from male patients having seminal fluid infection gram positive bacteria constituted 44(62.9%) while gram negative bacteria constituted 26(37.1%) of isolates, coagulase negative staphylococci (CoNS) represented by *S. epidermidis* and *S. saprophyticus* were the common type of bacterial isolates 25(35.7%) followed by *S. aureus* 19 (27.2%), *E. coli* 12 (17.1%), *Enterobacter aerogenes* 8 (11.4%), *Acinetobacter baumannii* 4 (5.7%) and *Moraxella* spp 2 (2.9%). Other national studies, Mogra et al (1981) found that 42.9% significant bacterial growth, the type of organisms isolated were *S. faecalis* (31.4%), *E. coli* (17.1%), and coagulase negative Staphylococci (14.3%). Orji et al, 2007 reported *S. aureus* was the highest prevalent bacteria isolated (37.1%). The study (18) obtained 73% positive bacterial cultures. The most common aerobic organisms grown were Corynebacterium, *S. aureus*, *S. epidermidis*, *E. coli*, *P. mirabilis*, *K. pneumoniae* and Mycoplasma. Ekhaise and Richard 2011 found that *S. aureus* 7 (77.8%) were the most common isolates. However, it has been reported that the presence of bacteria in semen may affect fertility in several ways including sperm damage, which hinders movement, and changes the chemical composition of semen (19). Seminal infection could be the cause of the chronicity of urinary tract infection by acting as the reservoir of infection (20). Some possible pathophysiological mechanisms that lead to the development of infertility are linked to the presence of microorganisms in the ejaculation (18). Microbial infections of the semen are major causes of male infertility (20). The viability and integrity of the semen lies in its characteristic mobility (21). The negative effects of these microorganisms on the sperm reproductive potential were detected in *E. coli* and *S. aureus* infections among other microorganisms (22). Presence of *E. coli* in semen decreases sperm motility. Bacteria affect sperm motility by adherence (23-25).

Conflict of Interest: There is no any Conflict of Interest

Ethical Clearance: Ethics committee refer that there is no plagiarism and there is no mistakes or wrong results in this work.

Source of Funding: Self funding.

REFERENCES


Conjecture of TSP Concentration and PM.10 through Measurement Dust Fall
(Study of Dust Dispersion from Special Roads for Coal Transport)

Junaidi¹, Rahmawati¹, Muhammad Pahruddin¹, Agnes T Diana Nerawati²
¹Department of Environmental Health, Health Polytechnic Ministry of Health Banjarmasin;
²Department of Environmental Health, Health Polytechnic Ministry of Health Surabaya

ABSTRACT

The naming of pollutants in the form of particles refers to their physical characteristics or relative size. Dustfall describes large particles that can settle (fall) because it is influenced by its gravitational force. TSP or dust are smaller particles that can float in the air and follow the movement of the wind. PM10 or PM2.5 are very small particles (equivalent diameter of 10 microns and 2.5 microns) that can enter the human respiratory tract. The existence of these particles is interrelated because they originate from the same source, which is a solid which is mechanically destroyed. Because it comes from the same source and process, the presence of one type of particle under natural conditions will also be followed by the presence of other particles. This makes it possible to estimate the existence of other particles by measuring one of the selected types of particles.

This study aims to obtain an estimation model of PM10 and TSP levels through the measurement of dustfall concentration. Dustfall, TSP and PM10 measurements were carried out simultaneously at one coal haul roadside location for 24 hours divided per hour in each measurement set, air temperature humidity measurement, and observation of coal transport volume were also carried out in each measurement set.

The results of the study show that; air temperatures ranged from 26 - 35°C and air humidity ranged from 42 - 76%, dustfall levels ranged from 676.95 - 4,041.14 tons/km². Month, TSP levels ranged from 153.2 - 9457.8 µg/m³ and levels PM10 ranges from 145.0 - 7,603.4 µg/m³. The particulate matter in the air has a positive correlation with air temperature and has a negative correlation with air humidity. The model of TSP relationship with PM10 was TSP = 0.077 + 1.251 (PM10), the relationship between dustfall and TSP was dustfall = 935,702 + 305,333 (TSP), the relationship between dustfall and PM10 was dustfall = 938,719 + 393,762 (PM10).

It was concluded that there was a relationship between dustfall with the levels of TSP and PM10 individually, and the estimation model PM10 and TSP by the dustfall was a dustfall filled with 60% by TSP and PM10 and TSP filled with 77.8% PM10.

Keywords: pollutants, dustfall, TSP, PM10

Introduction

The naming of pollutants in the form of particles refers to their physical characteristics or relative size. Dust fall describes large particles that can settle (fall) because they are influenced by their gravitational force. TSP or dust are smaller particles that can float in the air and follow the movement of the wind. PM10 or PM2.5 are very small particles (equivalent diameter of 10 microns...
and 2.5 microns) that can enter the human respiratory tract. The existence of these particles is interrelated because they originate from the same source, which is a solid which is mechanically destroyed. Because it comes from the same source and process, the presence of one type of particle under natural conditions will also be followed by the presence of other particles. This makes it possible to estimate the existence of other particles by measuring one of the selected types of particles.2

**Method**

The coal transportation traffic disperses the Total Particles into ambient air in a certain amount. The total scattered particles consist of various sizes, ranging from large to small. In this study measurements were carried out on dustfall, TSP and PM10 simultaneously on one spot on the side of the road that was considered safe, which is 5 meters away on the edge of the coal haul road. Measurements were carried out for 24 hours divided per hour of observation, besides that, measurements were also made on the air temperature, air humidity and the volume of traffic passing by coal. The measurement data are analyzed statistically and see the third particle fraction of the type of dust.

**Results and Discussion**

The concentration of dust from direct measurements in the field is as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Days to</th>
<th>Dust Fall (ton/km².bulan)</th>
<th>TSP (µg/m³)</th>
<th>PM₁₀ (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>12.00 – 13.00</td>
<td>4.041,14</td>
<td>9.457,8</td>
<td>7.603,4</td>
</tr>
<tr>
<td>2.</td>
<td>13.00 – 14.00</td>
<td>3.972,35</td>
<td>8.336,5</td>
<td>6.826,7</td>
</tr>
<tr>
<td>3.</td>
<td>14.00 – 15.00</td>
<td>812,34</td>
<td>3.918,8</td>
<td>2.480,1</td>
</tr>
<tr>
<td>4.</td>
<td>15.00 – 16.00</td>
<td>2.663,72</td>
<td>4.152,6</td>
<td>3.468,3</td>
</tr>
<tr>
<td>5.</td>
<td>16.00 – 17.00</td>
<td>2.554,47</td>
<td>5.016,4</td>
<td>3.275,6</td>
</tr>
<tr>
<td>6.</td>
<td>17.00 – 18.00</td>
<td>1.188,05</td>
<td>869,0</td>
<td>716,0</td>
</tr>
<tr>
<td>7.</td>
<td>18.00 – 19.00</td>
<td>852,96</td>
<td>618,2</td>
<td>486,3</td>
</tr>
<tr>
<td>8.</td>
<td>19.00 – 20.00</td>
<td>1.218,51</td>
<td>788,2</td>
<td>584,0</td>
</tr>
<tr>
<td>9.</td>
<td>20.00 – 21.00</td>
<td>1.329,28</td>
<td>582,3</td>
<td>447,3</td>
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<tr>
<td>10.</td>
<td>21.00 – 22.00</td>
<td>1.396,21</td>
<td>362,0</td>
<td>298,6</td>
</tr>
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<td>11.</td>
<td>22.00 – 23.00</td>
<td>676,95</td>
<td>267,6</td>
<td>185,6</td>
</tr>
<tr>
<td>12.</td>
<td>23.00 – 00.00</td>
<td>888,80</td>
<td>356,1</td>
<td>280,5</td>
</tr>
<tr>
<td>13.</td>
<td>00.00 – 01.00</td>
<td>1.035,73</td>
<td>362,1</td>
<td>261,0</td>
</tr>
<tr>
<td>14.</td>
<td>01.00 – 02.00</td>
<td>1.090,25</td>
<td>311,5</td>
<td>245,8</td>
</tr>
<tr>
<td>15.</td>
<td>02.00 – 03.00</td>
<td>1.343,49</td>
<td>215,6</td>
<td>192,4</td>
</tr>
<tr>
<td>16.</td>
<td>03.00 – 04.00</td>
<td>893,57</td>
<td>153,2</td>
<td>145,0</td>
</tr>
<tr>
<td>17.</td>
<td>04.00 – 05.00</td>
<td>1.613,70</td>
<td>1.062,5</td>
<td>812,7</td>
</tr>
<tr>
<td>18.</td>
<td>05.00 – 06.00</td>
<td>1.462,21</td>
<td>838,9</td>
<td>566,1</td>
</tr>
<tr>
<td>19.</td>
<td>06.00 – 07.00</td>
<td>1.847,85</td>
<td>2.643,4</td>
<td>1.891,2</td>
</tr>
<tr>
<td>20.</td>
<td>07.00 – 08.00</td>
<td>1.399,99</td>
<td>3.465,8</td>
<td>3.092,6</td>
</tr>
</tbody>
</table>
21. 08.00 – 09.00          1.190,17         2.865,1         2.072,3
22. 09.00 – 10.00         1.787,15         2.783,6         2.129,4
23. 10.00 – 11.00         1.367,11         2.971,6         2.179,4
24. 11.00 – 12.00         2.172,13         1.120,7         1.076,2
   Average                  1.616,59         2.229,98        1.721,5

Description: Quality standards According to PPRI No. 41 of 1999

- Dust Fall: 20 tons/km². Month
- TSP: 230 µg/m³
- PM10: 150 µg/m³

The concentration of dust fall in Total Suspended Particulate (TSP) and Particulate Matter 10 micron (PM10) is very high and has exceeded the maximum quality standard set by PP 41 of 1999. The high concentration of the three dust parameters is caused by:

- The first factor, is the density or volume of coal transportation traffic, recorded the volume of coal truck traffic passing a total of 5,283 units or an average of 220 units per hour. The high level of dust around the road, especially the special road for coal transportation, corresponds to several previous studies, such as; 3,4,7

- The second factor, is that the road conditions are less compact, so that when there is friction between the wheels of the vehicle and the road body and air turbulence due to vehicle speed (reaching 60 km/h) it triggers the dispersion of particles into the air around the road.

- The third factor, is air temperature and air humidity, these two factors are related to the nature of dust (Patty, 1976); During the day the air temperature can reach 35°C, with a low humidity of 42% and a correlation of air temperature with positive particle content, that is, the higher the air temperature the more the particle content, while the air humidity is negatively related, or the smaller the air humidity high particle content.

The percentage of PM10 from TSP ranges from 63.3% – 96.0% with an average of 77.8% (± 8.4%), while the dustfall content is filled by 60% of the concentration of TSP + PM10 obtained from the average measurement results of dustfall in the field = 1,616.59 tons/km². Month deducted by 970,638 tons/km². Month (Dustfall constant = 970,638 - 414,735 (TSP) + 912,450 (PM10)), to 645.95 tons/km². Month or 40%, it can be concluded that the remaining 60% of dustfall is TSP concentration and PM10.

Conclusions and Recommendations

Conclusion:

1. Measured Particulate Matter 10 micron (PM10) concentration ranged from 145.0 - 7.603.4 µg/m³, Total Suspended Particulate (TSP) ranged from 153.2 - 9,457.8 µg/m³ and dust fall ranged from between 676.95 - 4,041.14 tons/km². month.

2. The air temperature at the study site ranged from 26°C to 35°C and air humidity ranged from 42 - 76%.

3. The model for estimating TSP and PM10 by dust fall is
   a. PM10 and TSP fill 60% of dustfall
   b. PM10 fills 77.8% of TSP

Recommendation:

1. Determination of TSP and PM10 concentrations can be done by measuring the level of dustfall using a dustfall collector and the estimator using the model results of this study.

2. Further research on PM2.5 dust fraction by PM10 and TSP, because these three particulate parameters have the same unit

Conflict of Interest: None

Ethical Clearance: From ethical committee at Health Polytechnic Ministry of Health Banjarmasin & Surabaya

Source of Funding: Self
REFERENCES


Development of Cardiovascular Complications in Polycythemia Vera Patients Influenced by Increased Blood Viscosity

Kaliberdenko V. B.,1 Kuznetsov E. S.,2 Shanmugaraj K.,3 Keerthanaa B.,3 Al-Nsour J. M.,4 Poleshchuk O. Yu.5
1Associate Professor, Department of Internal Medicine No.2, 2Assistant, Department of Internal Medicine No.1, 3Department of Internal Medicine No.2, 4Associate Professor, Department of Oncology, 5Associate Professor, Department of Propedeutics of Dentistry, V. I. Vernadsky Crimean Federal University, Simferopol, Russia

ABSTRACT

True polycythemia is a clonal myeloproliferative process, from the group of Ph-negative myeloproliferative diseases, developing at the level of the stem hematopoietic cell with a subsequent violation of the proliferation and differentiation of hematopoietic cells. Purpose of the study is to analyze the features of the development of cardiovascular complications in patients with true polycythemia and to establish correlation between age of the patients, duration of the disease and the effectiveness of their symptomatic therapy. Materials and methods - An Assessment of the evolution of complications in cardiovascular system with patients suffering from polycythemia vera was evaluated, and a correlation was established between age of the patients, duration of illness, and the effectiveness of their symptomatic therapy. An analysis of 30 patients suffering from polycythemia vera – 23 men and 7 women were studied. Results - The main complications that develop as syndromes and symptoms in patients suffering from polycythemia vera were found and the probability of development of thrombotic complications were assessed. The possibility of progressing of complications in cardiovascular system were as follows, symptomatic arterial hypertension, coronary artery diseases(CAD) and hypertension, increases with age of the patients and with the length of the disease.

Keywords: Polycythemia vera (Erythremia, Vaquez-osler disease), Cardio-vascular complications, thrombotic complications, Myeloproliferative disease, JAK2.

Introduction

True polycythemia (syn. Erythremia) is a clonal myeloproliferative process, from the group of Ph-negative myeloproliferative diseases, developing at the level of the stem hematopoietic cell with a subsequent violation of the proliferation and differentiation of hematopoietic cells [2]. Ultimately, the uncontrolled formation of blood cells leads to pancytosis (erythrocytosis, thrombocytosis, leukocytosis) with symptoms of splenomegaly. The history of true polycythemia is conditionally divided into three eras. The first one is related to the description of the disease by the Frenchman Louis Vaquez in 1892 and in 1903 by the Canadian William Osler [3]. Increased blood viscosity and splenomegaly in their patients, prompted the idea that impaired blood formation is associated with enhanced proliferation of hematopoietic cells. At the same time, phlebotomy (bloodletting) began to be used as a “first line” therapy [5], and the disease was isolated into a separate non-zoological form, and erythremia was referred to as Vaquez-Osler disease. The second epoch is diagnostic at the beginning of 19th century in 1939, on the basis of a detailed analysis of blood parameters and trepanobiopsy, attempts were made to differentiate absolute polycythemia from relative polycythemia. It is worth noting that in this era they began to use radioactive phosphorus as a treatment for erythremia. Finally, the third era, when increased attention to Vaquez-Osler disease from all
diseases in hematology allowed scientists to create the American Polycythemia Research Group. This period, from 1967 to the present day, made many discoveries. First of all, research in the field of molecular genetic mechanisms of development and course of this disease contributed to the discovery of a mutation in the JAK2 gene as a trigger in the pathogenesis of erythremia [2]. This made it possible to revise treatment approaches, in particular, in addition to traditional phlebotomy and the use of antiplatelet agents, drugs from the group of Janus kinase (JAK), as well as hydroxyurea and interferon-α, are available for use in patients with true polycythemia. Analysis, collection and systematization of the obtained data on this disease led to the creation of diagnostic criteria of the WHO, 2008 [7].

Therefore, the study of cardiovascular complications in patients with erythremia is a very urgent task, the solution of which will improve the quality and duration of life of patients.

**Purpose of the Study**

To study the features of the development of cardiovascular complications in patients with true polycythemia and to establish the relationship between age, duration of the disease and the effectiveness of symptomatic therapy.

**Materials and Method**

The study analyzed data of 30 patients with erythema - 23 men and 7 women who were under observation in the conditions of the Department of Hematology and Chemotherapy of the Crimean Republican Oncological Clinical Clinic named after V. M. Efetov, Simferopol. The Patient’s registration was carried out from October 2013 to September 2016. The median age is 57.5 years (from 29 to 86 years). In order to verify the diagnosis of true polycythemia, we have used the WHO 2008 diagnostic criteria, which included 2 groups: large (hemoglobin level is more than 185 g/l and 165 g/l in men and women, respectively, including other signs increasing the volume of circulating erythrocytes, confirmation of mutations in the JAK2 V617F gene) and small criteria (results of trepanobiopsy; erythropoietin level; spontaneous growth of erythroid colonies without growth factors) [7]. The criteria were developed on the basis of a comprehensive clinical and laboratory picture, in order to evaluate true polycythemia in a patients.

The diagnosis of polycythemia vera is confirmed in the presence of two large and one small criteria or in the presence of the one large and two small criteria [7]. The distribution of patients in stages was carried out according to the clinical and pathogenetic classification. The determination of risk groups for the development of thrombotic complications in patients with true polycythemia was carried out by assigning scores to such signs as age, white blood cell count (WBC) and venous thrombosis in history.

The conservative therapy offered to our patients, for the most part, was aimed at relieving symptoms and reducing the development of complications (escuzan, therapeutic phlebotomy, aspecard, heparin, dipyridamole, hydroxyurea). In order to study the relationship between age, duration of the disease and the effectiveness of symptomatic therapy, Spearman’s rank correlation coefficient was used. Statistical data processing was performed using Microsoft Office Excel 2013, Statistica-10.

**Research Results**

By stages, patients with erythremia were distributed as follows: In Stage I - 5 patients, Stage IIa - 7 patients, Stage IIb - 10 patients and in Stage III - 8 patients. Despite the relatively latent course of erythremia, especially in the initial stages, in the studied patients, a group of syndromes and symptoms can be distinguished, which are the result of changes in the rheological properties of blood and pancytosis (see table 1). The most frequent complaints that were presented in patients were associated with damage to the cardiovascular system: increased blood pressure, headache, dizziness, shortness of breath, discomfort, and recurrent pain in the heart area. However, in patients with previous cardiac pathology, there is a sharp progression and deterioration in the debut of the disease. But among the majority of patients, complaints of the cardiovascular system were detected for the first time. Analyzing the findings, we grouped them into symptomatic hypertension 16.7% (n=5), hypertension 20% (n=6) and CAD 16.7% (n=5).

Plethoric syndrome was detected in 10% (n=3) of cases, the main manifestations of which were flushing of the face, palms, and pruritus. Changes in the bone tissue, which on the one hand are associated with impaired blood circulation in the vessels of the microvasculature and the appearance of microthrombus in the capillaries,
are a manifestation of the ossalgic symptom 10% (n=3).
In this case, patients complain of persistent pain in
the lower limbs, joints. On the other hand, enhanced
proliferation of pathologically altered hematopoietic
cells leads to bone marrow fibrosis - osteomyelofibrosis
10% (n=3). Phenomena of splenomegaly and portal
hypertension in patients with erythremia were detected
in 13.3% (n=4) and 3.3% (n=1) cases, respectively. At
the same time, the latter had an episode of spontaneous
bleeding from the veins of the esophagus.

Table 1: The main clinical syndromes and symptoms
in patients with Polycythemia Vera

<table>
<thead>
<tr>
<th>Syndrome/symptom</th>
<th>Number of patients, n = 30, (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>6 (20%)</td>
</tr>
<tr>
<td>CAD</td>
<td>5 (16.7%)</td>
</tr>
</tbody>
</table>
| Symptomatic arterial
  hypertension               | 5 (16.7%)                       |
| Plethoric                   | 3 (10.0%)                       |
| Ossalgic                    | 3 (10.0%)                       |
| Osteomyelofibrosis          | 3 (10.0%)                       |
| Splenomegaly                | 4 (13.3%)                       |
| Portal hypertension         | 1 (3.3%)                        |

The high frequency of thrombotic complications in
patients with erythremia makes it necessary to isolate
patients at risk. Thus, patients belonging to the low-risk
group (0 points) were identified in 23.3% (n=7) cases,
the intermediate-risk group (1-2 points) - 30% (n=9)
and the high-risk group (≥ 3 points) - 46.7% (n=14) of
patients with erythremia (table 2).

Table 2: Risk groups for the development
of thrombotic complications in patients with true
polythemia

<table>
<thead>
<tr>
<th>Sign System of risk stratification</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 57–66 years</td>
<td>2</td>
</tr>
<tr>
<td>Leukocytes ≥ 15*10^9/L</td>
<td>1</td>
</tr>
<tr>
<td>Venous thrombosis in history</td>
<td>1</td>
</tr>
<tr>
<td>Low risk group - 23.3%</td>
<td></td>
</tr>
<tr>
<td>Medium risk group - 30%</td>
<td></td>
</tr>
<tr>
<td>High risk group - 46.7%</td>
<td></td>
</tr>
</tbody>
</table>

By determining the Spearman’s rank correlation
coefficient, a direct relationship was established
between the following indicators: duration and
complications (0.686, T-crit. = 0.487 with p=0.05), age
and complications (0.931, T-crit. =0.487 with p=0.05).
Feedback between duration and effectiveness of the
treatment (0.694, Tcrit. =0.487 with p=0.05), age and
treatment efficacy (0.954, Tcrit. =0.487 with p=0.05).

Discussion

In WHO, MPN category includes seven
subcategories, the term “MPN” usually refers to the three
JAK2 mutation-enriched clinicopathologic entities: PV,
essential thrombocythemia and primary myelofibrosis
(PMF)[22]. PV and its sister diseases constitute stem cell-
derived clonal myeloproliferation that is characterized
by three mutually-exclusive “driver” mutations: JAK2,
CALR, and MPL, with respective distribution frequency
of ~99, 0, and 0% for PV, 55, 22, and 3% for ET and
65, 20 and 7% for PMF.[23] The most frequent MPN-
associated JAK2 mutation is the exon 14 JAK2V617F,
which is responsible for almost all the JAK2 mutations in
ET and PMF, and 97% of those seen in PV; the remainder
3% of JAK2 mutations in PV are spread across exons 12,
13, and 14.[24, 25].

The successes from recent years have helped to
make accurate and timely diagnosis of Vaquez’s disease,
and therapy as effective as possible. However, the
problem of cardiovascular complications in patients
with true polycythemia is not completely resolved and
is not sufficiently studied [6]. First of all, it is associated
with a cascade of changes that occur with the blood
of patients with erythremia. The most simplified is the
following scheme: an increase in the mass of circulating
erthrocytes leads to an increase in hematocrit, which
ultimately leads to a change in the rheological properties
of blood - an increase in viscosity. Such changes
increase the risk of thrombotic complications in patients
with erythremia, which in some cases become the first
manifestations of the disease, and in others may be fatal.
So, thrombotic complications are the main cause
death and disability in 12-49% of patients with true
colythemia, and every fifth patient has at least
one episode of thrombosis in the history [6]. But true
colythemia is not limited to thrombotic complications,
since the effect on the cardiovascular system leads to
the development of numerous complications which will be
discussed in our article. It should also be remembered that
the risk of various complications of the cardiovascular
system increases with the transition of the disease to the
terminal (anemic) phase [13, 14].
Diagnosis of PV often requires the presence of a JAK2 mutation, in addition to documentation of increased hemoglobin/hematocrit, to a threshold level established by the 2016 WHO criteria (>16.5 g/dL/49% for males and >16 g/dL/48% for females) [22]. In addition, bone marrow morphologic assessment is encouraged, in order to distinguish PV from JAK2-mutated ET [26,27,28] and obtain cytogenetic information, which has recently been shown to be prognostically relevant [29,30,31]. Clinical features in PV include mild-to-moderate degree of splenomegaly, mild-to-moderate degree of constitutional symptoms, including fatigue and pruritus, symptoms of hyperviscosity, leukocytosis, thrombocytosis, microvascular symptoms (visual disturbances, atypical chest pain, erythromelalgia, paresthesia), thrombotic and bleeding complications, and risk of leukemic transformation or fibrotic progression [32].

Conclusion

A variety of clinical manifestations and a high percentage of complications, differing in nature and severity, in patients with erythremia continues to create difficulties both in treatment and in improving the quality of life of patients [6]. Changes in rheological properties and increase in blood viscosity, according to the results of our research, have a greater impact on the cardiovascular system with the development of a number of syndromes and symptoms - hypertension, CAD, symptomatic arterial hypertension in 53.4% of cases. The age peak of morbidity appearing from middle-aged and elderly patients makes them more vulnerable to the development of thrombotic complications. In our study about true polycythemia, men from 40 to 70 years are more susceptible. The risk of developing complications such as hypertension, CAD, symptomatic hypertension increases with age and with the duration of the disease. When analyzing the effectiveness of therapy in patients with erythremia, an inverse relationship was established between the experience of the disease and age. Thus, the high age and long-term course of the disease makes the sensitivity to treatment low, which is associated both with thrombotic complications in patients of this age group and with the risk of progression of the tumor process with transition to leukemia, the development of intoxication syndrome, secondary myelofibrosis. In such cases, it is necessary to consider cytoreductive or targeted therapy, as a “first-line” therapy [3]. Of course, elderly patients with a long course of the disease and a high risk of thrombotic complications deserve special attention, since the question of achieving a full therapeutic response, controlling complications and improving the quality of life remains open.

Conflict of Interests: None declared.

Source of Funding: Self funding by authors

Ethical Clearance: In our study involving all human participants were in accordance with ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1964 and later amendments.

REFERENCES


Determination of Safe Concentration of Benzene Exposure in Workers in a Laboratory of Oil Processing Industry in Indonesia

Kharina Almira Djalali¹, Abdul Rohim Tualeka¹, Pudji Rahmawati², Syamsiar S Russeng³, Atjo Wahyu³, Ahsan⁴, Dewi Kartikasari⁵

¹Department of Occupational Health and Safety, Faculty of Public Health, Airlangga University, 60155 Surabaya, East Java, Indonesia; ²Department of Development of Islamic Society, State Islamic University Sunan Ampel, Surabaya, Indonesia; ³Department of Occupational Health and Safety, Faculty of Public Health, Hassamudin University, Makassar, Indonesia; ⁴Faculty of Nurse, University of Brawijaya, Malang, Indonesia; ⁵Department of Environmental Health, Faculty of Public Health, Diponegoro University, Semarang, Indonesia

ABSTRACT

Benzene is one of the substances included in the poison of air pollution. The Environmental Protection Agency (EPA) has classified benzene in Group A carcinogens for humans. The widespread use of benzene in the industrial world can have harmful consequences. The amount of exposure workers receive has a negative impact on their health. Workers at the petroleum refinery laboratory are workers at risk of exposure to benzene. The study aimed to measure the safe concentration limit in the Main Laboratory section of PT. Pertamina RU IV Cilacap. This was a cross sectional, observational, and descriptive study with 51 samples of PT Pertamina RU IV Cilacap laboratory workers. Variables of this study were benzene concentration in the workplace, working time per day, work respiration rate, worker height, weight, and body surface area, white mice body surface and weight, Km factor on workers (Human Km), Km factor on animals (Animal Km), No Observed Adverse Effect Level (NOAEL), safe human dose (SHD), and benzene safe concentrations (C safe) in the air for workers.

The result indicated that safe concentration (C safe) limit in PT Pertamina RU IV Cilacap was 0.03 ppm. It is less than the safe concentration set by Minister of Manpower and Transmigration Regulation No. 13 of 2011 which stated that the C safe is 0.5 ppm. It showed that the TLV in the Main Laboratory section of PT. Pertamina RU IV Cilacap is not safe for workers as benzene concentration in this laboratory is 16.67 times bigger than its safe concentration of benzene.

Keywords: Benzene, safe concentration, laboratory worker

Introduction

Benzene is one of the substances included in the poison of air pollution. The Environmental Protection Agency (EPA) has classified benzene in Group A carcinogens for humans. The widespread use of benzene in the industrial world can have harmful consequences. The amount of exposure workers receive has a negative impact on their health. Workers at the petroleum refinery laboratory are workers at risk of exposure to benzene. One of the chronic effects of being exposed to benzene is a bone disorder of the spinal cord which changes the blood profile.

Benzene enters the body through inhalation. It enters in the form of steam with the main absorption occurring in the lungs. A number of cases of benzene poisoning occurs through the respiratory tract in the workplace. Ninety per cent of those cases are because of inhaling the
benzene as much as ± 8 m³ of air for 8 hours/day every day long exposure, exposure frequency, and duration of exposure. The measures include the analysis of hazard identification, dose-response analysis, exposure analysis, risk characteristics, and risk management. The results of the average concentration of benzene from 8 point was 0.287 mg/m³. The average yield intake of all workers on non-carcinogenic effects was 0.0027 mg/kg/day. The average of workers intakes of carcinogenic effect was 0.0039 mg/kg/day. A total of 19 respondents (37.35).

Benzene as a toxic substance has a safe concentration. Based on research that has been done in the PT. Pertamina RU IV Cilacap, the average concentration of benzene measured at 8 points was 0.09 ppm. It is below the Threshold Limit Value (TLV) set by Minister of Manpower and Transmigration in its regulation No. 13 of 2011 which is equal to 0.5 ppm. However, this TLV can still bring health effects for the workers. Based on the Environmental Protection Agency (EPA) research, a long-term tolerance of benzene exposure in the air with a concentration limit of 0.004 ppm can cause case of leukemia one in 10,000 populations (2013).

Safe benzene concentration is needed as a benchmark for exposure limits that are permitted to avoid the occurrence of health effects for workers. However, many of safe concentration origin are not known. Research by Saridewi and Tualeka in 2012 shows calculation results of safe concentrations derived from NOAEL and Rfc values². Based on the weight of white mice, its body surface area (BSA) can be calculated using the following formula:

\[ \text{Animal BSA} = 0.09 \times W^{0.67} \]

<table>
<thead>
<tr>
<th>Experimental Animal (White Mice)</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024050</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
</tr>
</tbody>
</table>

Based on the description above, this study aimed to determine the Threshold Limit Value of benzene in the Main Laboratory section of PT. Pertamina RU IV Cilacap.

Material and Method

It is an observational, cross sectional and descriptive study. Subject for this study is 51 out of 85 workers of the Laboratory section of PT. Pertamina RU IV Cilacap. The object sample of this study is the air in the working area of Main Laboratory and Petrochemical and Gas Laboratory of PT. Pertamina RU IV Cilacap.

Primary data is taken from the measurement of benzene concentration in the air sample in the working area of Laboratory of PT. Pertamina RU IV Cilacap and the weight of experimental animal, white mice.
B. Workers Characteristic: The characteristics of workers in this study consisted of workers’ weight, height, working time and the average respiratory rate in the PT. Pertamina RU IV Cilacap. Table 2 shows the characteristics of workers.

Based on the average weight and height of the workers’, body surface area and respiration rate of the workers can be calculated using the following formula:

1. The Average of Workers’ Body Surface Area:
   \[ \text{BSA} = \sqrt{\frac{W \times h}{3600}} = \sqrt{67.159 / 3600} = 1.72 \text{ m}^2 \]
   
   **Annotation:**
   - BSA: Body Surface Area (m$^2$)
   - W: weight (kg)
   - h: height (cm)

2. The Average of Workers’ Respiration Rate
   \[ \text{BR} = 5.3 \ln W - 6.9/24 = 5.3 \ln 67 - 6.9/24 = 0.596 \text{ m}^3/\text{jam} \]

   **Annotation:**
   - BR: Breathing Rate (m$^3$/hour)
   - h: height (cm)

Table 2: Distribution of Workers’ Characteristics, Respiration Rate and Working Time in Average

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>W (kg)</th>
<th>h (cm)</th>
<th>BSA (m$^2$)</th>
<th>BR (m$^3$/h)</th>
<th>t (hour/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>67</td>
<td>159</td>
<td>1.72</td>
<td>0.596</td>
<td>8</td>
</tr>
</tbody>
</table>

C. Benzene Concentration: Table 3 shows the measurement result of benzene concentration in 8 different measurement spots in the working area of laboratory of PT. Pertamina RU IV Cilacap.

Table 3: Benzene Concentration in the Working Area of Laboratory of PT. Pertamina RU IV Cilacap

<table>
<thead>
<tr>
<th>Location</th>
<th>Concentration (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation Table 1</td>
<td>0.011</td>
</tr>
<tr>
<td>Observation Table 2</td>
<td>0.006</td>
</tr>
<tr>
<td>Shelter D</td>
<td>0.169</td>
</tr>
</tbody>
</table>
Conted…

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
<th>Human Km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.024223</td>
<td>5.820914007</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024050</td>
<td>5.8004158</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
<td>5.85576247</td>
</tr>
<tr>
<td>Rata-Rata</td>
<td>0.1407</td>
<td>0.024165</td>
<td>5.82</td>
</tr>
</tbody>
</table>

2. Human Km

\[
\text{Human Km} = \frac{W \text{ human}}{\text{BSA human}}
\]

**Annotation:**

- Human Km: human Km factor
- W human: weight of workers
- BSA human: Body Surface Area of workers

Table 5 shows the result of human Km calculation. It shows the weight, body surface area and the average human Km.

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
<th>Human Km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>67</td>
<td>1.72</td>
<td>38.95</td>
</tr>
</tbody>
</table>

E. NOAEL: *No Observed Adverse Effect Level* (NOAEL) is a calculation that must be done to determine the extent to which the concentration of chemicals. NOAEL of benzene is 0.022 mg/kg (EPA, 2005). It is obtained by the calculation using the following formula:

\[
\text{NOAEL Benzene (mg/m³)} = \frac{3 \times 0.00013 \times 8}{0.1405} = 0.022 \text{ mg/kg}
\]

F. Safe Human Dose: Safe Human Dose (SHD) can be calculated using the formula of Shaw et al (2007):

\[
\text{SHD} = \frac{\text{NOAEL Animal Km}}{\text{Human Km}}
\]

**Annotation:**

- SHD: Safe Human Dose (mg/kg)
- NOAEL: *No Observed Adverse Effect Level* (mg/kg)

Based on the formula above, SHD can be obtained by calculating NOAEL, the average animal Km dan the average human Km as follows:

\[
\text{SHD} = \frac{0.022 \times 5.82}{38.95} = 0.003 \text{ mg/kg}
\]

G. Safe Concentration of Benzene: The calculation of safe concentration of benzene in the laboratory of PT. Pertamina RU IV Cilacap can be made using William (1985) as follows:

\[
\text{Safe Concentration} = \frac{\text{SHD} \times W}{\delta \times \text{BR} \times t} \left( \frac{mg}{m^3} \right)
\]

Conversion formula from mg/m³ to ppm is as follows:

\[
\text{Safe Concentration} = \frac{mg/m^3}{MW} \times 24.5 \text{ ppm}
\]

**Annotation:**

- Safe concentration: safe concentration of a toxic in the air for workers (mg/m³)
- SHD: Safe Human Dose (mg/kg)
- W: weight (kg)
- δ: % of substances absorbed by the lungs
- BR: breathing rate (m³/hour)
- t: working time (hour)

Based on the above formula, the results of the calculation of the safe limit of benzene concentration in the Laboratory section of PT. Pertamina RU IV Cilacap as follows:

\[
C_{\text{safe}} (mg/m^3) = \frac{(0.003)(67)}{(50\%)(0.596)(8)} = 0.092 \text{ mg/m}^3
\]

\[
C_{\text{safe}} (ppm) = \frac{(0.0092mg/m^3)(24.5ppm)}{(78.11mg/mol)} = 0.03 \text{ ppm}
\]

The calculation result of the safe concentration benzene in the air in the working area of the PT. Pertamina RU IV Cilacap can be used as a predictor of safe toxin concentration limits for workers in the workplace when the Threshold Limit Value (TLV) has not been established. It can also be used as a comparison with the current TLV set by other institutions.

**Discussion**

Trial activities in the Laboratory of PT Pertamina RU IV Cilacap which involves test samples in the form of crude oil and fuel-based products and non-fuel products containing benzene and which can evaporate
at certain temperatures and pressures is a source of benzene hazards for workers. Stages of handling the test sample require combustion or heating the test sample. It causes benzene to evaporate into the air in the working environment which later can cause negative effect for workers’ health. It is due to that benzene is in Group A of carcinogens for humans (EPA).

Workers in the Laboratory of PT Pertamina RU IV Cilacap work with a duration of 8 hours/day for 265 days/year. The results of interviews with 51 respondents found that 21.6% respondents reported to experience dizziness, 21.6% irritability, 17.6% sleep disorders, 13.7% breathlessness, and 11.8% nausea.

The measures include the analysis of hazard identification, dose-response analysis, exposure analysis, risk characteristics, and risk management. The results of the average concentration of benzene from 8 point was 0.287 mg/m³. The average yield intake of all workers on non-carcinogenic effects was 0.0027 mg/kg/day. The average of workers intakes of carcinogenic effect was 0.0039 mg/kg/day. A total of 19 respondents (37.35).

Calculation of safe concentration limit in PT. Pertamina RU IV Cilacap was carried out in some steps. It was started with the calculation of NOAEL, followed by calculation of SHD/Rfc and, as a final step, calculation of the safe limit of benzene concentration. Saridewi and Tualeka (2012) who conducted a study to determine the benzene safe concentration limits also performed such calculation steps using NOAEL and SHD/Rfc.

According to EPA, NOAEL (No Observe Adverse Effect Level) is an experiment in determining doses that do not indicate a statistically significant effect on toxic effects or biological functions¹. NOAEL benzene values in this study is 0.022 mg/kg determined by EPA (2005). Based on research results by Swaan et al (2010), the result of NOAEL benzene was 3.0 mg/m³ or equal to 0.022 mg/kg. The research conducted by Kruskal Wallis to determine NOAEL values by testing the expression of imuneractive interleukin-2 showed that the IRS score results were not significantly different so that they could be used as a reference for NOAEL values¹.

SHD (Safe Human Dose) or Rfc is a dose reference for humans. When the dose received by human exceeds the SHD/Rfc value, the risk for human health is also greater². Generally, in the previous study, the value of Rfc used was a provision determined by IRIS (Integrated Risk Information System) from US-EPA which was equal to 0.0086 mg/kg/day. However, this study obtained Rfc result of 0.003 mg/kg. It was derived from the calculation of NOAEL, Animal Km and Human Km. Saridewi and Tualeka (2012) used the Rfc calculation formula and get the Rfc value of 0.004 mg/kg. A research conducted at the Wedoro shoe factory, Sidoarjo, which used the same Rfc calculation formula, obtained the Rfc value of 0.0036 mg/kg.

The measurement result of benzene concentration in 8 different measurement spots in the working area of laboratory of PT. Pertamina RU IV Cilacap showed that its highest benzene concentration was 0.187 ppm and the lowest was 0.006 ppm. It is still far below the TLV set by Minister of Manpower and Transmigration in its regulation No. 13 of 2011, which stated that the TLV of benzene is 0.5 ppm.

The obtained safe concentration limit of benzene in the Laboratory of PT. Pertamina RU IV Cilacap is 0.03 ppm. It is below the TLV set by Minister of Manpower and Transmigration in its regulation No. 13 of 2011, which stated that the TLV of benzene is 0.5 ppm. It indicated that working area in the Laboratory of PT Pertamina RU IV Cilacap is not safe for workers as it is 16.67 times bigger than the safe limit in the Laboratory.

Benzene contains gasoline which can have an impact on blood hemoglobin levels. Exposure to benzene through the respiratory tract with certain doses can damage human blood cells. Benzene can provide an impact on the spinal cord which can cause aplastic anemia, immune cell damage and acute bleeding. It is proved by workers complaints of uncomfortableness of respiratory tract and eyes. The use of personal protective equipment (PPE) for workers such as masks is strongly recommended. It is also strongly recommended for workers to consume nutritious foods such as beef liver and salmon, to increase their immunity against benzene⁵.

**Conclusion**

1. NOAEL benzene in the Laboratory Section of PT. Pertamina RU IV Cilacap is 0.022 mg/kg.
2. SHD/Rfc benzene in the Laboratory Section of PT. Pertamina RU IV Cilacap is 0.003 mg/kg
3. Safe concentration of benzene in the Laboratory Section of PT. Pertamina RU IV Cilacap is 0.092 mg/m³ or equal to 0.03 ppm.

**Recommendation**

The Threshold Limit Value (TLV) of benzene concentration obtained from manual calculations of this study can be used as the TLV of benzene in PT. Pertamina RU IV Cilacap.

It is strongly recommended for workers to use personal protective equipment (PPE) such as masks during working hours, and for the company to provide high nutritious food for workers.

**Conflict of Interest:** All authors have no conflicts of interest to declare.

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**Ethical Clearance:** The study was approved by the institutional Ethical Board of the Public Health, Diponegoro University

**REFERENCE**


Saponin Maintaining and Dose Determining in Carica Papaya Leaf Cookies as a Breast Milk Booster (galactogogue)

Krisdiana Wijayanti¹, Hertanto W. Subagio², Martha Irene Kartasurya³, Sri Achadi Nugraheni³

¹Doctoral Student, Faculty of Public Health, ²Professor, Faculty of Medicine, ³Associate Professor, Public Health Nutrition Department, Faculty of Public Health, Diponegoro University, Semarang, Indonesia

ABSTRAcT

Background: Papaya leaf has been proven to increase breastmilk production as the saponin content increases oxytocin level. However papaya leaf has a bitter taste, therefore cookies form is a good alternative to increase compliance. Saponin content has to be maintained and the dose should be determined to be an effective breastmilk booster (galactogogue).

Objective: This study aimed to find the best process in 1. Minimizing the bitter taste of papaya leaf, 2. Maintaining saponin content of cookies, 3. Finding the highest dose of acceptable cookies, and 4. Determining the amount of cookies has to be consumed by lactating mothers as a breastmilk booster.

Method: For minimizing the bitter taste of Carica papaya leaf we compared the pH level of mashed papaya leaf after three different treatments. For saponin maintaining, we compared two different temperature and duration of baking processes. Hedonic tests were performed to find the dose of papaya leaf cookies which were acceptable. The number of cookies should be consumed was calculated based on amount of saponin in the cookies, which had been shown to have an effective outcome.

Findings: This study found that Carica papaya leaf which was boiled twice in 60⁰C for 10 minutes had the lowest pH compared to be soaked in 2.5% volume of quicklime (calcium oxide) solution or 10 minutes boiled in the cooked rice water. Baking Carica papaya leaf cookies in 60⁰C for 70 minutes could maintain saponin content compared to be baked in 130⁰C for 35 minutes. Hedonic test results showed that there was no significant differences in acceptability levels of Carica papaya leaf content between the groups. A hundred gram cookies with 40% carica papaya leaves contained 3.67g saponin, thus for 1.8g saponin intake/day in two cookies of 25g should be consumed.

Conclusion: The best method in reducing the bitter taste of Carica papaya leaf cookies was by boiling in 60⁰C for 10 minutes. Saponin content in the cookies could be maintained by 60⁰C for 70 minutes baking. The highest dose but acceptable taste of carica papaya leaf cookies was 40%. Two pieces of 25g carica papaya leaves cookies can be consumed as galactogogue.

Keywords: Breastmilk booster, Carica papaya, Cookies, galactogogue, saponin.

Introduction

Exclusive breastfeeding is important for baby’s growth and health¹. However, many problems occur in exclusive breastfeeding practice. One of the important problems was breastmilk production insufficiency. Many efforts have been conducted to increase breastmilk production, including medical treatment and herbal galactogogue consumption.² In Malaysia, 87% of insufficient breastmilk problems were overcome by herbal galactagogue because it is considered safer and more available.³ In Thailand herbal galactagogue such as banana heart (Musa acuminata), basil (Ocimum), water pumpkin (Lagenaria siceraria), pumpkin (Cucurbita) had been shown to be significantly associated with milk production.⁴ In Indonesia katuk leaves (Sauropsus androgynus (L) Merr) increased milk production to 50.7%.⁵

Corresponding Author:
Martha Irene Kartasurya,
Faculty of Public Health, Diponegoro University
Email: mkartasurya64@gmail.com
Some plants including Carica papaya leaf can increase milk production because they contain certain compounds and minerals. Compared to katuk leaves, papaya leaves contain manganese and potassium which increase prolactin and oxytocin hormones for milk forming and milk ejecting. Furthermore Carica papaya leaves are more available in Indonesia than katuk leaves. However, the bitter taste caused by of carpain alkaloid content in carica papaya is the main reason for their unconsumption. Preparing of Carica papaya leaves in the form of cookies, may enhance the acceptance level of papaya leaves as a source of saponin. Processing Carica papaya leaves into cookies has some benefits of a much better taste, easier to consume at any time and less perishable.

Materials and Method

The materials used in this study were Carica papaya leaves processed in the form of cookies. Several steps were carried out to get cookies that contained saponin from carica papaya leaves in a less bitter taste, acceptable in taste and proper dose in administering. The first step was reducing the bitter taste of Carica papaya leaves. The method of the first step was comparing pH level of the mashed leaves that already processed with three different treatments. The first treatment was boiling the leaves at 60°C for 10 minutes and discharged the water. Then the leaves were boiled again with the same temperature for another 10 minutes. The second treatment in minimizing the bitter taste of papaya leaves was soaking carica papaya leaf in 2.5% volume of calcium oxides solution (25g calcium oxides in 1000 ml water) for 90 minutes. The third treatment was boiling papaya leaves in the cooked rice water for 10 minutes. Cooked rice water was made by boiling 250g rice in 1000ml water.

The methods for maintaining saponin in carica papaya leaf cookies were found by comparing 2 baking processes (in different temperature and duration). The temperature which generally used for cookies is 130°C in 35 minutes. However saponin is damaged at temperature higher than 60°C of heating. Therefore we compared the saponin content of cookies baked in 130°C for 35 minutes and 60°C for 70 minutes. In 70 minutes, cookies were ready looked yellowish and have a crunchy texture. The method used in determining the degree of acceptability was hedonic test. Untrained panelists of breastfeeding mothers were employed in this test. They were provided with the cookies containing 0%, 10%, 20%, 30% and 40% carica papaya leaves. Then, they were requested to taste the cookies alternately, with 5 minutes space of time. Panelists were allowed to drink mineral water in order to neutralize the taste. After that the panelists were asked to gave a score according to the level of taste acceptance in the range of extremely like (6), very much like (5), moderately like (4), slightly like (3), neutral (2), unlike (1). Furthermore, data was categorized in accepted and not accepted. The accepted category toward the taste of cookies was determined when the panelist stated extremely like, very much like, moderately like, slightly like and neutral.

The process of making carica papaya leaf cookies is as follows: blending 40g Carica papaya leaves, mixing with 60g wheat flour, 50g sugar, 40g margarine, 17g egg yolks, 10g skim milk, 1g baking soda and 0.5g salt using an electric mixer. Round cookies with a diameter of 5cm was formed from the and then baked. Baking process was terminated when the cookies was cooked.

The taste of cookies was not accepted when the panelists stated dislike. Univariate analysis was used to find the distribution of accepted and not accepted cookies in several doses. Normality of data in each variable was tested using Saphiro Wilk test. Data analysis in the two group showed that all data was not normally distributed, therefore Mann-Whitney test were used to compare between scores of each dose Carica papaya leaves content with other dose in related with level of acceptibility.

The taste of cookies was not accepted when the panelists stated dislike. Univariate analysis was used to find the distribution of accepted and not accepted cookies in several doses. Normality of data in each variable was tested using Saphiro Wilk test. Data analysis in the two group showed that all data was not normally distributed, therefore Mann-Whitney test were used to compare between scores of each dose Carica papaya leaves content with other dose in related with level of acceptibility.

The dose of Carica papaya leaf cookies as breast milk booster was determined by calculating the saponin content. Saponin was tested using a UV-vis spectrophotometry method. Previous study done in Tehran on 2013 involving of 78 Iranian girl infants 0-4 months old showed that 1.8g saponin a day in the fenugreek seed tea was able to increase the breast milk production. Based on that finding the dose calculation could be done with the formula below:

\[
\text{Saponin content in the cookies} = \frac{1.8 \text{ g saponin}}{100} \times \frac{X}{100 \times 1.8}
\]

\[X = \frac{\text{Saponin content in the cookies}}{100} \times 1.8\]

The process of making carica papaya leaf cookies is as follows: blending 40g Carica papaya leaves, mixing with 60g wheat flour, 50g sugar, 40g margarine, 17g egg yolks, 10g skim milk, 1g baking soda and 0.5g salt using an electric mixer. Round cookies with a diameter of 5cm was formed from the and then baked. Baking process was terminated when the cookies was cooked.
sign of cooked cookies are yellowish color and crunchy texture. The same procedures were applied in making of 0%, 10%, 20%, and 30% of carica papaya leaf cookies.

Findings

The findings was explained based on 4 goals of of this research, which are:

**Reducing the Bitter Taste:** For reducing the bitter taste, three different methods were compared to find pH level as an indicator for a bitter taste, the lowest pH will be chosen as the sign of the least bitter taste from several methods. The lower the pH, the more acidic the solution. Lowering the pH produced the biggest increase in sourness of food and results in less bitter taste.16 Table 1 shows the pH levels resulted from different several treatments. It can be seen from the table that the lowest pH in carica papaya leaves was 7.70, therefore the best method in reducing bitter taste was boiling leaves twice in the temperature of 60°C.

**Table 1: pH levels of carica papaya leaf after three different treatments**

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Ph level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling twice in 60°C for 10 minutes</td>
<td>7.70</td>
</tr>
<tr>
<td>Boiling in cooked rice water for 10 minutes</td>
<td>7.84</td>
</tr>
<tr>
<td>Soaking in 2,5% calcium oxide solution for 90 minutes</td>
<td>8.13</td>
</tr>
</tbody>
</table>

The bitter taste in the Carica papaya leaf was caused by alkaloid carpain substance (C_{14}H_{25}NO_{2}). Boiling is the most practice method for bitter taste elimination, because of decomposition process of alkaloid carpain.9 Carpain is not related with the function of carica papaya leaf as a breast milk booster. Therefore reducing a bitter taste did not influence the effect of carica papaya leaves as a breastmilk booster. The most reason of the low enthusiasm in consuming Carica papaya leaf among Indonesia communities is the strong bitter taste.17 Therefore reducing the bitter taste will increase the acceptibility of Carica papaya leaves.7

**Baking Process:** Two methods of baking process were compared to find the best method in maintaining the saponin content of Carica papaya leaves. The saponin content should be maintained maximally for galactogogue purpose. Table 2 shows two different baking processes (based on the temperature and duration) of cookies and the saponin content after treatments.

**Table 2: Saponin content in 100g cookies after two different baking processes**

<table>
<thead>
<tr>
<th>Baking Process</th>
<th>Saponin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature of 130°C for 35 minutes</td>
<td>(-)</td>
</tr>
<tr>
<td>Temperature of 60°C for 70 minutes</td>
<td>3.67g</td>
</tr>
</tbody>
</table>

Table 2 reveals that saponin was totally damaged by the baking process of 130°C in 35 minutes. The heat of > 60°C damages the saponin structure.11 Therefore the best temperature of baking to maintain saponin content was 60°C. After 70 minutes, the cookies were already cooked and crunchy.

**Hedonic Test:** Thirty-nine breast feeding women were employed as panelists in the hedonic test. They were served with the cookies containing 0%, 10%, 20%, 30% and 40% carica papaya leaves. Table 3 shows the percentage of acceptability of several different doses Carica papaya leaf cookies.

**Table 3: Taste acceptability level cookies with several different doses of Carica papaya leaf**

<table>
<thead>
<tr>
<th>Papaya leaf content</th>
<th>Accepted</th>
<th>Not accepted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>extremely like</td>
<td>very much like</td>
<td>moderately like</td>
</tr>
<tr>
<td>0%</td>
<td>8 20.5</td>
<td>9 23.1</td>
<td>8 20.5</td>
</tr>
<tr>
<td>10%</td>
<td>5 12.8</td>
<td>9 23.1</td>
<td>9 23.1</td>
</tr>
<tr>
<td>20%</td>
<td>4 10.3</td>
<td>8 20.5</td>
<td>9 23.1</td>
</tr>
<tr>
<td>30%</td>
<td>3 7.7</td>
<td>7 17.4</td>
<td>10 25.6</td>
</tr>
<tr>
<td>40%</td>
<td>2 5.1</td>
<td>6 15.4</td>
<td>9 23.1</td>
</tr>
</tbody>
</table>
Table 3 shows that the percentage of dislike panelist was slightly increased with the increasing amount of Carica papaya leaves in cookies. However, most of panelists accepted the taste of 0%-40% Carica papaya leaf cookies. Furthermore we also conducted acceptability test between two groups of cookies based on the amount of carica papaya leaf content.

Table 4: Comparison of acceptibility levels between two groups of papaya leaf content

<table>
<thead>
<tr>
<th>Compared cookies</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% - 20%</td>
<td>0.465</td>
</tr>
<tr>
<td>10% - 30%</td>
<td>0.232</td>
</tr>
<tr>
<td>10% - 40%</td>
<td>0.052</td>
</tr>
<tr>
<td>20% - 30%</td>
<td>0.648</td>
</tr>
<tr>
<td>20% - 40%</td>
<td>0.237</td>
</tr>
<tr>
<td>30% - 40%</td>
<td>0.466</td>
</tr>
</tbody>
</table>

*Mann-Whitney

Table 4 shows that there was no significant difference in acceptibility levels of Carica papaya leaf content between the groups. The acceptibility between 30% and 40% of Carica papaya leaves in the cookies was not different. Therefore we used 40% carica papaya leaf cookies for galactogogue purpose and use it for dose calculation.

Dose Calculation: The laboratory test shows that there was 3.67g saponin in 100g of 40% Carica papaya leaf cookies. This finding was used to calculate the dose of cookies. The need of saponin content for galactogogue based on previous research was 1.8g a day.\textsuperscript{14}

The calculation of the dose:

\[
X = \frac{100 \times 1.8 \text{ g}}{3.67 \text{ g}}
\]

\[
X = 49 \text{ g}
\]

Forty nine grams was rounded to 50g, thus 2 pieces of 25g Carica papaya leaf cookies fullfilled the need of saponin content as galactogogue. Two pieces of cookies a day was also feasible to be consumed as snack.

Other than saponin, Carica papaya leaves also contain potassium and mangan which also have galactogogue effect. Laboratory test results showed that there was 1.6mg/g potassium in the cookies. Women in 19-29 years old need 470mg potassium everyday. Lactating mothers need an additional 40 mg potassium per day. Thus potassium need of lactating mothers is 510mg/day.\textsuperscript{18} Two pieces of 25g Carica papaya leaf cookies contained 80mg potassium, which supplied 15.7% potassium need for lactating women per day.

Carica papaya leaf cookies contained 0.01mg/g mangan. The need of mangan for adult women is 1.8mg/ day. During lactation period, the women need additional 0.8mg aditional mangan per day. Thus 2.6mg mangan is needed by lactating mothers everyday.\textsuperscript{18} Two pieces of 25g cookies contained 0.50mg mangan which contributed to 19.2% mangan need for breastfeeding mother.

Mangan and potassium can stimulate the production and activity of prolactin and oxitocyn. Mangan content in Carica leaf cookies stimulated pituitary gland in producing prolactin, which increase breast milk production. Potassium deficiency caused tiredness and mood swings which inhibited oxytocin production. Potassium has relaxing effect, thus may stimulate oxytocin production which is needed for breast milk ejection.\textsuperscript{2}

Conclusion

The best process of making papaya leaves cookies which can be used as galactogogue was boiling leaves twice at \(\leq 60^\circ\text{C}\) before adding other ingredients and bake the cookies of 40% Carica papaya leaves in 60\(^\circ\text{C}\) for 70 minutes. Two pieces of 25g papaya leaves cookies every day can be consumed by lactating mothers as a galactogogue (breastmilk booster).

Conflict of Interest: The authors have no conflict of interest related with conducting and reporting this study.

Source of Funding: This study was funded by the researcher.

Ethical Clearance: This study was approved by the Ethic Committee for Health Research, Faculty of Public Health, Diponegoro University (No.079/EC/FKM/2018).

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Factors Related to Competence in Prehospital Care

Ns. Kristianto Dwi Nugroho¹, dr Setyawati Soeharto², Yulian Wiji Utami²
¹Student Magister of Nursing, ²Lecturer, Faculty of Medicine, Brawijaya University, Malang, Indonesia, Sawojajar, Malang, Est Java, Indonesia

ABSTRACT

Pre-hospital service in Indonesia is a service which is relatively new and still in the development stage. The main priority of this development is human resource development by increasing competence. But unfortunately, Indonesia does not yet have core competencies in pre-hospital services. On the other hand, competency is not an independent matter, many factors are related such as work experience and personality characteristics. This study used cross sectional approach with paper-based survey method on 120 respondents from, 12 health centers (puskesmas), call center of TEMS and TEMS team in Hospital of Dr. Iskak. Experience had correlation with the competency of ambulance officers with sufficient correlation strength (p=0.000). Similarly, the personality characteristics had correlation that was also sufficient (p=0.000). Multivariate analysis found that experience was removed from the equation, and obtained the characteristics that related to competency. But the equation had a low strength (adjusted r square=0.232). In this study, competency related to two main variables, they were personality characteristics and experience. Experience was not only considered according to the length of working, but also how the people mastery their work. Neither the personality characteristic, had a role in the formation of a good competency. Personality characteristic was factor that related to the competency. The competency needed to improve the quality of pre-hospital service and reduce mortality experienced by the patient.

Keywords: Ambulance Officer competency; personality characteristics; experience

Introduction

Pre-hospital services in Indonesia have been started since the 1980s by Association of Indonesian Surgeon. But the lack of support from the government and various stakeholders resulted this service did not develop¹. The government initiated pre-hospital service that called by Sistem Pelayanan Gawat Darurat Terpadu (SPGDT) in 2016²,³. SPGDT has the aim to provide emergency service, reduce mortality and prevent permanent disability on patients².

Prehospital service in Indonesia is relatively new, thus it requires a special development to get the maximum service⁴. The first thing that should be conducted was by developing the human resource in pre-hospital service. Competency is a key factor in human resources development⁵. Various pre-hospital services and its competency due to there is no international consensus about this service⁶. Indonesia has not yet developed specific competencies that concerning to pre-hospital services, thus the researcher used the ambulance officer competencies that developed by the Paramedics Australasia⁷. In this competency, there are three main competencies that consist of professional practice, clinical practice, and professional knowledge.

Competency is not a variable that is completely free, many factors related to it⁸,⁹. Experience is a factor that related to the competency of ambulance officers. Although experience is not only measured by the length of work, but it’s measured by the reliability in handling problems in the work environment¹⁰,¹¹. Personality can also affect someone in solving problem, ability in working together, and establishing an interpersonal relationship. Those things are very necessary within the scope of pre-hospital⁸,⁹. Therefore, personality
characteristics and experiences in both directly or indirectly related to the competency of ambulance officers. Then, there is a question “Are personality characteristics and experiences related to the increasing of ambulance officers competence?”

**Material and Methodology**

The study was an analytic observational research and cross-sectional as a method of approach. The population in this study was all of health workers who served pre-hospital in Tulungagung that were often known as TEMS (Tulungagung Emergency Medical Services). TEMS had three main parts in conducting pre-hospital services, they were call center, TEMS team in Hospital of Dr. Iskak, and supporting team that consisted of 14 puskesmas throughout Tulungagung. The study was conducted from February to March 2019.

*Simple Random Sampling* was a sampling technique in this study. The following was several criteria in sampling process: (1) respondents worked in TEMS environment, (2) respondents were health workers (doctors, nurses, midwives), (3) respondents were able to read and communicate well. Total of 120 respondents obtained by using measurement method of “rule of trump’s”.

The instrument of competency assessment was arranged by researchers that developed from *Australasia Competency of Paramedics 2011*. There were three main competencies of officers, they were professional practice, clinical practice, and professional knowledge. The independent variable consisted of working experience and personality characteristics. In this study, the experience was not only measured by the length of working of respondents, but by how they understanding the work, procedures and control of existing equipment such as a tsunami, earthquake or volcanic eruption, affecting humans. In order to support emergency medical communication services in natural disaster areas where the telecommunications facility has been seriously damaged, an ad hoc communication network backbone should be build to support emergency medical services. Combinations of requirements need to be considered before deciding on the best option. In the present study we have proposed a Low Altitude Platform consisting of tethered balloons combined with Wireless Fidelity (WiFi). Variable of personality characteristics such as the ability to cooperate, creativity, timely and ambitious.

The questionnaire had been developed by the researcher which consisted of 38 questions. The answer of question in the form of Likert scale with 1 to state strongly disagree to 4 for strongly agree. Validity test was conducted in PSC (Public Safety Center) of Malang with Cronbach’s alpha (0.917), thus the questionnaire was reliable to use in research.

**Finding**

There were 150 questionnaires that were distributed in 14 puskesmas, call centers and TEMS team in Hospital of Dr Iskak. 136 questionnaires were returned and 16 questionnaires were excluded because there were incomplete data filled.

From the demographic data, more than half of respondents in this study were women (61.6%), mostly, aged between 25-34 years (45.8%). Nearly a third of respondents (30.8%) had worked less than 20 months in pre-hospital services. The most profession of respondents in this study was nurses who worked in TEMS (68.3%) and most of them work in puskesmas (84%).

The requirement to conduct bivariate analysis was by looking at the distribution of data. Normality test shows that the three variables are abnormally distributed (p=0.000), so the test used Spearman rank test. Bivariate analysis shown (table 1) that experience had correlation with the competency of ambulance officer (p=0.000). Similarly, the personality characteristics also had correlation with the competency of ambulance officer (p = 0.000).

<table>
<thead>
<tr>
<th>Competency of Officer</th>
<th>N</th>
<th>Mean ± SD</th>
<th>Correlation Coefficient</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work experience</td>
<td>120</td>
<td>11.72 ± 1.958</td>
<td>0.372</td>
<td>0.000</td>
</tr>
<tr>
<td>Personality characteristics</td>
<td>120</td>
<td>20.1 ± 1.682</td>
<td>0.421</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 2 shows that word experience variable was excluded from the equation and have adjusted r-square of 0.232.
Table 2: The most significant factors

<table>
<thead>
<tr>
<th>Model</th>
<th>Variable</th>
<th>B</th>
<th>Sig.</th>
<th>Adjusted R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>53.002</td>
<td>0.000</td>
<td>0.232</td>
</tr>
<tr>
<td></td>
<td>Experience</td>
<td>0.305</td>
<td>0.304</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Personality characteristics</td>
<td>1.881</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>(Constant)</td>
<td>54.420</td>
<td>0.000</td>
<td>0.232</td>
</tr>
<tr>
<td></td>
<td>Personality characteristics</td>
<td>1.988</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Demography: The demographic of respondents indicated that most of the puskesmas who have responsibility to maintaining the health of community. Good coordination that made the pre-hospital services more efficient with the officers\textsuperscript{17}. Coordination was always conducted by all of stakeholders in order to provide the services well, efficiently and optimally\textsuperscript{18}.

The demographic also found that more than two-thirds of respondents were nurses (68.3%). This was in accordance with the regulations in Indonesia that all of healthcare workers were health workers\textsuperscript{19}. This data also explained that more than a quarter of respondents had worked less than 20 months. But there were several respondents who had worked more than 20 months. Pre-hospital services in Tulungagung was start in in 2015\textsuperscript{20}. The respondents who had worked more than 20 months were respondents who had been working for pre-hospital service in each puskesmas or hospital independently and not coordinated, then become a system such as TEMS.

Experience: This study described that the experience of work had significant effect against competency (p=0.000). Experience was one important aspect in improving competency. Previous research had shown that the experience affected the improvement of competency and assess the deterioration of the client’s situation \textsuperscript{21,22}.

This study did not determine the experience according to the length of work, rather than how the officers mastery their work. The length of working of officer did not give guarantee that the officer also had good competency\textsuperscript{10}. The understanding of the work, and mastery of the procedures to be important in the experience of working\textsuperscript{12} such as a tsunami, earthquake or volcanic eruption, affecting humans. In order to support emergency medical communication services in natural disaster areas where the telecommunications facility has been seriously damaged, an ad hoc communication network backbone should be build to support emergency medical services. Combinations of requirements need to be considered before deciding on the best option. In the present study we have proposed a Low Altitude Platform consisting of tethered balloons combined with Wireless Fidelity (WiFi).

Experience played a key role in enhancing the competency of ambulance officers. This was according to research conducted by Steigerwald\textsuperscript{23} was shown that the experience of nurse was a key factor to improve the competency. Improving the experience could be enhanced not only by the length of work. The provision of training and simulation about as similar and complexity in the field could also be performed. Training and a good simulation had the advantage of reducing the risk that would be experienced by the patient\textsuperscript{24}. Good simulation also could increase the knowledge of nurse and other health professionals in providing services such as patients with cardiac arrest, myocardial infarction, trauma and stroke, while population-based studies including all diagnoses are few. We examined the diagnostic pattern and mortality among all patients brought to hospital by ambulance after emergency calls. DESIGN Registry-based cohort study. SETTING AND PARTICIPANTS We included patients brought to hospital in an ambulance dispatched after emergency calls during 2007-2014 in the North Denmark Region (580 000 inhabitants).

Personality characteristics: Personality characteristic was a psychological characteristic that reflected an individual’s response to the environment. Everyone had a different personality, but could possibly had the similar personality characteristics\textsuperscript{26}. Thus, personality characteristics had an important role against competency. Bivariate analysis shown that personality characteristics had correlation with competency (p=0.000).
Competency development was not only about training and experience, but extended into the domain of personality traits. Several personality characteristics such as curiosity, easy to get along with, creative, timely and ambitious affected the competency. Thus, human resource development in pre-hospital service was also necessary to improve the characteristics of each individual. A good development of individual characteristics effectively would be improved the competency of a group.

The personality characteristics which related with the improvement of competency was a feeling to conduct the entire job. The desire to always learn continuously to achieve maximum competency was a lifelong learning process that should be owned by an ambulance officer. Personality characteristics which related to the competency such as socializing and being easy to believe made the working environment in a team being good and related to the competency of ambulance officers.

The improvement competency through the building of good character for ambulance officers should to be conducted. Building the value of responsibility, friendliness, precision, emotional stability, and innovation were required. The improvement was accomplished by the addition of training, discussion and motivation in the formation of officers. Building the passion for self-respect was the beginning of the enhancement characteristics. Giving suggestions to always think positively also could be done. Building to the individual and organization to be enthusiastic, not afraid of being wrong and the spirit of finding solutions could also be carried out. The last thing that should be conducted was the improvement the knowledge of ambulance officers, that being the key to improve personality characteristics.

Most related factor: According in multivariate analysis, was found that personality characteristic was only one variable that related to the competency of ambulance officers. Adjusted r square of multivariate analysis has a value of 23.2%, it can be interpreted there was still other variables that affect competency by 78.6%.

This study shown that inner characteristic of ambulance officers had a stronger correlation. Motivation to work that was more optimally, confidence and positive thinking should be improved in order to improve the characteristics of ambulance officer. Building the right motivation to nurses and ambulance officers could be given to be able to improve competency indirectly.

The improvement of personality characteristics by conducting selection with people who had an interest in pre-hospital service. This greatly affected the characteristics of the inside of an ambulance officer. Good mentorship also seen to improve the characteristics of the personality of each ambulance attendant. Expected eventually to increase the overall competency of the ambulance officers.

It was undeniable that there were still many factors that affected competency. In this study, there were many factors that should be investigated. Factors related to the competency of ambulance officer should to be studied more deeply. Assessment factors related to the competency such as organizational culture, policy, professionalism factor, level of education and critical thinking also should be studied further.

Keep in mind that attitudes, knowledge and practices was a major aspect forming competency and different studies was needed. Limitation of this study was to assess the competency only of the aspects of respondents’ knowledge. That assessment only be based on the perspective of the service provider, so the result was less holistically. The research was conducted in several different places, so that it had different policies. Although every month they conduct communication, coordination, evaluation and regular training spot differences provide different perspectives ambulance officers.

Conclusion

The competency development could relate to two things, they were personality characteristics and experience. As an ambulance officer, high competency was needed in providing services. These competencies were needed to improve pre-hospital services and reduce deaths experienced by patients. Personality characteristics were more dominant factors when compared with experience as factors related to competency. Efforts to study and establish ambulance staff competencies should continue to be improved, especially in countries with relatively new pre-hospital services.

Conflict of Interest: None

Source of Funding: Self
Ethical Clearance: Ethics of clearance was taken from the Hospital of Iskak ethics commission under number 070/785/407.206/2019.

REFERENCE


Empowerment of Coastal Communities Through Systems Approach in the Field of Environmental Health in Kendari City, Southeast Sulawesi Province, Indonesia

La Dupai¹, Nani Yuniar¹, Ruslan Majid¹, Arum Dian Pratiwi¹, Syawal Kamuluddin Saptaputra¹, Rahman¹

¹Faculty of Public Health, University Halu Oleo, Green Campus Bumi Tridharma, Anduonohu Kendari, Southeast Sulawesi, Indonesia

ABSTRACT

One of the health problems faced by coastal communities is community behavior in the management and utilization of environmental resources. Coastal area has problems like the limitations of environmental health facilities that cause the health status low. The study aimed to know the Coastal Community Empowerment with environmental health systems approach of Kendari. The type of study was qualitative. The informants was 12 people. Data collection uses in-depth interviews and Focus Group Discussion. Results of the implementation program appeared in three dimensions: a) Development of local communities through cross training sectors: agriculture and food, fisheries, private institutions, finance lending institutions and academics; and empowering youth groups through social activities. Empowerment through health village was carried out with: environmental cleanliness, family education, clean and healthy behavior, increasing family income, hydroponic planting methods, and utilizing plastic waste. b) Judging from the aspect of social policy, there was already the KOTAKU program (city without slums). c) Social action: Initiation of Movement 1 house 1 hand-washing, family medicinal plants, mobilizing to cleanliness the house yard, waste transportation services, coordinating with the Government to provide environmental health education, made a healthy smoke-free village. Conclusion: Community empowerment in order to improve environmental health behaviors can be more effective if using all potential stakeholders, education and training, local community development, social action and social policy. Recommendation: needin for socialization, education and training for the community, advocacy and collaboration across sectors of government agencies, and continuous supervision.

Keywords: Empowerment, Coastal Community, Environmental Health.

Introduction

The environment in coastal areas is generally an area that has very complex health problems like the limited of health facilities, the clean water, drainage, and sanitation services, as well as limited of infrastructure and facilities to create an environment and healthy behaviour in order to live productively.

Corresponding Author:
Ruslan Majid
Faculty of Public Health, University Halu Oleo, Anduonohu Kendari, Southeast Sulawesi, Indonesia
Phone:+62811402644
Email: ruslanmajid777@gmail.com

The Regulation of the Minister of Health of the Republic of Indonesia mandates the restructuring of various steps in the field of management of natural resources, human resources, environment and institutions so that the Indonesian nation can catch up and have a parallel position and strong competitiveness in the international community association¹. Therefore, community empowerment is very important, as stated in Law Number 36 of 2009 concerning Health. In the Health regulation stated that: 1) 70% of the national development resources come from community contributions; 2) Community empowerment based on mutual cooperation, as a culture of Indonesian society; 3) Community behavior is the main factor in the occurrence of health problems, therefore the community itself can solve the problem through government...
guidance; 4) The government has limited resources in overcoming increasingly complex health problems in the community, while the community has considerable potential to be mobilized in prevention efforts in its area; 5) The potential of the community includes community leadership, community organizations, community financing, community material, community knowledge, community technology, community decision making processes, in efforts to improve health, this potential needs to be optimized; 6) Prevention efforts are more effective and efficient than treatment efforts, and the community also has the ability to make preventive efforts if efforts are made to empower the community, especially for clean and healthy life behavior.

Method

The type of study was qualitative study. The instrument was the researchers themselves using interview guidelines. Qualitative study is intended to explore social or human problems where community empowerment has interactions between individual communities and environmental health as a result of program objectives. This study was conducted in 2017 in the Coastal Region of Kendari City, Southeast Sulawesi Province.

Results

Local Community Development: This research seeks to gather information on the forms of local community development carried out by the local government and the involvement of stakeholders in developing the capabilities of individual communities in the research locations so that they have the ability to maintain health. Efforts to develop local communities focus more on the economic, education and health improvement sectors. In the economic sector, the development of local communities in the form of training and mentoring of working groups to improve the income sector includes:

“Here it is the usual training provided by the Food Service are groups of mothers, like the making of fish meatballs. Fish farming, catfish farming. Here there are already several working groups, but some have already succeeded in harvesting ... “(Key Informant, 47).

To increase community income, fishermen were given training fish meatballs production from the Food Security Service. The training was attended by housewives in the form of working groups hoping to increase household income to help the income of households. Likewise, the Fisheries Service provides training in the cultivation of sea fish and catfish by forming work groups to facilitate supervision and control of their development.

“For many years, the company has now planted live coral nurseries, the corals are cultivated, after four months, they are seen, not corals, a gathering place for fish, ornamental fish, and also some of employees here is from community... “(Key Informant 2.52).

Coral reef cultivation activities involve coastal communities. The cultivation activities are intended to safeguard coral reef ecosystems and how to catch legal fish and so that the marine ecosystem is maintained. This cultivation activity is carried out by private companies while still involving the community in the cultivation of coral reefs. The existence of these private companies provides positive value for the local area in reducing unemployment.

Social Policy: The policy and implementation of the “KOTAKU” program was promoted by the government is an effort to improve the quality of the residential environment. The program is very important and strategic to realize the commitment of all elements both government and community as development actors especially to create a clean housing environment and healthy.

“There are those who are running this KOTAKU program, this city is 100-0-100, 100 is for sanitation, 0 is slum housing, 100 percent is for water, irrigation, clean water ...” (Informant Key 1, 47).

Based on the interview results of the KOTAKU program, it is important to optimize sanitation because it is integrated in 3 program indicators, namely 100-0-100. 100 percent for the provision of proper sanitation for residents, 0 percent for reducing slum areas and 100 percent access to clean drinking water. Therefore, there is a need for awareness and active role of all parties by prioritizing the local wisdom of community both the government, religious leaders, community leaders and other components involved to make the program a success. Through this activity the standard of living of the community can be better, especially on health aspects by ensuring that all local communities are free from slums.
One indicator related to the “KOTAKU” Program is the problem of uninhabitable homes. Efforts are being made to change behavior through programs that are launched such as home renovation program for the poor community. This effort is one form of effort to get a decent place to live. Through this assistance, the involvement and active participation of the community is very much needed.

“Yes, if there is a government program, many of these home renovation program were carried out yesterday, there were also several houses that were repaired ...” (Community Leader L, 46).

Another form of the “KOTAKU” program activity, which is 100 clean water, is to ensure clean and healthy water concessions. To meet the needs of clean water, residents rely on one water source provided by the NGO called SINTESA. The Abeli District Government stated that the existence of the SINTESA greatly helped the community in providing clean water.

Social Action: Changing the culture of coastal communities to behave healthy is very difficult because of the many factors that influence it, so that specific approaches are needed by understanding the conditions of the local community. Therefore, the involvement of the local government is very important in understanding the conditions of the local community. The stakeholders made a number of breakthrough actions both initiated by the City government and the local Government.

Discussion

Local Community Development: Based on the results of this study, to improve the participation of the community in maintaining environmental health, it is necessary to revive community institutions such as local youth organization, one of the organizations that involve easy generation that serves to accommodate aspirations, as a place to cultivate nationalism, develop self-potential and become a moving community organization in the field of social welfare.

Social Policy: The KOTAKU program is one of the policies of the Central Government to accelerate slum settlement with 3 program indicator focuses which are the main concerns, namely access to livable sanitation, access to clean water and slum-free settlements. The program is in dealing with slums so that it builds a collaboration platform through increasing the role of the government and community participation. Community participation in development can be demonstrated in participation in the implementation of activities and in decision-making and monitoring and evaluation. The involvement of the community in this program as a village facilitator who overseeing program activities by being given training by professional trainers from the Government.

The results of this study found that home renovation program is one of the assistance provided to disadvantaged communities in the region. Determination of assistance through the local government discussion and proposed in accordance with the level of needs desired. The directive approach is based on the assumption that community workers as actors of change already know what is needed and what is best for the community, in this case the fulfillment of needs according to appropriate standards applies to the community.

The KOTAKU program activities is to increase the participation of the community in maintaining environmental health, so that the program will be effective if it conducts strategic socialization by prioritizing the community as the main actors.

Social Action: The involvement of community leaders are able to mobilize communities, provide motivation and desire to do something desired by these leaders, namely implementing healthy behaviors to realize the vision and mission of Healthy City. Exemplary, persuasion, and control from the community encourage people to act.

Various approaches taken by stakeholders and community components involved in policy making made by the local government so as to produce a garbage transportation service and create a clean and healthy environment include: First step, social enthusiasm. Giving social enthusiasm is an important component of community work practices to increase inspiration, enthusiasm, stimulate, mobilize and motivate others to do behavior. Second Step, negotiating and mediating with community leaders, religious leaders, RT/RW and mothers organization to convey related ideas so that the community environment is healthy. Through negotiation and mediation, local stakeholders convey the intent and purpose of the need to maintain environmental health, need to organize structured waste transportation services. The third Step, make consensus. The consensus
was generated after mediation, sociation. The intended consensus is in the form of a joint agreement between the community, community elements and stakeholders to agree on a clean Friday/Saturday service, and garbage transportation services with community self-help. Therefore an organized committee was formed through an agreement in order to have policy power. This is because the possibility of society not obeying the agreed rules by not paying self-help contributions due to various factors, especially economic factors.

To make the village smoke-free, there are several approaches taken. First step, coordinating with health agencies to provide health education related to PHBS, one of the indicators is smoking behavior. Counseling is intended to increase public knowledge and awareness regarding PHBS in general and specifically smoking behavior. The Second Step, conduct socialization to the public regarding policies that will be implemented with all the consequences. The essence of giving socialization is to increase community participation together to maintain health, especially the practice of PHBS. Through the socialization, a response and conflict reaction will be seen that might arise and a solution to overcome it.

Community empowerment through a healthy green environment system and a waste free environment can be seen from the aspects of input, process, output, and impact. In Kendari City, basically there have been efforts by regional governments to develop hydroponic planting methods. In addition to having a relationship with the environment, it also makes the environment greener because it uses the yard so that it obtains economic value for the local community. The program is also an inventory of PKK through the planting of family medicine which was later developed by the local Government because it became capital to familiarize the community to organize a clean and healthy green environment. In terms of environmental health aspects, the government’s efforts to develop hydroponic planting methods will help household-generated waste such as plastic bottles and others be recycled for planting media. Ecosystems relating to natural resource management, humans are directly involved in a series of activity processes that contain ecological processes.

Conclusion and Suggestion

The implementation of the coastal community empowerment program in enhancing the participation of the community in the field of environmental health appears in three main dimensions: a) Development of local communities through cross training sectors: agriculture and food, fisheries, private institutions, finance lending institutions and academics; and empowering youth groups through social activities. Empowerment through health village was carried out with: environmental cleanliness, family education, clean and healthy behavior, increasing family income, hydroponic planting methods, and utilizing plastic waste. b) Judging from the aspect of social policy, there was already the KOTAKU program (city without slums). c) Social action: Initiation of Movement 1 house 1 hand-washing, family medicinal plants, mobilizing to cleanliness the house yard, waste transportation services, coordinating with the Government to provide environmental health education, made a healthy smoke-free village. Conclusion: Community empowerment in order to improve environmental health behaviors can be more effective if using all potential stakeholders, education and training, local community development, social action and social policy. Recommendation: need in for socialization, education and training for the community, advocacy and collaboration across sectors of government agencies, and continuous supervision. In enhancing the role of community empowerment, it is necessary to provide assistance, education and training continuously by paying attention to aspects of socio-cultural conditions and financial capacity of coastal communities so that the support of the City Government like strong policies and regulations need to improve environmental health.

Ethical Clearance: The ethical clearance was taken from Faculty Committee and community agreement.

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Conflict of Interest: Authors declares that there is no any conflict of interest within this research.

REFERENCES


Study the Level of Interlukin-2 During and after Treatment in Sputum of Iraqi Patients with Pulmonary Tuberculosis

Liqa K. A. Alzubaidi1, Nisreen Sherif Alyasiri2, Luma yousif Mehdi3

1Department of Community Health Techniques, Mosul Technical Institute, Northern Technical University, Mosul, Iraq; 2Department of Nursing, AL-Suwaira Technical Institute, 3Department of Medical Laboratory Technologies, College of Health and Medical Technology, Middle Technical University, Baghdad, Iraq

ABSTRACT

The role of IL-2 as a biomarker for tuberculosis disease has been assessed. Lung infection with Mycobacterium tuberculosis induce T cell responses which is mainly regulated by interleukin-2 (IL-2). Recombinant human (rhIL-2) was administered with adjunctive immunotherapy to 30 patients diagnosed with primary tuberculosis (PTB), IL-2 level was observed in sputa at different intervals during treatment and at the mean time it was microscopically examined for acid fast bacilli (AFB). Thirty patients with latent tuberculosis after treatment (LTBat) in whom sputum production was successfully induced were also included. Placebo controlled trial patients were accredited twice injections of IL-2 on daily basis or placebo for the first 30 days of treatment. Subjects were followed for six months. The levels of IL-2 were increased in all patients compared to the control. Raised IL-2 level among LTBat patients was age dependent. Conversely, decreased IL-2 levels occur at the age 37 years and above. Increased IL-2 level in sputum enhanced bacillary smear clearance of patients with tuberculosis.

Keywords: Tuberculosis; IL-2; immunotherapy; Sputum

Introduction

Globally, Pulmonary Tuberculosis (TB) is the most unceasing life-threatening health issue that mainly attacks the lungs, and spread through the air via droplets of cough or sneeze carrying infectious M. tuberculosis or M. bovis. The World Health Organization (WHO) published many reports in this concern and narrated million cases come about every year, causing high morbidity rate especially among HIV patients and more than 1.8 million deaths per annum12. For long time, TB has been controlled adequately and treated using dual chemotherapy of pyrazinamide isoniazid, ethambutol, and rifampicin, as recommended by the world health organization3-5. However, conflicting affairs (e.g., prolonged uptake, intolerantness, and toxicity) are characterized compliance in patients under chemotherapeutic treatment. Nevertheless, Multi-drug-resistant tuberculosis has increased in rate not only in third world countries but also in developed countries6-7.

Interleukin 2 primarily produced by active T cells and its main function is to stimulate the differentiation and expand population of lymphocytes and plays central role in cell mediated immunity to infectious diseases8. Accordingly, administration of IL-2 was applied as a complementary biologic therapy to control many bacterial and viral infections, like leprosy, AIDS and leishmaniasis9-11.

Meantime, administration of rhIL-2 in addition to conventional treatment to patients with pulmonary tuberculosis could elicit the antimicrobial immune response, and betterment of sputum smear recognition for diagnosis of acid-fast bacteria12. Conversely rhIL-2 administration may increase T-cell activity vis a vis enhances bacilli reproduction and spread11. Therefore, we aimed to evaluate the level of IL-2 in sputa, other than
serum, of primary and latent TB patients and whether it can be used as indicator for disease progress.

**Material and Method**

**Subjects:** Eighty-five subjects, aged 17 to 50 years, thirty subjects with Primary Diagnosed TB, 30 subjects’ high sputum bacillary with latent TB, and 25 subjects as control were enrolled in this study. Tuberculosis patients were recruited from Merjan Teaching Hospital in Babylon. Cases that we had failed to induce sputum production effectively were excluded from the study. Patients with AFB-positive sputum of primary tuberculosis and AFB-negative sputum of latent tuberculosis were considered. Patients who show resistance to traditional treatment were also excluded. All patients in our study group were clinically examined by specialized Physicians. The study was ethically approved by the health committee center. All patients gave their consent for sputum collection.

**Treatment Allocation:** Patients were admitted to the hospital after being diagnosed for treatment and observation. Treatment included two months of chemotherapy (once a day pyrazinamide, rifampin, ethambutol and INH). The second course was four month long and included once a day both INH and rifampin) and twice daily injections of rhIL-2.

**Sputum Collection:** Morning sputum was collected after having a cup of hot water then the patients were asked to cough in a disposable collection cup.

Sputum sample for acid fast bacilli smear was collected on daily basis after two days and four days from day one of treatment administrations. Sputum was collected on weekly basis as well, from week one through week four, and after six weeks, and then monthly as long as the sputum can be effectively induced. For IL-2 level measurements sputum was processed after two weeks and six weeks of treatment. Subjects were followed for 6 months from day one of receiving treatment.

**Sputum Processing:** Collected sputum sample was processed without delay and as described\(^{13,14}\). Smear for AFB was prepared and processed for examination. The volume of remaining samples was measured and weighed as well. 0.1% of freshly prepared DTT (dithiothreitol) solution was added in twice the volume of sputum, followed by vortexing for fifteen minutes. The mixture was filtered using sterile gauze and centrifuged for ten minutes at 900 g. Supernatant was collected for interleukin-2 analysis or stored at −70 °C to be processed later.

**IL-2 Analysis:** ELISA (R & D Systems) was used to measure IL-2 concentration in sputum. IL-2 standard was reconstituted in DTT-PBS dilution buffer to limit any possible effect of DDT on IL-2 during sputum processing\(^{10}\). Serum was collected for ESR estimation as in Deice and Lewis\(^{13}\).

**Statistical Analysis:** Statistical SPSS version 20 software package was used for statistical study.

**Results**

Levels of IL-2 in primary tuberculosis (PTB), latent tuberculosis after treatment (LTBat) and control (CT) are shown in Table 1. IL-2 levels in both disease forms were higher than the control. However, the level of IL-2 in (LTB) group was slightly higher than the (CT) group. The mean ESR level in both disease forms were higher than the control.

<table>
<thead>
<tr>
<th>Table 1: Mean level of IL-2 in samples study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ESR</strong></td>
</tr>
<tr>
<td>Primary Diagnosed TB</td>
</tr>
<tr>
<td>Latent TB after Treatment</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td><strong>IL-2 level</strong></td>
</tr>
<tr>
<td>Primary Diagnosed TB</td>
</tr>
<tr>
<td>Latent TB after Treatment</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td><strong>Age</strong></td>
</tr>
<tr>
<td>Primary Diagnosed TB</td>
</tr>
<tr>
<td>Latent TB after Treatment</td>
</tr>
<tr>
<td>Control</td>
</tr>
</tbody>
</table>

HS: Highly significant, NS: Non significant.
Thirty subjects were scanned for primary TB (PTB) in each treatment. sputum AFB counts were also conducted during treatment. Bacillary count was reduced in patients had placebo as compared to interleukin-2 (p-value = 0.03; 0.02 and 0.01 after four days; three weeks and after four weeks respectively (Table 2).

Table 2: Bacillary count in sputum of PTB patient during anti-tuberculosis course of treatment

<table>
<thead>
<tr>
<th>Date</th>
<th>IL-2</th>
<th>BLACEBO</th>
<th>p-value (t-test)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>BASLINE</td>
<td>16 (53%)</td>
<td>14 (46%)</td>
<td>0.15</td>
</tr>
<tr>
<td>at 2 day</td>
<td>16 (53%)</td>
<td>14 (46%)</td>
<td>0.15</td>
</tr>
<tr>
<td>at 4 day</td>
<td>14 (46%)</td>
<td>12 (40%)</td>
<td>0.03*</td>
</tr>
<tr>
<td>at 7 day</td>
<td>16 (53%)</td>
<td>13 (43%)</td>
<td>0.07</td>
</tr>
<tr>
<td>at 14 day</td>
<td>16 (53%)</td>
<td>13 (43%)</td>
<td>0.07</td>
</tr>
<tr>
<td>at 21 day</td>
<td>16 (53%)</td>
<td>11 (36%)</td>
<td>0.02*</td>
</tr>
<tr>
<td>at 28 day</td>
<td>19 (63%)</td>
<td>10 (33%)</td>
<td>0.01*</td>
</tr>
<tr>
<td>at 60 day</td>
<td>12 (40%)</td>
<td>9 (30%)</td>
<td>0.1</td>
</tr>
</tbody>
</table>

*statistically significant p-value ≥0.05 n=number, IL-2=interleukin.

Level of IL-2 appear to be age dependant. For example, variation at age range (15-25) years was nearly double folds, and the range (26 -35) years was one and half folds the CT group. Relevance between aging and chronicity in LTBat group appear to be of high significance with p-value =0.002. However, at all age ranges the concentration means of ESR were high significant as illustrated in Table 3. The LTBat sputum smear negative were of higher IL-2 levels than LTBat sputum smear positive as shown in table (4).

Table 3: Mean of IL-2 level and ESR concentration in relation to age ranges of tuberculosis patients

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Age range</th>
<th>Descriptive</th>
<th>N</th>
<th>Mean ± SD</th>
<th>ANOVA P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL-2 level</td>
<td>15 – 25</td>
<td>PTB</td>
<td>8</td>
<td>0.83 ± 1.048</td>
<td>0.030 HS</td>
</tr>
<tr>
<td></td>
<td>26 -35</td>
<td>PTB</td>
<td>6</td>
<td>0.515 ± 0.585</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36-45</td>
<td>PTB</td>
<td>10</td>
<td>0.440 ± 0.178</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 45</td>
<td>PTB</td>
<td>6</td>
<td>0.423 ± 0.178</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 – 25</td>
<td>LTBat</td>
<td>6</td>
<td>0.368 ± 0.087</td>
<td>0.002HS</td>
</tr>
<tr>
<td></td>
<td>26 -35</td>
<td>LTBat</td>
<td>10</td>
<td>0.590 ± 0.335</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36-45</td>
<td>LTBat</td>
<td>8</td>
<td>0.450 ± 0.218</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 45</td>
<td>LTBat</td>
<td>6</td>
<td>0.320 ± 0.107</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 – 25</td>
<td>CT</td>
<td>6</td>
<td>0.4110 ± 0.028</td>
<td>0.10NS</td>
</tr>
<tr>
<td></td>
<td>26 -35</td>
<td>CT</td>
<td>7</td>
<td>0.4000 ± 0.017</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36-45</td>
<td>CT</td>
<td>7</td>
<td>0.4200 ± 0.208</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 45</td>
<td>CT</td>
<td>5</td>
<td>0.4100 ± 0.208</td>
<td></td>
</tr>
<tr>
<td>ESR</td>
<td>15 – 25</td>
<td>PTB</td>
<td>8</td>
<td>87.500 ± 10.690</td>
<td>0.00HS</td>
</tr>
<tr>
<td></td>
<td>26 -35</td>
<td>PTB</td>
<td>6</td>
<td>91.667 ± 13.292</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36-45</td>
<td>PTB</td>
<td>10</td>
<td>88.182 ± 12.703</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 45</td>
<td>PTB</td>
<td>6</td>
<td>87.152 ± 11.502</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 – 25</td>
<td>LTBat</td>
<td>6</td>
<td>34.167 ± 13.934</td>
<td>0.001HS</td>
</tr>
<tr>
<td></td>
<td>26 -35</td>
<td>LTBat</td>
<td>10</td>
<td>31.000 ± 11.499</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36-45</td>
<td>LTBat</td>
<td>8</td>
<td>35.000 ± 13.463</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 45</td>
<td>LTBat</td>
<td>6</td>
<td>36.001 ± 11.522</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 – 25</td>
<td>CT</td>
<td>6</td>
<td>7.01 ± 3.690</td>
<td>0.004HS</td>
</tr>
<tr>
<td></td>
<td>26 -35</td>
<td>CT</td>
<td>7</td>
<td>9.667 ± 3.292</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36-45</td>
<td>CT</td>
<td>7</td>
<td>10.182 ± 2.703</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 45</td>
<td>CT</td>
<td>5</td>
<td>11.071 ± 2.811</td>
<td></td>
</tr>
</tbody>
</table>
Table 4: Levels of IL-2 among LTB patients with TB infections with treatment program

<table>
<thead>
<tr>
<th>Groups</th>
<th>Smear negative</th>
<th>Smear positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient numbers</td>
<td>23</td>
<td>7</td>
</tr>
<tr>
<td>% of Total</td>
<td>64</td>
<td>36</td>
</tr>
<tr>
<td>IL-2 Value</td>
<td>0.620</td>
<td>0.390</td>
</tr>
</tbody>
</table>

Figure 1: Notable variation in the level of IL-2 for each individual subjects of the study and control group

Variation in age of each individual in relation with control cohort: A notable variation occurs in individual distribution of age in patients as compared with control cohort. Results are shown in figure (2).

Figure 2: Distribution curve of age range

Discussion

The present study cohort involved sputa of patients with primary Tuberculosis and sputa with positive acid-fast bacilli smear of patients with latent tuberculosis. Administration of human recombinant IL-2 were known to evoke clearance of sputum smear, however that was not confirmed in Iraqi patients of the present study either in those who receive treatment, newly diagnosed for TB or had TB. Previous study showed a moderate fundamental outcome of interleukin-2 that would be relevant with increment in the level of both CD25 & CD4 T cells as well as increment in serum. In current study IL-2 administration with lack of clinical response could be due to the fact that IL-2 had short term effect on immune criterions. However, similar studies postulated that a sustained immune response mediated by anti- \( M. tuberculosis \) included CD8 & CD4 T cells.

Our data show no relevance between rhIL-2 and clearance of acid-fast bacilli from sputum smear and release of IL-2 after 72 hours of being stimulated with
TB antigen could be a useful tool to distinguish between patients with LTB and those with active TB, finding in agreement with studies done using flow cytometry\(^\text{17}\). Many studies were done to evaluate IL-2 as a marker for infection with tuberculosis and concluded that it cannot be a reliable diagnostic marker alone and a second marker needs to be used to strengthen diagnostic outcome and they found that IFN-γ-secreting effector memory T-cells can be used as co-marker for this purpose\(^\text{18-19}\). Other researches documented the involvement of CD8 & CD4 T cells in immunity against *Mycobacterium tuberculosis*\(^\text{20-21}\).

Our data demonstrated a variable mean of IL-2 level among PTB and OTBat patients such finding analogue study done on African patients\(^\text{16}\).

It is well known that age is a key factor in immune system activity and responses and that was emphasized in tuberculosis patients the decline in interleukin-2 level is significantly associated with age increment as shown in tables (2,3).

AFB continually shed in sputum of active old TB patients in result of induction of monocytes by bacteria\(^\text{22-23}\).

We studied only one dosing chart of rhIL-2 which was selected based on available information from published data at the time of study design.

Previous studies found a distinctive correlation between administration of rhIL-2 treatment and improvement of sputum smear\(^\text{24-26}\). Our data show that and during the first month of treatment, daily increased level of IL-2 did not clear bacillary bacteria from sputum smear. Based on previously presented data, we could conclude that immunotherapy based on administration of rhIL-2 might participate in betterment of host immunity function and advancement of disease. A negative acid-fast bacilli smear could be a reliable approach in determining the validity of treatment and the virulence of a pulmonary TB\(^\text{27-29}\).

**Conclusion**

Treating TB with rhuIL-2 could enhance the smear conversion of TB. Levels of IL-2 in sputum was higher in primary tuberculosis patients than old tuberculosis after treatment. Our result indicate that IL-2 level could be used as indicator to determine severity of pulmonary tuberculosis.

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**Conflict of Interest:** The authors declare no conflict of interest.

**Ethical Clearance:** A local ethical committee approved the study.

**REFERENCES**


Warm Footbath Minimize Osteo-arthritis Joint Pain on the Elderly in Surabaya’s Public Health Center

Muhamad Ibnu Hasan1, Elida Ulfiana1, Deni Yasmara1

1Faculty of Nursing, Universitas Airlangga Campus C, Mulyorejo street, Surabaya (60115), Indonesia

ABSTRACT

Background: Osteoarthritis joint pain is caused by degeneration process of cartilage bone and emphasized on weight bearing joints such as knees, hips, feet and the back. Warm footbath is one of hydrotherapies which used the modality of warm water to recover injury and minimize the symptoms of chronic joint problems.

Objective: This study aims to analyze the impact of warm footbath therapy to minimize osteoarthritis joint pain on elderly.

Method: This study employed a quasi-experimental design. The research samples were the elderly from a Mojo Public Health Center, Surabaya who suffered from osteoarthritis. The samples consisted of 20 respondents selected according to the inclusion criteria and were distributed into two groups, i.e. experimental group (n=10) and control group (n=10) by using purposive sampling technique. The independent variable of this research was the warm footbath while the dependent variable was the level of osteoarthritis joint pain on elderly. The data were collected by using The Western Ontario McMaster Universities Arthritis Index (WOMAC) questionnaire and analyzed by using Wilcoxon signed rank test and Mann-Whitney test with deviation level of p ≤ 0.05.

Result: The result of Wilcoxon signed rank test identified that there were differences between pretest and posttest in the experimental group (p=0.004) and the control group (p=0.011). Furthermore, the research result provided by Mann-Whitney also illustrated that there were significant differences between the posttest results of the experimental group and control group (p=0.035).

Conclusion: Warm footbath was proven to alleviate joint pain. The most dominantly declined osteoarthritis joint pain after a warm footbath was the pain resulted from standing.

Keywords: Warm footbath, joint pain, elderly, osteoarthritis

Introduction

Joint pain due to osteoarthritis causes negative impacts on the elderly’s daily life routine. Osteoarthritis is a joint degenerative process, a chronic condition which causes degeneration of bone cartilage and new bone formation as a reaction to the degeneration in the peripheral area and the subchondral area of the bone joint (1). The elderly who always experience osteoarthritis knee pain and are not in the long-term care facility become dependent in their efforts to fulfill their activity daily living or ADL at home, such as bathing, putting on clothes, and moving (2).

To minimize osteoarthritis pain, nursing intervention can be conducted through a collaborative and independent manner. The nursing intervention is carried out through cognitive behavioral approach and physical approach to minimize the pain. The physical approach can be performed through relaxation techniques. Warm footbath is one of the relaxation techniques that induces the body to relax, resulting in the occurrence of vascular vasodilation (3). This condition, mediated by intensified reflex axons mechanism in the circulation, causes an impact on the spread of algogenic substances that will

Corresponding Author:
Elida Ulfiana
Faculty of Nursing, Universitas Airlangga Campus C, Mulyorejo street, Surabaya (60115), Indonesia
Phone: +6287884019278
Email: elidaulfiana@yahoo.com
ease nociceptive pain. Warm footbath is useful for providing relaxation for the body, stretching muscles and pain as well as inducing the effect of reducing blockages in the brain and visceral (2).

The study on warm footbath has been performed previously with warm footbath effects on the anti-spastic effect in post-stroke patients as the research object. The study observed the changes on the stiffness level of the foot triceps using the MAS (Modified Ashworth Scale) indicator and controlled the observation of electromyographic changes by measuring the changes in F-waves parameters before treatment, immediately after treatment, and 30 minutes after treatment. The research results stated that there were differences in MAS scores before and after treatment, as well as in the description of the F-waves parameters comparison (4). Warm footbath is proven effective in minimizing the stiffness level in post-stroke patients. Based on the background of the problem, this study observed the effect of warm footbath to minimize osteoarthritis pain on the elderly (3).

**Material and Method**

This study uses quasi-experiment because this experiment does not have the characteristics of the actual experimental design since the variables need to be controlled or manipulated. Therefore, the research validity is insufficient to be classified as an actual experiment (5). In this research design, the experimental group was treated while the control group was not. Both groups, the treatment group and the control group, were preceded by a pre-test and after treatment and non-treatment activities, a post-test was conducted to remeasure the groups (6).

**Research Samples:** In this study, the sample population was the elderly with osteoarthritis joint pain disorders in Mojo Public Health Center, Surabaya, Indonesia. The method to determine the sample was the sample size application. The minimum samples size required by each group were 12 respondents or 24 respondents for 2 groups. The sample determination technique applied a method of specifying samples among the population in accordance with the researcher’s needs (research objectives/problems), so that the samples could represent the population characteristics that had previously been identified (7).

The sample inclusion criteria included elderly who were over 60 years old; diagnosed to suffer from osteoarthritis by medical personnel; had good cognitive function and able to take the WOMAC test; and were taking osteoarthritis treatment from the public health center of non-opioid NSAIDs and analgesics. The data on osteoarthritis joint pain on the elderly were assessed with the WOMAC index. There were five questions related to the pain, two questions related to joint stiffness and seventeen questions related to functional activities. This instrument is the most sensitive instrument in assessing osteoarthritis on knee or pelvis and is widely used in clinical trials (8).

**Data Analysis Method:** Data of post test were analyzed by Mann-Whitney test. Mann-Whitney is a statistical test (a comparative test of 2 dependent/independent samples) with a deviation level of $\alpha \leq 0.05$. When the results indicates that the value of $\alpha \leq 0.05$, H1 is accepted, meaning that there was a difference in the osteoarthritis joint pain alleviation in the elderly who were treated with those who were not.

**Result**

**Table 1: Medicines consumed by respondents**

<table>
<thead>
<tr>
<th>No.</th>
<th>Consumed Medicines</th>
<th>Experimental group (Σ)</th>
<th>%</th>
<th>Control group (Σ)</th>
<th>Σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Non-opioid analgesic</td>
<td>10</td>
<td>100</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>NSAIDs</td>
<td>8</td>
<td>80</td>
<td>7</td>
<td>70</td>
</tr>
<tr>
<td>3</td>
<td>Allupurinol</td>
<td>2</td>
<td>20</td>
<td>3</td>
<td>30</td>
</tr>
</tbody>
</table>

The analysis results indicated that all respondents were taking non-opioid analgesic medicines, amounting to 20 people (100%). The respondents who consumed allupurinol were 2 people (20%) in the experimental group and 3 people (30%) in the control group.
Table 2: Respondent distribution based on Body Mass Index (BMI)

<table>
<thead>
<tr>
<th>No.</th>
<th>BMI</th>
<th>Σ</th>
<th>%</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>&lt; 14.9</td>
<td>0</td>
<td>0</td>
<td>Extremely thin</td>
</tr>
<tr>
<td>2.</td>
<td>1158.4</td>
<td>1</td>
<td>5</td>
<td>Thin</td>
</tr>
<tr>
<td>3.</td>
<td>18.5 - 22.9</td>
<td>15</td>
<td>75</td>
<td>Normal</td>
</tr>
<tr>
<td>4.</td>
<td>2237.5</td>
<td>4</td>
<td>20</td>
<td>Fat</td>
</tr>
<tr>
<td>5.</td>
<td>27.6 - 40</td>
<td>0</td>
<td>0</td>
<td>Obese</td>
</tr>
<tr>
<td>6.</td>
<td>Over 40</td>
<td>0</td>
<td>0</td>
<td>Over Obese</td>
</tr>
</tbody>
</table>

Mean = 21.5, Median = 21.675, Modus = 19.53, SD = 1.901, Min = 17.70, Max = 25.7

The respondents’ BMI value distribution indicated that the majority of respondents were in the normal category with 15 people (75%). The lowest BMI value of the respondent was 17.7 kg/m² while the highest was 25.7 kg/m². The average BMI value of the respondents was 21.500 kg/m² with a standard deviation of 1.901. The WOMAC joint pain assessment on elderly with osteoarthritis was conducted before and after warm footbath for the experimental group while for the control group, the assessment was performed directly.

Table 3: Respondent Distribution based on WOMAC joint pain score before the intervention

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Experimental Pre-Test</th>
<th>Experimental Post-Test</th>
<th>Control Pre-Test</th>
<th>Control Post-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Σ</td>
<td>Σ</td>
<td>Σ</td>
<td>Σ</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>5</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>7</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>6</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>8</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>5</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>6</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>4</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Mean</td>
<td>7.80</td>
<td>5.90</td>
<td>8.60</td>
<td>7.80</td>
</tr>
<tr>
<td>Median</td>
<td>8.00</td>
<td>6.00</td>
<td>8.50</td>
<td>8.00</td>
</tr>
<tr>
<td>SD</td>
<td>1.619</td>
<td>1.197</td>
<td>1.897</td>
<td>1.988</td>
</tr>
<tr>
<td>Min-Max</td>
<td>5-10</td>
<td>4-8</td>
<td>6-11</td>
<td>5-10</td>
</tr>
</tbody>
</table>

Wilcoxon Sign Rank test p = 0.011 Wilcoxon Sign Rank test p = 0.004

Mann-Whitney test p = 0.035

The results from the statistical analysis using Wilcoxon Sign Rank Test indicated that p = 0.004 (α ≤ 0.05). This means that there was a decrease in the joint pain scores in the experimental group before and after the warm footbath intervention. The control group that was not treated with a warm footbath intervention showed that p = 0.011 (α ≤ 0.05) which indicated that joint pain decrease also occurred in the control group.

The analysis results of Table 5 suggested that the average pain score of the experimental group before the intervention was 7.80 with a standard deviation of 1.61, maximum score of 10, and minimum score 5. After the intervention, the average pain score in the experimental group decreased to 5.90 with a standard deviation of 1.197, a maximum value of 8, and a minimum score of 4.
Prior to the test, the mean value of pain score for the control group was 8.60 with a standard deviation of 1.89, a maximum score of 11, and a minimum score of 6. The average pain score after the test for the control group experienced only a slight decrease to 7.80 with a standard deviation of 1.988, maximum score of 10, and minimum score of 5. The results of the Wilcoxon Sign Rank test on the experimental group's pain score indicated that p score reached 0.004 (α ≤ 0.05) while in the control group, p score reached 0.011 (α ≤ 0.05). The result of the Mann-Whitney statistic Test on the pain score was that both the control and experimental groups indicated p score of 0.035 (α ≤ 0.05).

**Discussion**

The posttest analysis using Mann Whitney Test suggested that p score was 0.035 (α ≤ 0.05), indicating that there was a difference between the experimental group and the control group on the post-intervention pain score. The study results also found data on the decrease of the total pain score in each activity, including pain during walking on a flat surface, sleeping at night, sitting or lying down, and standing. There was no change in the pain experienced during climbing up and stepping stairs after a warm footbath with a total score of 20. A significant pain reduction occurred in the pain experienced when standing with the difference between the pretest and posttest scores reaching nine points.

Furthermore, of the 24 questions on the WOMAC index, the df score obtained was 22. At the significance level of 5%, the r score for the table reached 0.404. Meanwhile, in the statistical test, the difference between the scores of each variable and the total r score obtained r of all questions ranged from 0.452-0.830. This value was greater than the r table value (0.404). Thus, all questions were declared valid. The Cronbach Alpha test for the WOMAC index reached 0.951 which was above the minimum limit of 0.70. Thus, it can be concluded that the WOMAC index had a good reliability.

This is in accordance with the research conducted by Matsumoto (2000) where the stimulation of warm water in certain areas could increase the production of endorphin neuroregulators and induce an increase blood circulation to stimulate the release of endorphins, natural analgesic compounds in the body. This concept was based on pain modulation using the acupuncture method. Acupuncture is a pain modulation method that can trigger the release of endorphins. Acupuncture techniques increases local NO levels and cause hypervascularization. In addition, a large increase in local NO is believed to be capable of releasing a number of endorphins as natural analgesic compounds that can ease pain (4).

The pain subscales at WOMAC were set in 45% of 134 trials. Appropriate method reports in applying the WOMAC pain subscale were found in many cases. 52% of the study reports using the WOMAC subscale indicated inadequate results with ambiguous ranges of pain scores of 38% and only 10% became completely clear (9).

The pain experienced when climbing up and stepping down stairs constituted a question that had the highest value in comparison with the other questions with a value of 48. Joint pain when climbing up and stepping down stairs was experienced as severe pain by the majority of respondents. Severe pain was described by the respondents as pre-existing pain and it would increase when carrying out the activity (10).

The main cause of osteoarthritis joint pain is the cartilage bone degeneration which induces suppression of supporting bones and it gets worse with activities or weight supporting positions in the body (11). Stepping down the stairs induces an increase in the knee joint and causing pain. The more severe the symptoms of knee osteoarthritis experienced by a person, the lesser ability of the knee joint to absorb the impact of increasing body weight, especially in the initial phase of stepping down the stairs (2).

The decrease in osteoarthritis pain scores in the experimental and control groups were also caused by nutritional factors that could not be fully controlled by the researchers. Nutrition is an important component in the process of forming and healing an injury. Vitamin D plays a vital role in bone metabolism (12). These conditions may spur the emergence of the postulate that consumption of vitamin D, with adverse effects on the growth of osteoarthritis bone, may be involved in the changes in bone behavior at various stages of the osteoarthritis development (11).

Consequently, other physiological effects induced by warm footbath are the mechanism of pain reduction through the gate control theory and intensify the production of endorphin neuroregulators. The thermodynamic properties that will be received by the thermoreceptors with peripheral bemyelin fine afferent
fibers reached a speed of 30 m/s which is referred to as alpha beta fibers that feed on muscle spindles. This thermal stimulus causes activation of the diameter widening of myelin fibers, enabling it to “close” the nociceptive impulses gate before reaching the brain (13).

The stimulation of warm water in the area would increase the production of endorphin neuroregulators and induce an increase in blood circulation so that it could stimulate the release of endorphins, natural analgesic compounds in the body. This concept is based on pain modulation by using the acupuncture method. Acupuncture is a pain modulation method that can trigger the release of endorphins (4).

Warm footbath implemented for osteoarthritis joints utilized thermodynamic effects (heat flow) and hydrostatic pressure (buoyancy) of the warm water surface as a mechanism to ease pain. The hydrostatic force would relieve the joints when the feet were soaked in the water (14). The thermodynamic effects of warm water surface induced an increase in core body temperature, triggering a series of advanced processes that could reduce ischemia due to cartilage degeneration which often caused pain (15).

**Conclusion**

Based on the last statistical test employed, the pain when standing was experienced as a mild pain and often occurred in the morning, accompanied by stiffness and can be relaxed by using warm footbath. The respondents who were given the opportunity to relax and increase body temperature through the thermodynamic effects of warm footbath could minimize osteoarthritis joint pain through the increased synovium tissue vascularization and muscle relaxation.

**Ethical Clearance:** The research process involves participants in the survey using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, nonmaleficence, and justice.

**Conflict of Interest:** The authors guarantee that there was no conflict of interest as well as copyright conflict involved with this research.

**Source of Funding:** This study is funded by the authors only and there is no external fund involved this research.

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An Epidemiological Study on Common Types of Tuberculosis in Al-Najaf City

Murtadha M. Hameed1, Alaa S. Alattabi2, Hassan M. Abolmaali3

1B.Sc. in Medical Technology, Department of Immunology, Alsader hospital, Najaf city; 2M.B.CH.B., FIMCS Path, Immunology Department of Microbiology, College of Medicine, 3TPhD in Genetic Engineering and Biotechnology/Department of Clinical, Laboratory Sciences, College of Pharmacy, University of Kerbala

ABSTRACT

Background: Tuberculosis is a contagious air transmitted bacterial disease caused by Mycobacterium tuberculosis. It mainly infects the lungs, but it may infect other parts of the body. It is considered a major community health problem globally, it is the world second largest cause of death in adults between the infectious diseases after HIV/AIDS.

Objective: This study was aimed to estimate the common types of tuberculosis in Al-Najaf city.

Materials and Method: This is a case-control study accomplished in the Advisory Clinic for Thoracic and Respiratory Diseases in Al-Najaf city, for the period from December 2017 to August 2018. A total of 70 individuals were included in this study, 37 were diagnosed with tuberculosis by specialist respiratory physician, and 33 were healthy controls. All data that include age, gender, residence, smoking, site of infection and history of diabetes were collected from all participants. The data were analyzed by using the statistical package social system (SPSS).

Results: This study show that pulmonary TB more frequent in men 11(61.1%) than in women 7(38.9%), pleural TB also has high male to female ratio 5(83.3%) to 1 (16.7%) respectively, and the incidence was also higher in males in bone, peritoneum and meninges TB. In contrast lymph node tuberculosis is found to be predominant in females.

It also found that tuberculosis was more frequent in age interval from (25-50) years old. It also shows that out of total 37 tuberculosis cases 28 cases (75.7%) were from urban area, compared to 9 cases (24.3%) from rural area.

Conclusion: Sex differences affect TB infection, it is significantly higher in male over female except in lymph node TB where it more frequent in female, TB most commonly infects economically active age groups (21-50 years old), it more frequent in urban areas than rural areas.

Keywords: M. tuberculosis, Najaf, TB

Introduction

Tuberculosis is a contagious air transmitted bacterial disease caused by Mycobacterium Tuberculosis. It is considered a major community health problem globally. In 2017 about 10 million people manifested with active tuberculosis, and almost 1.6 million persons die from TB globally. It is the world second largest cause of death in adults between the infectious diseases after HIV/AIDS, as it is results in death of about two million individuals annually 1.

In 2014 Iraq accounts for about 25% of the global TB burden. It is predestined that Iraq which accounts 3% of the total number of cases in the region, there were roughly 20000 TB patients and 4000 deaths yearly 2. Tuberculosis can infect both male and female and occur in any age and can attack any organ/tissue of the body 3. TB bacilli generally infect the lungs in approximately 80% of the cases, which leads to primary pulmonary tuberculosis. Extra-pulmonary tuberculosis (EPTB) represents nearly 20% of cases and affects many organs such as lymph nodes, intestine, meninges, bone and...
joints. Lymph node Tuberculosis (LNTB) represents the most common among other types of EPTB in multiple regions of the world representing 40% of EPTB cases.

The pathogen that causes Tuberculosis disease is Mycobacterium tuberculosis (M. tb), this bacterium included within the class Actinobacteria, and belongs to subclass Corynebacterineae. It is rod in shape about 1-10μm in length, and nearly 0.4 μm in diameter.

Some individuals are naturally more vulnerable to mycobacterial infections than others. Individuals who have high risk of getting mycobacterial infections include persons who have chronic renal failure, patients having insulin-dependent diabetes, individuals subjecting to immunosuppressive therapy, prisons residents and people inhabitant homeless shelters, peoples using intravenous-drug, and HIV infected individuals.

The prevalence of TB among diabetic patients was 1.8–9.5 times higher than in the general population in some Asian countries.

**Subjects and Method**

Ethically, data collection and the design of the study groups were accomplished after the approval on the research proposal was done by Research Ethics Committee of Najaf Health Directorate to work in its hospitals.

A case-control study conducted during the period from December 2017 to August 2018 in Al-Najaf city. A total of seventy subjects were included. Thirty seven tuberculosis patients including 21 (56.8%) male and 16 (43.2%) female, and the male to female ratio was 3:2, those patients were diagnosed according to laboratory, radiology and clinical investigations by specialist respiratory physician, and (33) healthy individuals as control who were attended the Advisory Clinic for Thoracic and Respiratory Diseases in Al-Najaf city.

All data that include: age, gender, site of infection, history of diabetes, smoking and residence have been collected from all participants, and appropriate statistical and descriptive analysis were performed using IBM SPSS V21.

**Results**

A total of 70 individuals were included in this study, divided into 37 (52.9 %) patients (males 21 (56.8%) and females 16 (43.2%)), their ages ranged between (14-75) years with mean value (43.86), the male to female ratio was 3:2 it is higher in males than in females, and 33 (47.1%) as a control group (males 22 (66.7) and females 11 (33.3)), their ages ranged from (16-72) and the mean value is (42.48) as in table 1.

The number of tuberculosis cases was more frequent in age interval from (25-50) years old which comprises 19 patients (51%) from the total TB cases, the lowest number of cases was in the age interval (>50) which is only 8 cases (21.6%), while in control group it include 8 individuals (24.2%) in (<25 years) age group, and 19 (57.6%) in age group (25-50 years), while the age group (>50 years) include 6 individuals (18.2%) table 1.

The impact of gender on the type of tuberculosis revealed the marked predominance of pulmonary tuberculosis in males in compare with females 11 (61.1%) and 7 (38.9%) respectively, this dominance is also observed in pleural TB 5 (83.3%) in males compared with 1 (16.7%) in female, and the incidence was also higher in males in bone, peritoneum and meninges TB. In contrast lymph node tuberculosis is found to be predominant in females while no males infection has recorded as shown in table 1.

It has been shown that diabetic patients represent 8 (21.6%) of TB cases and non-diabetic patients were 29 (78.4%) of total TB cases as illustrated in table 1.

In this experiment it has been found that 16 (43.2%) TB patients were smokers and 21 (56.8%) of TB patients were non-smokers as shown in table 1.

As shown in table 1 there is marked dominance of tuberculosis infection in urban than in rural area in Najaf city 28 cases (75.7%) out of total 37 Tuberculosis cases were from urban area, whereas 9 cases (24.3%) from rural area.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Case N. (%)</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
</tr>
<tr>
<td>&lt;25 years</td>
<td>10 (27)</td>
</tr>
<tr>
<td>25-50 years</td>
<td>19 (51.4)</td>
</tr>
<tr>
<td>&gt;50 years</td>
<td>8 (21.6)</td>
</tr>
<tr>
<td>Total</td>
<td>37 (100)</td>
</tr>
</tbody>
</table>

Table 1: Description the frequency of each parameter in case and control group.
Conted…

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
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</thead>
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<tr>
<td></td>
<td>21 (56.8)</td>
<td>16 (43.2)</td>
<td>37 (100)</td>
</tr>
<tr>
<td></td>
<td>22 (66.7)</td>
<td>11 (33.3)</td>
<td>33 (100)</td>
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<table>
<thead>
<tr>
<th>Smoking</th>
<th>Smokers</th>
<th>Non-smokers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15 (40.5)</td>
<td>22 (59.5)</td>
<td>37 (100)</td>
</tr>
<tr>
<td></td>
<td>12 (36.4)</td>
<td>21 (63.6)</td>
<td>33 (100)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>DM</th>
<th>Diabetic</th>
<th>Non-diabetic</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8 (21.6)</td>
<td>29 (78.4)</td>
<td>37 (100)</td>
</tr>
<tr>
<td></td>
<td>3 (9.1)</td>
<td>30 (90.9)</td>
<td>33 (100)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Residence</th>
<th>Urban</th>
<th>Rural</th>
<th>Total</th>
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<tr>
<td></td>
<td>28 (75.7)</td>
<td>9 (24.3)</td>
<td>37 (100)</td>
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<tr>
<td></td>
<td>30 (90.9)</td>
<td>3 (9.1)</td>
<td>33 (100)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Site of infection</th>
<th>Pulmonary</th>
<th>Lymph node</th>
<th>Meninges</th>
<th>Bone</th>
<th>Peritoneum</th>
<th>Pleural</th>
<th>Fallopian tube</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18 (48.6)</td>
<td>6 (26.2)</td>
<td>3 (8.1)</td>
<td>2 (5.4)</td>
<td>1 (2.7)</td>
<td>6 (16.2)</td>
<td>1 (2.7)</td>
<td>37 (100)</td>
</tr>
</tbody>
</table>

Discussion

The most infected age groups are (25-50) years while the lowest infected age groups were (<25) and (>50) years, and this does not mean that these age groups are less or not susceptible to TB infection, on the contrary these age groups are of high susceptibility to TB infection as a result of their deficient or weak immune system. This result agrees with Bhatt et al., 2009 who suggest that TB most commonly infect economically active age groups (21-50 years old), and also agree with the global burden of TB in developing countries who reported that 75% of TB infected cases are within the age group (15-54) years old which is economically active and most productive age.

This study shows predominance of TB in males in compare with females patients, with male to female ratio (3:2). This result matched with other studies done in Iraq by Al-Jubouri, 2010 and Al-Zubaidi, 2010 who point out the rate of TB was higher in male than female (3:2). World health organization reported that globally more men infected with TB than women, in (2017) however WHO mentioned that some places has more women than men such as Afghanistan, Iran and some part of Pakistan. Another study mentioned that males and females has equal TB incidence. In the current study, the cause of high incidence of TB in men may be due to the susceptibility of men to TB as a result of the nature of their lifestyle that characterized of being more exposed to predisposing factor like tobacco smoking, drug abuse and alcohol.

Pulmonary TB more frequent in men (61.1%) than in women (38.9%), pleural TB also has high male to female ratio 5 (83.3%) to 1 (16.7%), while lymph node TB found to be higher in women, these results agree with study done in Tunisia that mentioned the predominance of pulmonary TB in men over women and higher incidence of pleural TB in men, it also reported the predominance of lymph node TB in women. A study done in Hong Kong by Noertjojo et al., 2002 postulate that lymph node TB occur significantly higher in women, while pleural TB was significantly higher in men.

TB patients with diabetic consist of 8 (21.6%) while nondiabetic TB patients 29 (78.4%). This result agrees with systematic review done by Baker et al., 2016 showing high number of hyperglycemia in TB patients especially in Indonesia, Mexico and Iran that reported diabetes mellitus prevalence of 13%, 35% and 32% respectively. A cross sectional study done in south Texas and north Mexico it found high prevalence of diabetes in TB patients 39% in Texas and 36% in Mexico. The number of smokers in TB patients 15 (40.5%) and nonsmoking TB patients were 22 (59.5%), A study conducted in Iran by Ghasemian et al., 2009 has found that smokers were 2.1 times more likely to fell ill with pulmonary tuberculosis than non-smoker. A study done by Basu et al., 2011 predicts that smoking would increases the global TB cases by 18 million more and 40 million deaths between 2010 and 2050.

Tuberculosis has higher incidence among urban people than rural 28 (75.7%) versus 9 (24.3%) respectively. And this agrees with study done in Iran by Yazdani and Kazemnejad, 2010 has mention that 61% of TB patients were urban and 39% from rural resident. Another study done by Zadeh et al., 2013 also reported
the higher incidence of TB in urban area. The low number notification of TB cases in rural area probably, because of their limited access to health services and low knowledge about TB and poor health seeking.

**Conclusion**

TB most commonly infects economically active age groups (21-50 years old). Sex differences affect TB infection, it is significantly higher in males over females, except in lymph node TB where it more frequent in females. The TB situation appear to be worse in urban areas, with a significantly higher risk of infection compared to rural areas.

**Conflict of Interest:** No

**Source of Funding:** Self

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The Effect of Ammuntuli Bija Tianang Na Beja-Beja Model on Knowledge, Motivation, and Attitude of Pregnant Women’s Health Services in Jeneponto District, Indonesia

Mustamin¹, Ridwan Amiruddin², Sukri Palutturi³, Stang⁴, Risnah⁵
¹Student, Doctoral Program, in the Faculty of Public Health, Hasanuddin University Makassar, and Staff of the Jeneponto District Health Office; ²Professor, Epidemiology Science, ³Professor, Health Policy and Administration, ⁴Professor, Population, Family Planning and Biostatistics, Faculty of Public Health, Hasanuddin University Makassar, Indonesia; ⁵Lecturer, Faculty of Medicine and Health Sciences State Islamic University of Alauddin Makassar, Indonesia

ABSTRACT

Background: Maternal mortality is an important indicator to assess the level of a country’s welfare and public health status. If the high maternal mortality rate means that the maternal health care system is still poor. Ammuntuli Bija Teanang na Beja-Beja (home visit) is an approach or alternative solution to improve maternal and child health.

Objective: This study was to determine the effect of the ammuntuli bija teanang na beja-beja model on the knowledge, motivation, and attitudes of midwives in the health services of pregnant women. This study was conducted in six health centers in Jeneponto Regency.

Method: This study used a “Pre-Experimental” design method with a “one group pre and post-test design”. Statistical analysis used was the Wilcoxon rank test. The population was 113 midwives with a study sample of 33 midwives in six Puskesmas in Jeneponto Regency. The sampling technique was purposive sampling.

Results: This study showed that there are differences in the knowledge, motivation, and attitudes of midwives in the health services of pregnant women before and after the intervention of the ammuntuli bija teanang na beja-beja model given. Significant changes occurred (p <0.05), namely; knowledge (p = 0.001), motivation (p = 0.001) and attitude (p = 0.001).

Conclusion: The administration of the ammuntuli bija teanang na beja-beja model has been able to improve the knowledge, motivation, and attitudes of midwives in the health services of pregnant women.

Keywords: Ammuntuli bija teanang na beja-beja, health services, midwives

Introduction

2012 Indonesian Demographic and Health Survey shows that the maternal mortality rate (related to pregnancy, childbirth, and childbirth) was 359 per 100,000 live births¹. Maternal mortality in South Sulawesi Province in 2014 was 138 people or 93.20 per 100,000 live births. Jeneponto Regency (193/100,000 live births) is ranked fourth after Bone (240/100,000 live births), Gowa (240/100,000 live births), and Luwu (293/100,000 live births)².

The high maternal mortality rate in Jeneponto Regency is due to bleeding, eclampsia, infectious diseases, and late referrals and low competence of midwives. This can be seen from a large number of midwife services, health services in Jeneponto Regency are still low³. Health care programs for pregnant women
Low knowledge, motivation, and attitudes of midwives are one of the important keys to the success of health services including improving health services for pregnant women. The basic causes of maternal death can occur because 1) Too late to recognize the danger and make decisions referring to health facilities; 2) Too late to reach a referral service facility, and 3) Too late in obtaining adequate services at the referral facility.

Several studies have identified factors that influence the low level of health services so that maternal and newborn mortality rates are still high. These factors are structural factors that lead to health inequalities of antenatal care (ANC), low quality of health workers, unavailability of potential equipment and drugs, ethnicity, and gender.

To improve maternal and child health, the World Health Organization (WHO) and UNICEF recommend that a home visit program is an effort that needs to be carried out by community health workers to address maternal and infant health problems and improve maternal and infant health services. One of the African sub-Saharan countries, Uganda, conducts home visits conducted by health workers (community health cadres, also known as village health teams) as a means to communicate health messages relevant to maternal and newborn health. In addition, Bangladesh, India, and Pakistan have conducted home visits by community health cadres’ programs designed to bridge public health problems. Efforts to prevent health problems have been carried out in various cases, including cardiovascular disease in cooks.

The home visit program on maternal and child health is a method used to provide broad results from early prevention and service interventions to families in need during the prenatal period or early pregnancy. Health workers strive to improve maternal services and the development of children by increasing parental knowledge, social support, the ability to overcome and solve health problems for pregnant women, access to the community and health services.

The aim of this study was to determine the effect of the current model of the ammuntuli bija teanang na beja-beja on the knowledge, attitudes, motivation, and abilities of midwives in the health services of pregnant women in Jeneponto Regency.

Materials and Method

This study used the method of “Pre-Experimental” design research with the design of “one group pre and post-test design”. Statistical analysis used was the Wilcoxon rank test. The population consisted of 113 midwives with a study sample of 33 midwives in six Public Health Center (Puskesmas) in Jeneponto Regency. The six Puskesmas includes Puskesmas Bontoramba, Puskesmas Bulusibatang, Buluoe, Bontomate’ne, Tolo dan Rumbia. The selection of Puskesmas is based on consideration of the low coverage of health services and consideration of geographical location includes Puskesmas in mountainous and lowland areas.

Results

Table 1: Characteristics of Respondents in Jeneponto Regency

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency (n = 33)</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30</td>
<td>19</td>
<td>57,6</td>
</tr>
<tr>
<td>31-40</td>
<td>14</td>
<td>42,4</td>
</tr>
<tr>
<td>41- 50</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Domicile</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don’t stay</td>
<td>16</td>
<td>48,5</td>
</tr>
<tr>
<td>Stay</td>
<td>17</td>
<td>51,5</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School of Health Nurses (SPK) + Midwives</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Diploma-III</td>
<td>30</td>
<td>90,9</td>
</tr>
<tr>
<td>Bachelor (Sarjana)/ Diploma-IV</td>
<td>2</td>
<td>6,1</td>
</tr>
<tr>
<td>Master</td>
<td>1</td>
<td>3,0</td>
</tr>
<tr>
<td><strong>Job</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil servant</td>
<td>5</td>
<td>15,2</td>
</tr>
<tr>
<td>Temporary employees(PTT)</td>
<td>26</td>
<td>78,8</td>
</tr>
<tr>
<td>Special Assignment (NUGSUS)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Training</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever</td>
<td>8</td>
<td>24,2</td>
</tr>
<tr>
<td>Never</td>
<td>25</td>
<td>75,8</td>
</tr>
<tr>
<td><strong>Years of service</strong></td>
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<tr>
<td>1- 3 years</td>
<td>1</td>
<td>3,0</td>
</tr>
<tr>
<td>4-5years</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Above 5 years</td>
<td>32</td>
<td>97,0</td>
</tr>
</tbody>
</table>

Source: Primary Data, 2018
Table 1 shows that the respondents in the intervention group, the most age group was the 20-30 age group with 19 people (57.6%), 17 people living in the village (51.5%) with the highest education level were Diploma-III with 30 people (90.9%). The highest number of jobs is PTT with 26 people (78.8%). Respondents who had a service period of more than 5 years were 32 people (97.0%) and had never attended training, the highest number being 25 people (75.8%).

Table 2: Differences in knowledge, motivation, and attitudes before and after intervention in Jeneponto Regency

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean ±</th>
<th>SD</th>
<th>Different Mean</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Before</td>
<td>8,606</td>
<td>1,121</td>
<td>2,151</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>10,757</td>
<td>1,173</td>
<td></td>
</tr>
<tr>
<td>Motivation</td>
<td>Before</td>
<td>58,036</td>
<td>2,855</td>
<td>5,812</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>63,848</td>
<td>9,852</td>
<td></td>
</tr>
<tr>
<td>Attitudes</td>
<td>Before</td>
<td>65,030</td>
<td>3,712</td>
<td>5,515</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>70,545</td>
<td>4,528</td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary Data, 2018

Table 2 shows that there was a change in knowledge, motivation, and attitudes before and after the intervention where knowledge increased by 2.151 points, motivation increased by 5.812 points, the attitude changed by 5.515 points with p <0.005 knowledge (0.001), motivation (0.001) and attitude (0.001).

Discussion

Organizational determinants play an important role, especially in providing adequate resources to support teamwork, human resource management, and leadership. As suggested by policymakers, the government must encourage the use of these workers by updating policies, so that conditions where there is still a lack of midwives and facilities by implementing programs to increase staff and facilities4,12.

In this study, the characteristics of the subjects were found to be mostly good in the young age group, the interval of 21-30 years. This greatly facilitates the transfer of information because the group is still relatively easy to receive knowledge and change. Age is one of the things that affect knowledge because a person’s growing age can make changes to the physical, psychological and psychological aspects. On the psychological aspect, a person’s level of thinking is getting more mature. In
practice, the characteristics that influence the attitudes of nurses in service are age, education, functional positions, and length of work, while the doctors are age, education, and length of work. In this study, groups have similarities to the dominance of subject characteristics, namely age, education and years of service.

As the results of the study that a person’s beliefs are needed to involve themselves effectively in service. Sometimes, new graduate midwives often lack confidence in doing services, and this can interfere with safe and effective health services. Therefore, an intervention is needed that can provide support to develop the knowledge and experience of new graduates regarding the services of pregnant women. This is very important to increase the confidence of new graduate nurses.

A. Knowledge: After the Wilcoxon Rank test, the results of the study in table 2 show the value ($\rho = 0.001$), which means the value ($p < 0.05$) with the mean difference of 2.151. This means that there is a change in the knowledge of midwives in the health services of pregnant women before and after the implementation of the ammuntuli bija teanang na beja-beja model. Ammuntuli bija teanang na beja-beja is the language of the Makassar, it is hoped that the use of this term will further facilitate local implementation. This is appropriate, that resolving health problems by taking into account the local context will be more effective than medical actions. It does not only contain home visits of a health worker to the home of pregnant women and/or mothers who have babies, but it also contains respect for health workers to them. With home visits, it means that they are picked up and it is hoped that they can make use of health services at the Puskesmas.

Knowledge is a continuous formation by someone who is experiencing reorganization at any time because of new understanding. Knowledge in a constructivist view is not a fact from a fact being studied, but as a person’s cognitive construction of objects, experiences, and environments. A person’s behavior tends to be good if his knowledge is also high. Efforts to improve maternal health services can be done in various ways. One of the strategies is training activities. In some training and development of health services, it has not been fully implemented.

Although it is known that there is an influence of education (counseling) on knowledge and attitudes. Knowledge, skills, and motivation correlate with the performance of midwives. Meanwhile, work time does not have a correlation with the performance of midwives. Health education is an effort to increase one’s knowledge and abilities, by encouraging self-direction and being active in providing new information or ideas.

B. Motivation: After the Wilcoxon Rank test, the results of the study in table 2 show the value ($\rho = 0.001$), which means the value ($p < 0.05$) with the mean difference of 5.812. This means that there is a change in the motivation of midwives in the health services of pregnant women before and after the implementation of the ammuntuli bija teanang na beja-beja model. Motivation is someone’s special readiness to carry out a series of activities aimed at achieving a number of targets. Work motivation is something that originates from the individual’s internal (desires, hopes, needs, and preferences) which cause encouragement or enthusiasm to work hard.

The motivation of village midwives is a condition in the village midwives who can give strength, enthusiasm, the courage to be honest and enjoy what they do in order to achieve high performance. One of the factors to improve performance is motivation because the presence of motivation will encourage work morale, inspiration from work activities of employees to work better in order to achieve organizational goals. Motivational factors are factors that are related to what they do, namely the content of the work on the task that encourages achievement. Motivational factors are intrinsic originating in the individual or also called the content factor of work content.

C. Attitude: After the Wilcoxon Rank test, the results of the research in table 2 show the value ($\rho = 0.001$). This means that the value ($p < 0.05$) with a mean difference of 5.515 means that there is a change in the attitude of midwives in the health services of pregnant women before and after the implementation of the ammunition bija teanang na beja-beja model. The attitude is as an evaluative response. The response arises if the individual is faced with a stimulant that requires
an individual reaction. Evaluative Response means the evaluation process of an individual who gives a conclusion to a stimulus. In the form of good-bad, positive-negative, pleasant, unpleasant, which then crystallizes as a potential reaction to the object’s attitude 19.

The higher the attitude of supporting health workers, the higher the behavior of antenatal care visits. The lower the attitude of health workers who do not support the lower behavior of antenatal care visits. This is in accordance with Lawrence Green’s theory that the attitude of health workers who are reinforcing factors can influence behavior change 20.

This research still has various limitations, namely the small number of samples that have not been able to see the overall aspects related to health care for pregnant women. Activities in daily health services at auxiliary health centers and village health posts provide limited intervention and communication time when conducting research. This study only looks at how the influence of the ammuntuli bija teanang na beja-beja model on the knowledge, motivation, and cycles of maternal health services does not see the overall aspects that affect the health services of pregnant women such as environmental, social, economic and family support factors.

Conclusions and Recommendations

This study concluded that there was an influence of the midwifery on the knowledge, motivation, and attitudes of in the health services of pregnant women in Jeneponto Regency. This study suggests that the implementation of the ammuntuli bija teanang na beja-beja model is very useful to be a reference for midwives in improving health services for pregnant women in Jeneponto Regency and can be replicated in other areas according to local conditions.

Significant Statement: This research is expected to be a recommendation for the regional government (health office) to make regulations by implementing and developing models of ammuntuli bija teanang na beja-beja, which are able to improve knowledge, motivation and attitudes of midwives in implementing health services and becoming a momentum in improving effective maternal health services so that the handling of maternal mortality can take place comprehensively and sustainably.

Acknowledgments

Our thanks go to various parties, namely the Jeneponto District Health Office, Bontoramba Health Center, Bulusibatang Health Center, Bululoe Health Center, BontoMatene Health Center, Tolo Health Center, Rumbia Health Center and all informants that help this research.

Conflict of Interest: There is no any conflict of interest within this study and publication.

Ethical Clearance: This study was obtained ethical Clearance from Hasanuddin University ethics committee with number: 965/H4.8.4.5.31/PP36-KOMETIK/2017

Source of Funding: Self

REFERENCES


A Study on New Frontier of Integrative Medicine on Social Media with Special Reference to Chennai City

N. Manivannan¹, G. Mythili²

¹Associate Professor, ²Assistant Professor, Department of Commerce, VELS Institute of Science, Technology and Advanced Studies (VISTAS), Pallavaram, Chennai

ABSTRACT

The integrative medicine is sold on direct and also the indirect methods to the people. The public people are ready to bought goods and services from the organisation without taking a risk. The risk less people are choosing the social Medias recommendations, these kinds of recommendations may lead to promote the goods in to the customers hands very easily. The easiest method may followed by the way of social media. The social media convey one information about product to number people at single minutes of time. It contains the need, scope, objectives of studies and also using the tools of Chi-square test for analyzing the data. Based on the findings, appropriate suggestions have been made for increasing the number of users.

Keywords: Medicine, Customers, Media, Information, Users, Online service, product

Introduction

The dynamism of the market has been a major area of everyone’s concern. The alarming shift from just “selling the products” to “being into the customers” has given marketing a different phase from „push marketing” to more of communicating with customers. Earlier the companies were connecting with the customers through radio, television, print media, bill boards and other traditional advertising. Now with a realization that the main conviction source are our colleagues, friends and our social network, where we lend our ears and mind with a personal touch and usually get persuaded taking it as more true and honest.

At the same time, technology paved the way for new possibilities. TiVo & digital video recorders made it easy for us to bypass & ignore commercials in live T.V. MPG players helped us listen to music & podcast on demand, which similarly margin zed radio advertising, online retailer realized that they could increase dates by allowing visitors to their site to offer personal recommendation about products they were selling and of course, the social media industry was very successful. It the rise of mainstream social media has proceeds one thing. It may be for providing oneself with significant identification socially. But social media today captures a lot of unusual information about users. Sometimes that mundane information can include on experience, point view or negative, with your brand or with your Company. Today everyone can connect to their own little social circle of usually a few hundred people.

People don’t just hear about news, events, and so on from the local TV news broadcast and/or newspapers. People here about things from blogs, Twitter, articles, casual conservation. The term social media refers to the collection of technologies that capture communication, content, and so on across individuals, their friends, and their social naturals. Examples of social media include social networking sites like Facebook and Twitter, Blogging technologies like type pad and word press, crowed sourcing products like Wikipedia, Photo & video sharing sites like Flicker & You tube, & others. These technologies help users easily create content on the Internet and share it with others. Social media is the Infrastructures that helps user to become publishers of content that is interesting to them & their friends.

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Corresponding Author:
Dr. G. Mythili
Assistant Professor, Department of Commerce, VELS Institute of Science, Technology and Advanced Studies (VISTAS), Pallavaram, Chennai
Email: uvimyth84@gmail.com
Healthcare Marketing is Everywhere, Socially Speaking: A quick scroll through your Facebook newsfeed on any given day probably turns up several compelling articles about wellness and medical research. It’s become the norm to see cutting-edge health news scattered throughout our social media channels with links to new studies being shared on timelines, retweeted on Twitter, even posted on LinkedIn and Instagram. Sometimes simple wellness tips about mindfulness or exercise can take on a life of their own across the several channels, going viral and then becoming water cooler talk or the latest “have you heard about?” fodder.

Alternatives are Welcome in the Social Sphere: As a marketing channel social media clearly has an edge, but is it a good match for the growing field of integrative medicine? The answer is absolutely 100% yes.

By definition, the practitioners of integrative medicine are open to thinking outside the box, using inclusive, holistic approaches that put the patient at the center of their own care. And the personal connection from practitioner to patient on social media is instant! Posts are presented right alongside user-generated content, taking up just as much weight and visual space as posts from friends and family. In addition, integrative medicine practitioners actively listen and rarely use a one-size-fits-all approach like mainstream medicine often does, and on social media that personal touch fits right in. More than ever it’s possible to build up one-on-one trust with a patient if they see reliable, helpful information coming from your page directly to their newsfeed on a regular basis.

Positioning your practice as an authority and a resource on social media goes a long way toward building confidence in your specific brand of medicine and promotes the positive influence of integrative medicine in general. Sharing helpful posts from fellow integrative pioneers spreads the message even farther and positions you as a thought-leader in the larger conversation, so don’t be shy about the share button.

The Newsfeed: Where Patients Meet Practitioners: By inviting the patient to take charge of their own health (and at the same time empowering them with information to do so) healthcare social media is at the forefront of progressive medicine. Social media also has the benefit of directly connecting patients with specific practitioners that have the unique skill sets to promote their wellbeing.

When a client reacts to your post or shares your links, your visibility goes up exponentially, opening the door to new patients who may be looking for the specialized care that can only be found in your niche.

The Great Conversation: Social media marketing is also unique in how it brings patients and clients back into the conversation. Traditional marketing and media such as print or commercials are a one-way messaging system (pretty useless for finding out what customers are really thinking) but social media is interactive by design. And since integrative medicine practitioners prefer to encourage patients to participate in their own care, social media marketing and integrative health are perfect partners. By including the interactive streams of Facebook, Twitter, and other popular outlets in our marketing strategies, we can help keep our patients in the driver’s seat of their well being.

Advantages of Social Networking Sites:

1. Facilitates open communication, leading to enhanced information discovery and delivery.
2. Allows employees to discuss ideas, post views, ask questions and share links.
3. Provides an opportunity to widen business contacts.
4. Targets a wide audience, making it a useful and effective recruitment tool.
5. Improves business reputation and client base with minimal use of advertising.

Benefits of Social Networking Sites to Business:

1. Increased awareness of the organization.
2. Increased traffic to website.
3. Greater favorable perceptions of the brand.
4. Able to monitor conversations about the organization.
5. Able to develop targeted marketing activities.

Objectives of the Study

- To understand the real situation of healthcare product qualities
- To make a awareness about the social media in metropolitan cities
To create a real value of product at the time purchasing

**Research Design:** Descriptive Research Design

**Sampling Method:** Since the population is large in number, the researcher undertook a sample survey. Convenient sampling method has been adopted to collect data from the respondents.

**Sample Size:** 310

**Method of Data Collection:** Surveys questionnaire method and Personal Discussion.

**Scope of the Study**
- All the level of organizational performance related to the customers with the efficient manner.
- The social media attract only the educated people so, they want to promote the business into the village level of people,
- Media activities all are goes to explain the real situation and value of the product at huge level.

**Limitations of the Study**
- The study only confined to Chennai city, the city have so many kinds of living hoods.
- The integrative medicine in social media is utmost developed in the study area
- The respondents all are eagerly waited for the answering of his personal questions.

**Review of Literature**

B.V.L. Narayana (2012) shows that populations with poor formal literacy rates show equivalent or even better health indices. These target populations have better attitudes, better access and consequently better utilization of health interventions. This utilization was dependent upon, first people becoming aware of existence of health conditions and understanding their impact. On being confronted with a specific health condition, this general awareness would prime specific health seeking behaviours. The success of such behaviours was crucially dependent upon access to corresponding health interventions. Thus a sequential model of general awareness-specific awareness-attitudes access-utilisation is developed.

**Abusaleh Shariff and Geeta Singh (2007)** made an attempt to discuss the issues associated with the demand and supply of the five measures of maternity care-antenatal care, blood pressure check up, place of delivery, use of trained help at the time of delivery and postnatal care. Econometric analysis is undertaken to find out the determinants of the use of reproductive health care services among rural Indian households. The focus on the role of education, information and economic factors as determinants of health care accessibility and their utilisation is the specialty of this analysis. Analysis shows that education and information variables significantly influence health seeking behaviour and as well increase the utilisation rates for prenatal, child delivery and postnatal health care.

**Srinivasan K. and Sharan Raka (2005)** focused their attention on the various aspects of religiosity and health. It is observed by various researches that the rural population of India, is very much influenced by religious beliefs. For example cultural formation of individuals closely inter linked with performance of individual’s daily routine. The study aimed to examine the impact of religious practices and rituals as aspects of religiosity on health with specific reference to rural individuals of India.

**Framework of Analysis and Analytical Tools**

**Chi-Square Test**

**Table No. 1: Medicine Requirements Versus Monthly Income**

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<tr>
<th>O</th>
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<td>310</td>
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</table>

**CHI SQUARE**

Df: (r-1)(c-1)  (6-1)(5-1)  20.

Table value: 31.410, Calculated Value: 32.564

**Result:** Since the calculated value of Chi Square is greater than the table value of $X^2$, $H_o$ is rejected. So the Respondent medicine requirement is influenced by the monthly income.

Hence there is evidence of association between requirement and by the monthly income.

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<td>310</td>
<td>310</td>
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</table>

**CHI SQUARE**

Df: (r-1)(c-1)  (5-1)(4-1)  12.

Table value: 21.026, Calculated Value: 41.339

**Result:** Since the calculated value of Chi Square is greater than the table value of $X^2$, $H_o$ is rejected. So the respondents social media is influenced by awareness of medicine.

Hence there is evidence of association between social media respondent and awareness of medicine.
Findings

The new frontier of the integrative medicine on social media with the effect of the societal people is ready to accept the situational reasons. The people are believing the social information from the way of social media, the social media may goes to give a huge level of attraction. The attractive people are sharing the information to others only on the basis of truthfulness. The truthful people are arrange all details about the information of original data. So we make one the decision from the social media is transferred to other valuable one.

Recommendations

The number of suggestions are need to promote the medicinal value to the social people. The people taking the life style of his individual life may goes to develop the organizational performance. The social media may ready to accept the all the related suggestions from the social. The medicine is one of the important source of the ill health people, the medicine is very relative on the decease. The deceased people are required a original quality of medicine from the company. So, the company produced a original medicine for the purpose of general people.

Future of the Study: Schools of Social Work should be instrumental in training and including courses on internally displaced child populations in the curricula. By partnering with these affected populations during concurrent field work and through action research projects, many issues can be addressed and this vulnerable group empowered. There is an urgent need to obtain baseline data on internally displaced populations, especially children. This data will facilitate planning of programmes and intervention in areas of education, health, nutrition, child rights, career and for improving quality of life of children in these situations. As many more resettlement sites are planned, it is imperative that the existing services and living conditions in resettlement sites be evaluated. Lessons learnt from experiences of internally displaced child populations in resettlement areas need to be considered while planning rehabilitation and resettlement in the future.

Conclusion

There is a need for making existing services more accessible. Opportunities for service collaboration and partnership in addressing and advocating specific needs of children and their families need to be explored. It will be beneficial to create new service intervention/strategies, developing community-based approaches, sensitizing teachers/schoolmates about issues, facilitating social and supportive interactions and equipping displaced children with life skills, which will enable them, cope with demands of their life in the area of resettlement. There is also an urgent need for legal mandates, for policy and institutions to address humanitarian aspects of those affected. Greater commitment, involvement of state machinery, inter-sectoral coordination between all ministries, and adequate representation from the internally displaced themselves in rehabilitation and resettlement will aid in effectively addressing issues that concern them.

Ethical Clearance: Completed

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES


Implementation of Nutrition Education to Knowledge, Behaviour, and Performance of Junior High School Children

Nanik Suhartatik¹, Sri Handayani², Agatha Jumiati³

¹Departement of Technology and Food Industry, ²Departement of Teacher Training and Education, ³Faculty of Law, Slamet Riyadi University, Middle Java, 57136, Indonesia

ABSTRACT

The prevalence of obesity increases from year to year. One of the factors that causes obesity was food habits. Precautions need to be taken to undergo this phenomena. One effort that can be done was to provide nutrition education to children. This research studied the role of nutrition education given to school-age children (8th grade junior high school) towards knowledge, behavior, and overall performance. The study was conducted by giving pre-test and post-test to students who were divided into 2 groups. The first group treated with nutrition education, while the second group did not. Each group consisted of 37 students. The results showed that nutrition education have a strong influence in to knowledge, behaviour, and also the performance of the student. Students who are involved in research are included in the middle to lower class of economics so there are not many opportunities to choose food. Research needs to be done in other locations with middle to upper economic levels.

Keywords: nutrition education, school-age children, knowledge, healthy food

Introduction

There are 3 health problems in all countries, namely: malnutrition, obesity and chronic diseases. These problems arise mainly because of the lack of public knowledge about food habits. Today’s lifestyle is instantaneous, encouraging people to consume food without regard to nutritional adequacy. Some studies said there is an increase in the prevalence of obesity in school-age children. The value was twice greater than the previous one.¹,²,³ Obesity is a condition where body fat stored in adipose tissue is excessive.

Yaquin dan Nurhayati² said that 75% of elementary school children belong to normal weight, 8% are obese, and 2% suffer from obesity. Obesity is now categorized as a disease, no longer a symptom of disease (WHO). Meanwhile, the prevalence of obesity will increase in junior high school children reaching 5% and high school children reaching 6%.² The main factor that causes obesity is a poor diet. The prevalence of obesity in elementary school children is more influenced by the social status of parents, parental feeding that exceeds the AKG, offspring (genetic), and lack of physical activity.²

One factor that causes obesity is consumption of “fast food”.⁴ Food categories that are not provided adequately to meet consumer nutritional needs or better known as junk food. “Junk food” and instant food are part of today’s human lifestyle. This food has low nutrient compounds, high calories, unbalanced nutrition, has the potential to increase high blood pressure (due to high levels of sodium), and high cholesterol.⁵ This consumption habits will increase the risk of obesity and the diabetes epidemic.⁶ Some types of packaging are specifically designed to attract the interest of young children. These foods usually delicious, contain high sugar and fat, and low nutritional value.⁷

Such research has been carried out in some countries.⁵,⁸,⁹,¹⁰ One of the results showed that nutrition education in elementary school children has been shown to be effective in reducing consumption of “junk food” and that education carried out for girls is more effective than boys. This kind of study has never been conducted in Indonesia. Education is not only about the dangers of...
consuming “junk food” but also includes the importance of consuming milk-based foods, knowledge about nutrition, and oral health education. Pem et al. have mentioned that age factors influence the effectiveness of education, in addition to gender as well. This study aims to obtain information about the effectiveness of nutrition education in school-age children in food selection, especially for junior high school children.

**Material and Method**

This research was conducted in a junior high school in Surakarta, namely Muhammadiyah 4 Surakarta Junior High School. Educational techniques that applied to students include group discussions, asking and answering questions, group discussions, and brainstorming methods. A total of 74 students were involved in the learning session and divided into 2 groups. One group received additional knowledge (nutrition education) while the other group did not. The questionnaire was organized into 4 parts, including questions about demographic conditions, knowledge about junk food; questions about attitude, and finally about how often participants consume some junk food. Feasibility and validity test was conducted to the questionnaire before used.

Nutrition education is given once a week with a duration of between 45-90 minutes. Education material including food safety, food additive, and children nutritional adequacy. Retrieval of post-test data was conducted 1 month after giving the last material to see the effectiveness and efficiency of education. The data obtained is then processed by T test (to compare the average knowledge, attitude, and performance). Data analysis was continued by Mann Whitney, Friedman, and ANOVA tests.

**Results**

Respondents involved in this research activity was 74 students with a distribution of 25 men (33.8%) and 49 women (66.2%) between 13-15 years old. This school was dominated by students from the middle to lower economic circles, as evidenced by the amount of allowance received by each student. The first part of the questionnaire were to assess the respondent knowledge about junk food. According to the results, group with nutrition education have a significant different in answer between pre-test and post-test while the group with no treatment were still have the same answer. This part of the questionnaire aimed to identifying respondents’ knowledge of healthy, unhealthy food (junk food), and nutritional fulfillment (Table 1). Group with treatment have a different opinion about junk food after education, especially for the statement that junk food was an healthy food and some food may considered as unhealthy because of the additive inside.

The second part of the questionnaire was to examine the respondent’s behavior or response to junk food. In this section, respondents were asked to give ratings for 6 types of food or drinks that are included in the junk food category and give the reason why they choose the food. The food category were pizza, grilled meatballs, chocolate, soft drinks, energy drink, sport drink, or potato chips. A total of 29 respondents chose pizza as their favorite food during the pre-test and this number dropped to number 24 at the time of the post test. Based on the results of statistical analysis, nutritional education did not affect the selection of favorite foods or the frequency of consumption of foods belonging to junk food.

Most of the respondents chose to consume foods that are included in the junk food category because they are tasty and fast, affordable, easy to find, and because they like it, because they are served in large portions, and because the ads are interesting (Table 1). The results showed that 64.9% of respondents doesn’t consume junk food because they want to buy other people or because they are served with a relatively large portion (40.7%) or because of the influence of advertising (47.3%). Nutritional education apparently did not affect the respondents’ reasons for consuming junk food, except for questions number 3 and number 4. Between pre-test and post-test, the results were statistically different.

**Table 1: Respondents’ behavior towards the reasons for consuming junk food**

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</tr>
<tr>
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<td>Fast and tasty</td>
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<td>pre-test</td>
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<td>post test</td>
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<td>pre-test</td>
<td>14.9</td>
<td>60.8</td>
<td>0</td>
<td>24.3</td>
</tr>
<tr>
<td></td>
<td>post test</td>
<td>14.9</td>
<td>47.3</td>
<td>2.7</td>
<td>35.1</td>
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<table>
<thead>
<tr>
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<tbody>
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<td>29.7</td>
<td>55.4</td>
<td>0</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
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<td>23.0</td>
<td>60.8</td>
<td>1.4</td>
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<table>
<thead>
<tr>
<th></th>
<th>Need to be like others</th>
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<tr>
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<td>14.9</td>
<td>0</td>
<td>64.9</td>
</tr>
<tr>
<td></td>
<td>post test</td>
<td>2.7</td>
<td>12.2</td>
<td>1.4</td>
<td>70.3</td>
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<table>
<thead>
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<th>Bigger portion</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>pre-test</td>
<td>5.4</td>
<td>40.5</td>
<td>5.4</td>
<td>40.5</td>
</tr>
<tr>
<td></td>
<td>post test</td>
<td>8.1</td>
<td>35.1</td>
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<td>50.0</td>
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<table>
<thead>
<tr>
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<th>Interesting ads</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>6.8</td>
<td>31.1</td>
<td>2.7</td>
<td>47.3</td>
</tr>
<tr>
<td></td>
<td>post test</td>
<td>8.1</td>
<td>31.1</td>
<td>0</td>
<td>47.3</td>
</tr>
</tbody>
</table>

**Description:** Based on statistical analysis, 7 questions stated in this part of the questionnaire are valid with moderate reliability.

Based on the results of a nutrition education survey, 8.1% of respondents stated strongly agree and 33.8% agreed that consuming junk food would affect the mood. However, the number of respondents who stated that they did not or strongly disagree with this was also relatively the same, 39.2% and 12.2%, respectively. Each of these numbers has increased after being given nutrition education. Five students expressed doubt during the pre-test and this number changed to 0 (zero) during the post-test. Group with nutrition education have change their mind about junk food. Especially for the reason that junk food have an affordable price and also because they want to be like someone when they consume junk food.

The third part of the question was about how often respondents eats certain foods or drinks (Table 2 and 3). The types of food or beverages that were asked about included fruit-flavored drinks, energy drinks, sweetened water, sports drinks, ice cream, soft drinks, and so on. For types of food, which are asked including fast food (Pizza Hut, McDonalds, Popeye, Olive, Fried Chicken, etc.), potato/corn chips, sweet (chocolate, candy, cupcakes), fresh fruit, vegetables, biscuits and instant noodles. The results showed that between the post-test and pre-test. Consumption frequency for drink category gave a significant difference between pre and post test only for energy drinks.

### Table 2: Consumption frequency for drink category

<table>
<thead>
<tr>
<th>Drinks</th>
<th>Compsumption frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily</td>
</tr>
<tr>
<td>Fruity drinks</td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>15</td>
</tr>
<tr>
<td>Post test</td>
<td>17</td>
</tr>
<tr>
<td>Energy drink</td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>1</td>
</tr>
<tr>
<td>Post test</td>
<td>4</td>
</tr>
</tbody>
</table>
Sweetened can/bottle drinks

<table>
<thead>
<tr>
<th></th>
<th>Pre-test</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
<td>7</td>
<td>23</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>Post test</td>
<td>17</td>
<td>15</td>
<td>20</td>
<td>21</td>
<td>0</td>
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</tbody>
</table>

Sports drink

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>5</td>
<td>10</td>
<td>35</td>
<td>23</td>
</tr>
<tr>
<td>Post test</td>
<td>2</td>
<td>10</td>
<td>15</td>
<td>22</td>
<td>25</td>
</tr>
</tbody>
</table>

Ice cream

<table>
<thead>
<tr>
<th></th>
<th>Pre-test</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7</td>
<td>11</td>
<td>17</td>
<td>35</td>
<td>4</td>
</tr>
<tr>
<td>Post test</td>
<td>6</td>
<td>6</td>
<td>29</td>
<td>27</td>
<td>6</td>
</tr>
</tbody>
</table>

Carbonated drinks

<table>
<thead>
<tr>
<th></th>
<th>Pre-test</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td>13</td>
<td>37</td>
<td>15</td>
</tr>
<tr>
<td>Post test</td>
<td>6</td>
<td>5</td>
<td>17</td>
<td>32</td>
<td>14</td>
</tr>
</tbody>
</table>

During the pre test, respondents had a high tendency to consume energy drinks, but at the post-test this trend had decreased. This shows that nutrition education is said to have succeeded in changing the level of consumption of drinks classified as energy drinks. Other types of drinks were not statistically different between pre- and post test.

The types of food that are frequently consumed are fresh fruit, vegetables, and biscuits. These three types of food are consumed almost every day by most respondents. For biscuits, it is relatively varied because there are some respondents who also consume it infrequently. Three other types of food such as fast food, potato/corn chips, and sweet foods are included in the category of foods that are rarely consumed, starting from once a week to rare. Nutrition education did not affect to the respondent’s preference for various types of

**Table 3: Food/snack consumption frequency**

<table>
<thead>
<tr>
<th>Drinks</th>
<th>Respondent consuming frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily</td>
</tr>
<tr>
<td>Fast food</td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>3</td>
</tr>
<tr>
<td>Post test</td>
<td>7</td>
</tr>
<tr>
<td>Tortilla/potato chips</td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>9</td>
</tr>
<tr>
<td>Post test</td>
<td>14</td>
</tr>
<tr>
<td>Sweet food</td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>15</td>
</tr>
<tr>
<td>Post test</td>
<td>17</td>
</tr>
<tr>
<td>Fresh Fruits</td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>33</td>
</tr>
<tr>
<td>Post test</td>
<td>33</td>
</tr>
<tr>
<td>Vegetable</td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>41</td>
</tr>
<tr>
<td>Post test</td>
<td>39</td>
</tr>
<tr>
<td>Biscuit</td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>21</td>
</tr>
<tr>
<td>Post test</td>
<td>21</td>
</tr>
</tbody>
</table>
food but most of respondent where decided to read the nutritional value from food label before buying the food. The category of drinks that are considered as invalid in this test and deleted from the list was tap water, while for the food category, the invalid ones was instant noodles.

**Findings**

Demographic condition were strongly influence the effect of the nutrition education to knowledge, behavior, and the performance of the student. The research was conducted at Muhammadiyah 4 Middle School in Surakarta that are dominated from the middle to lower economic classes and low academic abilities. In general, there are evidence that urban people prefer to send the children at an international junior high school or state junior high school. The school accommodates students in poor condition or even orphaned.

It was found that there were several types of food and beverage preferences which declined after going through nutritional education. Providing nutrition education needs to be done for children of lower age and better education techniques.10 The type of drink that is often consumed is a fruity beverage and the sweet one. Fruity drinks are often consumed compared to other types of drinks, ranging from daily to 1-4 times a week. Beverages that are rarely to infrequently consumed include energy drinks, sports drinks, ice cream, and soft drinks. In general, it can be seen that respondents who are between the ages of 13-15 years have known that these types of drinks should be consumed if needed. Pem et al. 12 also reported that nutrition knowledge to adults increase their willingness to consume more fruits and vegetable and reduce snack in the future.

Considering the reason the willingness of student to consume junk food, some recommendations must be done, including reducing the number of junk food ads during children program, health messages in junk food label or ads, increasing the awareness of the children to the health effect of junk food, highest standard for nutritious food, promoting the healthier food, and etc5.

**Conclusion**

Based on the results of research conducted at Muhammadiyah 4 Middle School in Surakarta, it was concluded that nutrition education had an effect on respondents’ knowledge, behavior, point of view, and habits. Nutrition education could change the respondent perception to some food, especially energy drink and sport drink. The reason why respondent chose some food was just because of fast and tasty, affordable price, lovely, easy to find and serve, and serve in bigger portion. Most of the respondents came from middle to lower economic circles, so they had relatively little allowance. The limitations make the respondent have not many choices to buy food. Supported by a school environment in suburban areas and away from crowds or food distributors. Implementation of nutrition education should be studied in different demographic environment.

**Conflict of Interest:** There was no conflict of interest between the author and the peer reviewer and with the editor.

**Source of Funding:** The author would also special thanks to founder, Slamet Riyadi University of Surakarta, Indonesia and the Head of Junior High School of Muhammadiyah 4, Surakarta, which allow us to do research in their school.

**Ethical Clearance:** The ethical clearance taken from dr. Oen’s hospital committee.

**REFERENCES**


IL-18 -137G/C (rs187238) Gene Polymorphisms in Pulmonary Tuberculosis Iraqi Arab Patients

Nawal Mohammed Utba

Department of Biology, College of Science, University of Baghdad, Al-Jaderia, Baghdad, Iraq

ABSTRAcT

Tuberculosis (TB) primarily caused by Mycobacterium tuberculosis and remains a worldwide problem despite well documented, well publicised methods of prevention and cure. 80 pulmonary tuberculosis (PTB) patients without HIV infection were included in this study. Patients were divided into three groups; 40 MDR (multidrug resistant), 20 RD (Recently diagnosed) and 20 OC (Old cases). While the others 89 apparently healthy subjects (control group, (HC)). IL-18 serum level was assessed by using ELISA technique. However, polymorphism was analyzed using polymerase chain reaction-single specific primer (PCR-SSP), at the position -137 G/C (rs187238) in the promoter of IL18 gene. The median serum level of IL-18 for all patient groups was significantly higher than HC group. Comparing PTB patient groups to HC group revealed that none of genotypes or alleles showed significant differences between patients groups and HC group. The results are indicated that IL-18-137 alleles and genotypes showed no association with the risk of PTB development in Iraqi Arab population or protection against it.

Keywords: pulmonary tuberculosis, Multidrug resistance drug, IL18 gene polymorphism, ELISA, Iraq

Introduction

Tuberculosis primarily caused by Mycobacterium tuberculosis (MTB), continues to be one of the most important infectious causes of death and is a serious public health problem that has caused 1.6 million deaths every year over the world, especially in Asian and Africa. In Iraq, WHO reported that the incidence rate of TB was 42 per 100 000 populations in 2017. However, only 10% of people infected with MTB may develop into clinical disease, which indicates that some factors can devote to the pathogenesis of tuberculosis, including host immune response and gene environment interactions.

Many proinflammatory cytokines such as IL-1 family cytokines have been described to be elevated in response to infection with MTB. This family includes IL-18. IL-18 plays immunoregulatory role via the induction of IFN-γ which exerts changes in a variety of cell types. Elevations of IFN-γ have been found in the affected lung and bloodstream of patients with PTB. IFN-γ has been shown to be an important mediator of macrophage activation involved in controlling MTB. IL-18 promoter gene polymorphisms have been associated with various inflammatory diseases, and the functional significance of the SNP at position −137 is attributed to the higher transcription and protein production of IL-18. In order to investigate the possible role of IL18-137 SNP in PTB Iraqi patients, the genetic polymorphisms of IL-18 gene were evaluated and its impact on the serum levels in Iraqi PTB patients was investigated.

Materials and Method

Study subjects and Blood Samples Collection: A total of 169 individuals were included in this study, 80 individuals of them had PTB without HIV infection (patients group); they were referred for diagnosis and treatment to the National Reference laboratory of tuberculosis in Baghdad during the period from January 2017 – April 2017. Patients were divided into three groups; 40 MDR (multidrug resistant), 20 RD (Recently
diagnosed) and 20 OC (Old cases); their age range 12-76 years. While the others 89 apparently healthy Iraqi Arab subjects (control group (HC)), their age range, gender and ethnicity similar with patients group. All participants gave informed consent prior to participating in the research, which was approved by the local ethics committee at National Reference laboratory of tuberculosis in accordance with the Helsinki Declaration. A venous blood samples were collected from patients and control groups, and it was divided into two tubes; the first whole blood sample was dispense in an EDTA-tube, this blood was mixed gently then stored placed in the freezer at (-20°C) until further processing for DNA extraction. The second tube used for serum collecting by centrifuge at (3000 rpm) for 10 min.

Assessment of Interleukin-18 serum levels: Serum samples were collected from all the subjects and assessed for the level of IL-18 using Human IL-18 Enzyme linked immunosorbant assay (ELISA) kit (MyBiosorce, USA) according to the manufacturer’s instructions.

Detection of IL18 -137 G/C: DNA extracted by using the Wizard® Genomic DNA Purification Kit (Promega/USA) and the polymorphisms were analyzed using PCR-SSP, at the position -137 G/C (rs187238) in the promoter of IL18 gene according to9 with minor modifications. Reactions were carried out in a Bio-Rad PCR thermal cycler/USA. PCR reaction was performed with a final volume of 20µl consisting of 5 µl of 10ng DNA template, 1 µl of each of the reverse primer and sequence-specific forward primers, and 12µl of Nuclease - free water in Accupower® PCR PreMix tube; this tube contains DNA polymerase, dNTPs, a tracking dye and reaction buffer in a premixed format. IL18 -137 a common reverse primer 5’-AGGAGGGCAAAATGCACTGG-3’ and two sequence-specific forward primers 5’-CCCCAACTTTTACGGAAGAAAG-3’ and 5’-CCCCAACTTTTACGGAAGAAAAAC-3’ were used. An amplification product of 261 bp was detected. Reaction conditions consisted of initial denaturation at 94 °C for 2 min followed by 5 cycles of denaturation at 94 °C for 20 sec., and annealing at 68 °C for 1 min. then 25 cycles of denaturation at 94 °C for 20 sec., annealing at 62 °C for 40 sec. and extension at 72 °C at 40sec. lastly final extension at 72°C at 5 min. PCR products were visualized by 2% agarose gel electrophoresis stained by ethidium bromide.

Statistical Analysis

All statistical analysis was performed using statistical package for social science program version 17 for windows (SPSS INC., Chicago IL, USA). Results were expressed as median. Comparisons between groups were performed using mann whitney u test and kruskal-Wallis test for categorical data. P value of <0.05 were considered to indicate statistical significance.

Genotypes of IL18 -137 were presented as frequencies percentage, and significant differences between their distributions in PTB and HC were assessed by two-tailed Fisher’s exact probability (P). Also, odds ratio (OR), etiological fraction (EF) and preventive fraction (PF) were calculated to define the association between a genotype with the disease. These estimations were calculated by using the WINPEPI computer programs free online at http://www.brixtonhealth.com for epidemiologists.

Allele frequencies of IL18 -137 gene were estimated by direct gene counting methods, however, a significant departure from Hardy-Weinberg (H-W) equilibrium was calculated using H-W calculator for two alleles, which is available free online at http://www.had2know.com/academics/hardy-weinbergequilibrium-calculator-3-alleles.html. Significant differences between the expected and observed frequencies are assessed by Pearson’s Chi-square test.

Results and Discussion

Serum levels of IL-18: The median of IL-18 serum levels in PTB patient groups was 306.7 pg/ml with range from 133.7- 498.0 pg/ml in MDR, 310.9 pg/ml with the range of 134.1-488.5 pg/ml in RD and 280.5 pg/ml with the range of 104.2-493.0 pg/ml in OC. II-18 serum level was significantly higher in all patient groups than HC group (225.9 pg/ml with range from 40.5-453.2 pg/ml).

When the IL-18 serum level distributed according to gender, its median level in MDR, RD and OC groups were insignificant difference between males and females. While in HC males were significantly higher than females (Table 1).
A functional cytokine network is a central element in the homeostasis of the immune response and its alteration may lead to an abnormal immune response. Additionally, different pathological and infectious situations may alter the cytokine network, and further complicate the pathological events. Hence, studies have focused upon genes regulating the cytokine expression; in particular on gene polymorphisms that may influence the levels of expression and therefore the overall immune response.  

The results of this study was corroborates with results, they found that significantly higher levels of serum IL-18 in patients with PTB than in HC subjects and there was no significant difference in circulating IL-18 between the sexes in patients with PTB in Japan. Also with who found that there was significantly difference in the levels of serum IL-18 in patients with PTB than in HC subjects in Saudi Arabia. And with who found that In China, IL-18 is higher in MDR-TB than in HC, as well as with who reported that patients with more advanced pulmonary involvement, revealed significantly higher level for IL-18.  

**Table 1: The median of IL-18 serum levels in study groups**

<table>
<thead>
<tr>
<th>Subject Gender</th>
<th>Median IL-18 serum levels (pg/ml) in MDR group</th>
<th>Median IL-18 serum levels (pg/ml) in RD group</th>
<th>Median IL-18 serum levels (pg/ml) in OC group</th>
<th>Median IL-18 serum levels (pg/ml) in HC group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>306.7</td>
<td>310.9</td>
<td>280.5</td>
<td>225.9</td>
</tr>
<tr>
<td>Male</td>
<td>305.2</td>
<td>300.6</td>
<td>298.1</td>
<td>230.9</td>
</tr>
<tr>
<td>Female</td>
<td>316.3</td>
<td>321.3</td>
<td>268.3</td>
<td>121.5</td>
</tr>
<tr>
<td>P value</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>0.0004 S</td>
</tr>
</tbody>
</table>

S: significant difference P < 0.05, NS: non significant

**Table 2: Statistical evaluations of associations between IL-18 -137 genotypes or allele and MDR group**

<table>
<thead>
<tr>
<th>IL18-137 Genotypes or Allele</th>
<th>MDR (N:40)</th>
<th>Controls (N:89)</th>
<th>OR</th>
<th>Etiological or Preventive Fraction</th>
<th>Fishers Exact Probability</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genotypes</td>
<td>N %</td>
<td>N %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GG</td>
<td>25 62.5</td>
<td>57 64</td>
<td>0.94</td>
<td>0.04</td>
<td>1</td>
<td>0.44 to 2.01</td>
</tr>
<tr>
<td>GC</td>
<td>13 32.5</td>
<td>26 29</td>
<td>1.17</td>
<td>0.04</td>
<td>0.836</td>
<td>0.53 to 2.59</td>
</tr>
<tr>
<td>CC</td>
<td>2 5</td>
<td>6 7</td>
<td>0.73</td>
<td>0.018</td>
<td>1</td>
<td>0.14 to 3.71</td>
</tr>
<tr>
<td>Alleles</td>
<td>80 178</td>
<td>140 78.7</td>
<td>1.01</td>
<td>0.005</td>
<td>1</td>
<td>0.53 to 1.91</td>
</tr>
<tr>
<td>G</td>
<td>63 78.75</td>
<td>140 78.7</td>
<td>1.01</td>
<td>0.005</td>
<td>1</td>
<td>0.53 to 1.91</td>
</tr>
<tr>
<td>C</td>
<td>17 21.25</td>
<td>38 21.3</td>
<td>0.99</td>
<td>0.001</td>
<td>1</td>
<td>0.52 to 1.89</td>
</tr>
</tbody>
</table>

OR= odds ratio; 95%CI = 95% confidence interval.
Table 3: Statistical evaluations of associations between IL-18 -137 genotypes or allele and RD group

<table>
<thead>
<tr>
<th>Genotypes/Allele</th>
<th>RD (N:20)</th>
<th>Controls (N:89)</th>
<th>OR</th>
<th>Etiological or Preventive Fraction</th>
<th>Fishers Exact Probability</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genotypes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GG</td>
<td>14</td>
<td>70</td>
<td>57</td>
<td>64</td>
<td>1.31</td>
<td>0.16</td>
</tr>
<tr>
<td>GC</td>
<td>4</td>
<td>20</td>
<td>26</td>
<td>29</td>
<td>0.61</td>
<td>0.11</td>
</tr>
<tr>
<td>CC</td>
<td>2</td>
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<td>6</td>
<td>7</td>
<td>1.54</td>
<td>0.035</td>
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<tr>
<td>Alleles</td>
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<td>-178</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>G</td>
<td>32</td>
<td>80</td>
<td>140</td>
<td>78.7</td>
<td>1.09</td>
<td>0.06</td>
</tr>
<tr>
<td>C</td>
<td>8</td>
<td>20</td>
<td>38</td>
<td>21.3</td>
<td>0.92</td>
<td>0.017</td>
</tr>
</tbody>
</table>

The results of present study agreed with\(^4\) who reported that Allele, genotype and haplotype frequencies did not differ significantly between HC and patients. The results suggest that the \(IL18\) gene promoter polymorphisms are not associated with susceptibility or resistance to PTB in south Indian population of Dravidian descent. But it’s not agree with\(^15\) who reported that with respect to the IL-18 gene polymorphisms, at -137 G>C variant, GG genotype was positively associated with tuberculosis in PTB patients with co-morbid diabetes mellitus. As well as In China, \(^16\)found that Polymorphism of the IL-18 gene promoter at position -137 is a potential host-susceptibility factor in tuberculosis in Chongqing. The people with allele C at that position may be protected against MTB infection.

IL-18-137 genotypes impact on IL-18 serum levels: For advance understanding of cytokines gene polymorphisms role in PTB patients, the impact of IL-18-137 gene polymorphism on its serum level was evaluated in patients and HC groups, because\(^17\) reported that it has been well documented that cytokines gene polymorphism have a functional importance and might be associated with high or low production of the corresponding cytokines.

The impact of \(IL18\)-137 gene polymorphism on its serum level was determined in patients and HC groups (Table-5). In patient groups, GG genotype showed the highest level (309.9 pg/ml) followed by genotype GC with 311.2 pg/ml and CC with 265.3 pg/ml. however, in HC, the GC genotype showed highest level (233.3 pg/ml) followed by GG genotype with 225.9 pg/ml then CC genotype with 136 pg/ml, and the IL-18 serum levels revealed significant variations (\(p<0.05\)) between HC genotypes. While there were no significant variations between the three IL-18-137 genotypes in PTB patients groups.

Table 5: Serum level of IL-18 in PTB patient and HC groups distributed by IL-18 -137 genotypes

<table>
<thead>
<tr>
<th>IL-18 -137 genotypes</th>
<th>TB P groups</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>GG</td>
<td>309.9</td>
<td>225.9*</td>
</tr>
<tr>
<td>GC</td>
<td>311.2</td>
<td>233.3*</td>
</tr>
<tr>
<td>CC</td>
<td>265.3</td>
<td>136*</td>
</tr>
</tbody>
</table>

*Significant differences (\(P<0.05\)) in IL-18 serum levels between GG GC and CC genotypes in control group.
The results of this study was not compatible with who found that Isolated PBMCs with IL-18 -137GC/CC genotype were able to produce a higher level of IL-18 than those with IL-18 -137GG genotype, either spontaneously or in response to PM acetate plus calcimycin A23187.

Cytokine gene polymorphisms may change the structure and biological function of a certain cytokine coded by the defective gene leading to either increase or decrease of cytokine production. The inheritance of SNP may render people more susceptible or resistant to a certain diseases, therefore affecting cytokine secretion levels, and eventually may influence the progression of tumor.

Conclusion

The results are indicated that IL-18-137 alleles and genotypes showed no association with the risk of pulmonary tuberculosis development in Iraqi Arab population or protection against it, and the recorded OR, EF and PF values are in favor of such conclusion. Other studies for cytokines gene expression and polymorphisms will be required for this disease.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: Not required.

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2. WHO report. TB burden estimates and country-reported TB data. 2018.


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Risk Factors Related to Diabetes Mellitus

Noor Diani¹, Dhian Ririn Lestari²
¹Lecturer, Department of Medical Surgical Nursing, ²Lecturer, Department of Mental Nursing, Nursing School, Faculty of Medicine, Lambung Mangkurat University

ABSTRACT

The efforts to control diabetes mellitus are carried out by improving the management of the main risk factors for diabetes mellitus in primary health care facilities and community empowerment. Activities carried out in this study, data collection in the form of primary data was carried out by filling out questionnaires about risk factors related to diabetes mellitus which consisted of 13 items of questions which included risk factors for gender, age, genetics/heredity, obesity/BMI, diet, pattern of exercise/activity, smoking, hypertension and stress. Sampling technique is done by non probability sampling method through purposive sampling. The results showed a mean age of 54.34 years. The lowest age of respondents was 34 years and the highest age of respondents was 70 years, male sex 26% and female 74%, had a family history of diabetes mellitus 58%, respondents who had a pattern of eating/drinking were sweet 90%, had sports activities 58%, has a normal body mass index of 56% and who has a body weight of more than 30% and obesity 6%, has a smoking habit of 16%, has a history of hypertension 54%, has stress in life 30%. These factors will reduce the occurrence of diabetes mellitus and keep blood sugar levels stable.

Keywords: diabetes mellitus, risk factor, primary health care facilities, community empowerment

Introduction

Diabetes mellitus is a metabolic disease which has a collection of symptoms since an increase of blood glucose levels above normal values (hyperglycemia). It is because decreasing in the body’s ability to react with insulin, impaired insulin secretion, or both.¹,²,³ There is an increasing prevalence of diabetes mellitus throughout the world related to the increasing population, increasing life expectancy, urbanization that changes traditional lifestyle into a modern lifestyle, the prevalence of obesity increases, and physical activity are lacking.

Efforts to control diabetes mellitus are implemented by improving the management of the main risk factors for diabetes mellitus in primary health care facilities and community empowerment.⁴ Those efforts will be effective and efficient if we can identify specific diabetes risk factors that are specific to the diamond mining community in South Kalimantan that is Cempaka sub-district in Banjarbaru. Health problems in the mining area are important to know in South Kalimantan.

Specific risk factors possessed by people with diabetes mellitus in the Cempaka Village need to be identified and analyzed as base developing preventive efforts for diabetes mellitus in the community in the Cempaka Village area. There was no research has been conducted on the analysis of risk factors associated with diabetes mellitus in the community of Cempaka Village. Based on the phenomena and results of previous studies, researchers are interested to conduct research on the analysis of risk factors associated with diabetes mellitus in the community of Cempaka Village.

Method

The research method used is research carried out on a set of objects that usually aim to see a picture of the phenomena that occur within a particular population.⁵ This study describes the risk factors associated with the incidence of diabetes mellitus.
The population in this study were all patients with diabetes mellitus in the Cempaka village. Sampling is done by non-probability sampling method through purposive sampling where this technique is used to select samples between populations according to what the researcher wants (goals/problems in the study) so that the sample can represent the characteristics of the population.5

Data collection in the form of primary data was taken on by filling out questionnaires about risk factors related to diabetes mellitus which consisted of 13 items of questions which included risk factors for gender, age, genetics/heredity, obesity/BMI, diet, exercise/activity patterns, smoking, hypertension, and stress.

Result & Discussion

The result of this research are:

Table 1: Characteristics of Respondent

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean</th>
<th>Min-Maks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>57.64 kg</td>
<td>39 – 85 kg</td>
</tr>
<tr>
<td>Height</td>
<td>155.42 cm</td>
<td>143 – 170 cm</td>
</tr>
<tr>
<td>BMI</td>
<td>23.84</td>
<td>15.6 – 33.3</td>
</tr>
<tr>
<td>Respiration Rate</td>
<td>20.44 times/ menit</td>
<td>15 – 25 times/ menit</td>
</tr>
<tr>
<td>Pulse</td>
<td>84.02 times/ menit</td>
<td>64 – 100 times/ menit</td>
</tr>
<tr>
<td>Temperature</td>
<td>36.76ºC</td>
<td>36.0 – 38.0ºC</td>
</tr>
<tr>
<td>Random Plasma Glucose (RPG)</td>
<td>228.26 mg/dl</td>
<td>109-575 mg/dl</td>
</tr>
<tr>
<td>Duration of Illness</td>
<td>3.95 years</td>
<td>0-21 years</td>
</tr>
</tbody>
</table>

Age Risk Factors in Diabetes Mellitus

Table 2: Distribution of Age Factors of Respondents

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Min-Maks</th>
<th>Deviation Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Year)</td>
<td>54.34</td>
<td>34-70</td>
<td>6.787</td>
</tr>
</tbody>
</table>

Based on the analysis of patients with diabetes mellitus, it is known that the average age is 54.34 years. The lowest age of respondents was 34 years and the highest age of respondents was 70 years with a standard deviation of 6.787 years. Age affects the risk and incidence of diabetes mellitus where according to Sudoyo, ages that have reached more than 30 years will experience anatomical, physiological and biochemical changes.6 Then blood glucose levels will rise 1-2 mg/dL/year when fasting and will rise 5, 6-13 mg/dL/year at 2 hours after meals. In middle adulthood various behaviors that often affect health such as nutrition, smoking and physical activity that causes obesity so this behavior increases the risk of developing diabetes.

Table 3: Distribution of Risk Factors

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Frequency (n = 50)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>13</td>
<td>26 %</td>
</tr>
<tr>
<td>Female</td>
<td>37</td>
<td>74 %</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family History of Diabetes Mellitus</th>
<th>Frequency (n = 50)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>29</td>
<td>58%</td>
</tr>
<tr>
<td>No</td>
<td>21</td>
<td>42%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics of Respondents</th>
<th>Frequency (n = 50)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>45</td>
<td>90%</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Frequency (n = 50)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With Physical Exercise</td>
<td>29</td>
<td>58%</td>
</tr>
<tr>
<td>Without Physical Exercise</td>
<td>21</td>
<td>42%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Body Mass Index</th>
<th>Frequency (n = 50)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less Weight</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td>Normal</td>
<td>28</td>
<td>56%</td>
</tr>
<tr>
<td>Over Weight</td>
<td>15</td>
<td>30%</td>
</tr>
<tr>
<td>Obesity</td>
<td>3</td>
<td>6%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Smoking Habit</th>
<th>Frequency (n = 50)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>8</td>
<td>16%</td>
</tr>
<tr>
<td>Not Smoking</td>
<td>42</td>
<td>84%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypertension</th>
<th>Frequency (n = 50)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Hypertension</td>
<td>27</td>
<td>54%</td>
</tr>
<tr>
<td>Without Hypertension</td>
<td>23</td>
<td>46%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>
Gender Risk Factors in Diabetes Mellitus: The results of the data analyst respondents in table 3 were 26% male and 74% female sex. Where women suffer from diabetes mellitus more than men. This study is the same as the results of research conducted by Isnaini which shows that sex frequency tends to be greater in women compared to men.7

This research is in accordance with the research conducted by Trisnawati which shows that the number of respondents is female more than male respondents.8 In the study conducted by Samodra also showed the same results namely more respondents were female than male respondents.9 According to Irawan, women are more at risk of developing diabetes because physically women have a greater chance of increasing their body mass index. Post-menopausal monthly cycle (premenstrual syndrome) syndrome that makes the distribution of body fat easily accumulated due to the hormonal process so that women are at risk of developing diabetes mellitus.10

Genetic or Hereditary Risk Factors in Diabetes Mellitus: The results of the analysis of the data seen in table 3, found that those who had a family history of diabetes mellitus were 58% and those without a history of diabetes mellitus were 42%. Other factors that contribute greatly to the prevalence of diabetes mellitus are hereditary or genetic factors. People who have a family history of diabetes mellitus are more at risk than people who have no history of diabetes mellitus.

This is similar to previous studies that showed the occurrence of type II diabetes mellitus would increase two to six times if parents or siblings experience this disease, the risk for type II diabetes in identical twins is 75-90%, which indicates that the factor genetic (hereditary) role in the incidence of diabetes mellitus in a person.11

Risk Factors for Diet in Diabetes Mellitus: The respondent’s data are found in table 3 which has a sweet food/drink consumption pattern of 90% and those who do not consume sweet foods/drinks 10%.

It can be seen that people with diabetes mellitus have a diet that likes sweet foods and drinks as the consumption of sweet and fatty foods is significantly associated with the incidence of diabetes mellitus. This is in accordance with the research conducted by Wicaksono who reported that the habit of consuming sweet foods has a two-fold risk of developing diabetes mellitus and makes blood sugar levels tripled three times.12

Risk Factors for Physical Activity in Diabetes Mellitus: In this study data (Table 3) obtained respondents who have sports activity 58% and those who do not exercise 42%. In contrast to the research conducted by Dolongseda who got the results that the pattern of physical activity in patients with diabetes mellitus was the respondent with a mild activity pattern of 96.0% and moderate activity patterns of 4.0%.13

It is found that many people with diabetes mellitus who do physical activities have very good conditions. This is because exercise plays a role in regulating blood glucose levels. The main problem in diabetes mellitus is a lack of response to insulin (insulin resistance) so that glucose cannot enter the cell. Membrane permeability to glucose increases when muscles contract because muscle contraction has insulin-like properties. Therefore, during physical activities such as exercise, insulin resistance decreases. Physical activity in the form of exercise is useful as blood sugar control and weight loss in diabetes mellitus.14

Risk Factors for Obesity in Diabetes Mellitus: The results of the data analysis of respondents (Table 3) who have a Normal Body Mass Index of 56%, and those who weigh more than 30%, and are obese 6%. According to Sari, the cause of diabetes mellitus is the lack of production and availability of insulin in the body or the occurrence of impaired insulin function, which is actually enough. Insulin deficiency is caused by damage to a small part or most beta cells of Langerhans Island in the pancreas gland which functions to produce insulin. That being because of hereditary factors, viruses and bacteria, toxic substances, and excessive weight nutrition (obesity) that can cause diabetes mellitus due to insulin, those who want to spread into cells are blocked as a result of sugar accumulating.15

This study nearly 56% of respondents possessed Normal BMI, this could be because the ones related to the physical activity carried out by people with diabetes
mellitus have an effect on maintaining BMI in people with diabetes mellitus.

Based on the interviews with patients of diabetes mellitus, they initially had obese weight but when they suffered from diabetes mellitus they lost weight. This is in accordance with the signs of diabetes mellitus, namely weight loss.

**Risk Factors for Smoking in Diabetes Mellitus:** The results of the data analysis of respondents (Table 3) who had a 16% smoking habit and who did not have a smoking habit were 84%. Where all who smoke are men. Smoking is known as a risk factor for coronary heart disease. However, after years, data collection research shows that smokers who smoke for a long time/chronic have a higher risk of developing insulin resistance. In diabetic patients, it is known that smoking exacerbates metabolic control. It can be proved that a larger dose of insulin is needed for the same metabolic control in nonsmokers in diabetic patients.16

**Risk Factors for Hypertension in Diabetes Mellitus:** Based on the respondent’s data analysts (Table 3), who have a history of hypertension are 54% and those without a history of hypertension are 46%. This is similar to previous studies with 54 subjects with diabetes mellitus. It is known that 66.6% of subjects suffer from hypertension, and the rest 33.4% of subjects have normal blood pressure, people with diabetes mellitus have hypertension.17

Many studies have found an association between increased hypertension in patients with diabetes mellitus. People who suffer from diabetes mellitus, especially type 2, have a risk of 2 to 4 times more susceptible to death due to cardiovascular disorders than people who do not suffer from diabetes mellitus and hypertension occur 2 times more vulnerable in patients with diabetes mellitus than non-diabetes mellitus in the same age group. In addition, diabetic patients accompanied by hypertension increase the risk of coronary heart disease, stroke, nephropathy, and retinopathy. In fact, diabetes accompanied by hypertension increases by 75% of morbidity and mortality in people who already have previous risk factors.18

**Risk Factors for Stress in Diabetes Mellitus:** Data of respondents (Table 3) who have stress in their lives are 30% and those who do not have stress in their lives are 70%. In patients with diabetes mellitus when interviewed, they said that they often think about the disease, so that they feel disturbed according to where various reactions arise after patients know that they have diabetes, ranging from feelings of fear, anxiety, stress, depression, anger, and even rebellion.19

People with diabetes mellitus have a high level of stress and anxiety, which is associated with treatment that must be followed and the occurrence of serious complications. The stress experienced by sufferers is related to therapeutic or therapeutic regimens that must be undertaken such as diet or eating arrangements, control of blood sugar, consumption of drugs, exercise and other things that must be done throughout his life. In addition, the risk of complications of the disease that can be experienced by the sufferer will also increase stress on the sufferer, which disturbs his quality of life.20

In diabetics, quality of life is the main goal of care, as much as possible good quality of life must be maintained in people with diabetes mellitus. It is because low quality of life and psychological problems can worsen metabolic disorders, either directly through hormonal stress or indirectly through complications.21

**Conclusion and Recommendation**

There are still many people who are not aware of the risk factors for the disease to maintain blood sugar stability for people with diabetes mellitus.

The need for public education is related to the factors that influence the disease and the incidence of diabetes mellitus so that people have a healthy quality of life.

**Acknowledgments**

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REFERENCES


Association of Hunting Behavior and Malaria Incidence: A Cross Sectional Study on Nuaulu Tribe Community in Mesoendemic Area of Malaria

Nur Baharia Marasabessy1,2, Oedojo Soedirham2, Yoes Prijatna Dachlan3
1Polytechnic of Health, Ministry of Health Maluku Province, Indonesia; 2Department of Health Promotion and Behavioral Sciences Faculty of Public Health, 3Faculty of Medicine, Universitas Airlangga, Indonesia

ABSTRACT

Background: The Nuaulu tribe is one of the indigenous tribes in Maluku Province, Indonesia which becomes the area of malaria endemics. This tribe still adheres to the customs and habits of its ancestors, one of which is hunting. It is carried out to fulfill the needs of life and the implementation of traditional rituals performed from afternoon to morning or days in the forest, depending on the obtained sustenance. The hunting location in a forest that is far from the residential area. Hunters are often exposed to mosquitoes from entering the forest to returning home.

Objective: this study aims to reveal the profile of TNF-α and IL-10 related to hunting habits in tribal community in malaria mesoendemic area.

Method: Cross sectional study was conducted in Sepa Village, Indonesia during July-August 2019. Each subject was asked to complete a questionnaire asking about demographic and the desired study factor. Laboratory evaluations used thick and thin blood films were prepared from venous blood, stained with Giemsa stain, and examined by two microscopists for detection of malarial parasites and parasite species. Inclusion criteria were being aged 18 years ≥ n ≤60 years, being a resident of Sepa Village and being willing to participate in the study. A total of 84 subjects were included in this study.

Result: 40 subjects were with hunting activities and 44 were not. Only three subjects (3,6%) were positive malaria. We found no significant association (p=0,243) between hunting behavior and malaria incidence, even no malaria sufferers in subjects with hunting behavior. We found significant association (p=0,000) between hunting behavior and gender.

Conclusion: our study showed that hunting behavior did not cause malaria incidence in the Nuaulu Tribe community. Malaria sufferers were only found in non-hunting groups.

Keywords: hunting behavior, malaria incidence, Nuaulu, tribe

Introduction

Malaria is caused by protozoa of the genus Plasmodium and is responsible for high levels of morbidity which has a serious impact on socio-economic development in endemic areas. Plasmodium vivax is the main species that cause malaria, responsible for 80% of cases in Indonesia (1). Malaria is a complex disease involving genetic factors inherent in parasites and hosts, geographical and environmental aspects(2). During the infection, antibody-mediated and cell-mediated immunity plays an important role in achieving clinical immunity (3,4). A research showed that the successful completion of malaria infection depends on the hosts’ ability to induce adequate levels of pro-inflammatory and regulatory cytokines during the main stages of infection. Thus, the adjustment between the inflammatory and anti-inflammatory response seems to be a determining factor in clinical outcome of the disease(5).
Maluku Province is one of the endemic provinces of malaria in Indonesia. The Nuaulu tribe is one of the isolated tribes in Seram Island, Central Maluku Regency, Maluku Province, Indonesia. This tribe still adheres to the customs of its ancestors, one of which is hunting. It is carried out to fulfill the needs of life and the needs of the implementation of traditional rituals performed from afternoon to morning or even days in the forest that depends on the sustenance. The hunting location is in a forest that is far from the residential area. This habit makes the hunters in this tribe are often exposed to the mosquitoes. Support by preliminary data, the recognition of the public is that they are very often bitten by mosquitoes from entering the forest to going back to home again to the settlement. However, this is not considered a problem since there is an interest in fulfilling the hunters’ needs of life and their families’.

Acquired immunity studies of malaria in endemic areas originally provide a greater potential for understanding the regulation of human immune responses to malaria parasites. However, little is known about malaria-specific immunity acquisition in areas that are unstable, mesoendemic or hypo-endemic transmission (6). The overall profile of cytokine production is still contradictory due to differences in the study population and the level of endemicity in the region, and other factors which require further investigation (7). This study aims to reveal the profile of TNF-α and IL-10 related to hunting habits in tribal community in malaria mesoendemic area.

Material and Method

The type of the present research is an observational analytic study with a cross-sectional design used to determine the associated of hunting behavior and malaria incidence on Nuaulu tribe community. The research areas were Rohua Hamlet and Bonara Hamlet, Sepa Village, Amahai Subdistrict, Central Maluku Regency, Indonesia. The research population was the indigenous people of the Nuaulu tribe who lived in the research areas. The sample was part of the study population that met the inclusion criteria, i.e. people aged 18 to 60 years, living in the research area for at least the last 3 years and were willing to be the research respondents. Age limitation was meant by considering that the ages of 18 to 60 are adults who often carry out hunting activities. The sample was determined using simple random sampling. Malaria examination is carried out through microscopic examination using thin blood preparations and thick blood. Examination of malaria slides were carried out in the parasitology laboratory of the Center for Environmental Health Engineering and Surabaya Disease Control.

Data analysis was done using the IBM Statistic Package for Social Science (SPSS) version 21.0 software. Variable were analyzed using the chi-square test. Ethical clearance was obtained from The Ethics Committee of Faculty of Public Health, Universitas Airlangga, Indonesia (Ref: No: 245/KEPK/22th May 2018).

Findings

The demographic characteristics of study subjects are summarized in table 1. Of the 84 subjects, 60.7% were male, 54.8% were aged 18-31 years, 57.1% of subjects had a low education level and 40% of subjects always carry out hunting activity.

| Table 1: Demographic characteristics of study subject (N = 84) |
|------------------|------------------|
| Variabel         | Number (%)       |
| Gender           |                  |
| Male             | 51 (60.7)        |
| Female           | 33 (39.3)        |
| Age              |                  |
| 18-31            | 46 (54.8)        |
| 32-46            | 18 (21.5)        |
| 47-60            | 19 (22.7)        |
| Education        |                  |
| Low education    | 48 (57.1)        |
| Higher education | 36 (42.9)        |
| Hunting behavior |                  |
| Hunting          | 40 (47.6)        |
| Non-hunting      | 44 (52.4)        |

Microscopic examination of malaria. Giemsa-stained thick and thin smears were showed none of the hunting group (0%) was infected plasmodium in their blood samples, whereas in non-hunting group showed that three samples out (7%) of 44 samples was found to be positive for Plasmodium in their blood samples. The plasmodium found in these three people was *p.vivax*. 
Table 2: Results of Microscopic Examination of Malaria

<table>
<thead>
<tr>
<th>Laboratory Results</th>
<th>Behavior</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hunting</td>
<td>Non-Hunting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>∑</td>
<td>%</td>
<td>∑</td>
<td>%</td>
<td>∑</td>
</tr>
<tr>
<td>Negative</td>
<td>40</td>
<td>100</td>
<td>41</td>
<td>93</td>
<td>81</td>
</tr>
<tr>
<td>Positive</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

The bivariate test results no significant association between malaria and gender (p = 0.558), malaria and education (p = 1,000) and malaria and hunting behavior (p = 0.243). There was a significant association between age and hunting behavior (p = 0.037) (table 3).

Table 3: Demographic characteristics of study subject (N = 84)

<table>
<thead>
<tr>
<th>Variabel</th>
<th>Malaria, n (%)</th>
<th>Total, N (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1</td>
<td>50</td>
<td>51 (60.7)</td>
</tr>
<tr>
<td>Female</td>
<td>2</td>
<td>31</td>
<td>33 (39.3)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-31</td>
<td>2</td>
<td>44</td>
<td>46 (54.8)</td>
</tr>
<tr>
<td>32-46</td>
<td>0</td>
<td>18</td>
<td>18 (21.5)</td>
</tr>
<tr>
<td>47-60</td>
<td>1</td>
<td>18</td>
<td>19 (22.7)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low education</td>
<td>2</td>
<td>46</td>
<td>48 (57.1)</td>
</tr>
<tr>
<td>Higher education</td>
<td>1</td>
<td>37</td>
<td>36 (42.9)</td>
</tr>
<tr>
<td>Hunting behavior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hunting</td>
<td>0</td>
<td>40</td>
<td>40 (47.6)</td>
</tr>
<tr>
<td>Non-hunting</td>
<td>3</td>
<td>41</td>
<td>44 (52.4)</td>
</tr>
</tbody>
</table>

Discussion

Hunting becomes one culture of the Nuaulu people who are at risk of malaria infection which is still maintained today. Results of the interview found that hunting activities are carried out with the aim of fulfilling the daily needs of life and the part of traditional rituals event according to the communitys’ trust, which according to Ellen (8) is classified as animism. Hunting activities are carried out from late afternoon to tomorrow morning or depending on the sustenance obtained. Being exposed to mosquitoes in the forest is common since they are always bitten by mosquitoes from entering the forest until going home. However, this is considered normal because they think that there is something more crucial than being bitten by mosquitoes, i.e. to fulfill the needs of the families and many people.

Forest ecosystems are well known to support transmission of malaria, significantly contributing to the global disease burden. A global assessment reports that “closed forests within areas of malaria risk cover approximately 4.8 million km²” (9). Almost half the malaria risk is estimated to occur among people living in forested areas (1.4 billion) accounting for 11.7, 18.7, 35.1 and 70.1 million population respectively from 1.5 million km2 in the Amazon region, 1.4 million km2 in Central Africa, 1.2 million km2 in the Western Pacific, and 0.7 million km2 in South-East Asia (10). Corresponding forest areas containing these malaria risk zones are 11.16 million to 15.71 million km2, 6.53 million– 7.80 million km2, 1.93 million– 5.19 million km2, 2.70 million–2.72 million km2 (9,10). Controlling malaria in these forested regions of the world has been a major challenge (11). Most studies of forest malaria are focused on local factors associated with malaria transmission. These include distance from forest, impact of deforestation and reforestation, effect of forest on microclimate, vector bionomics, Plasmodium species survival, and human activities in forests (12).

The results confirmed there were no significant association between malaria incidence with hunting behavior. The incidence of malaria only occurred in groups where the people did not hunt. On the other hand, there were no malaria sufferers in the hunting group. It was possible because while carried out hunting activities, the Nuaulu tribe consumed a lot of high-protein hunting foods such as pork (Sus scrofa), deer (Cervus molucencis), cuscus (Phalanger sp) and other wild foods obtained in the forest such as reptiles and eggs, bats, maggots (including sago worms), fruits and leaves.

Infection of the human body may occur if the first defense (innate immunity) cannot block the invasion of pathogens to the body (13). The immune response is
very dependent on the ability of the immune system to recognize foreign molecules (antigens) contained in potential pathogens and then generate the right reaction to getting rid of the source of the antigen in question. Clinical manifestations of malaria, including hematological changes, have been associated with several factors, such as demographic characteristics, the levels of malaria endemicity \(^{(14)}\), nutritional status \(^{(15,16)}\) and malaria immunity \(^{(17,18)}\). The immune system is a defense mechanism that can form a state of immunity to infection \(^{(19)}\), cells and molecules that are responsible for immunity to form the body immune system, as well as the collective and coordinated response of the immune system to the recognition of foreign substances, is called an immune response \(^{(20)}\). If the immune system is exposed to substances that are considered foreign, then there are two types of immune responses that may occur in the form of the response of innate and adaptive immunities.

The plasmodium examination showed that of the 84 people of the research objects, there were only three people who were positive for malaria, indicating that the immune system was good because they lived in an endemic area where malaria can infect them, but with the low malaria illness. The parameters that can modulate immune responses include nutritional status, changes in circulating cytokine levels, expression of adhesion molecules, chemotaxis or mobility changes and generation of reactive species. The immune response is also influenced by factors such as age, gender, biological rhythm, and lifestyle. The search for activities during hunting activities in the Nuaulu people concluded that the activities carried out during hunting were food gatherings, exercises or physical activities, the use of herbs to prevent fever and periodically being bitten by mosquitoes.

**Conclusion**

Our study showed that the incidence of malaria is not associated with hunting behavior and even the incidence of malaria only occurs in groups that do not hunt.

**Conflict of Interest:** The researcher has no conflict of interest with subjects research and related parties at the study site or with other parties related to this research.

**Ethical Clearance:** This study is voluntary. Before engaging in research, respondents are asked for their approval and signed informed consent.

**Acknowledgments**

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**REFERENCES**


Determination of Ammonia Gas Safe Concentration in Chicken Farm Workers in Lembak Village, South Sumatra Indonesia

Putri Arianto¹, Abdul Rohim Tualeka¹, Desheila Andarini², Pudji Rahmawati³, Syamsiar S Russeng⁴, Atjo Wahyu⁴

¹Department of Occupational Health and Safety, Public Health Faculty, Airlangga University, 60115, Surabaya, East Java, Indonesia; ²Department of Occupational Health and Safety, Faculty of Public Health, Sriwijaya University, South Sumatra, Indonesia; ³Department of Development of Islamic Society, State Islamic University Sunan Ampel, Surabaya, Indonesia; ⁴Department of Occupational Health and Safety, Public Health Faculty, Hassanudin University, Makassar, Indonesia

ABSTRACT

Ammonia is an alkaline gas with colorless and a strong odor characteristics. It can be formed naturally in the air, soil and water. Ammonia is also produced by humans and animals as part of normal biological processes. This study aims to determine the safe (C safe) concentration of ammonia gas in Chicken Farms in Lembak Village, South Sumatra Indonesia. This study was an observational with a sample of 14 chicken farm workers taken by purposive sampling. This study was analyzed based on primary and secondary data and processed through safe C calculations by determining the weight of experimental animals (W animals), body surface area of the experimental animal (BSA of experimental animals), workers’ body weight (W), workers’ body surface area (BSA), workers’ breathing rate (BR), benzene concentration in the workplace (C), factor Km in animals (Animal Km), factor Km in humans (Human Km), highest dose of toxin without effect (NOAEL), and reference concentration of ammonia gas on workers (RfC).

The measurement results of the highest concentration of ammonia gas in the chicken farm around Lembak Selatan village, Sumatra was 0.006 mg/m³ (0.0086) ppm and the average concentration of ammonia gas from 14 measurement points on the farm was 0.003214 mg/m³ (0.0046 ppm). The concentration level is below the threshold value set by PERMENAKER No. 5 of 2018, OSHA, NIOSH and ACGIH of 25 ppm. In contrast to these results, the manual calculation of safe (C safe) concentration of ammonia gas was 0.022 mg/m³ (0.031 ppm). With these results, the concentration of ammonia gas in the chicken farms of Desa Lembak Sumatera Selatan Indonesia is in the safe category. Nevertheless, prevention measures are needed to prevent the increase level of the gas.

Keywords: Ammonia gas, safe concentration, husbandry workers, husbandry

Introduction

Ammonia is an alkaline gas with characteristics of colorless and has a strong odor. About 80% of commercially produced ammonia is used in agricultural fertilizers. ². Ammonia can be formed naturally in the air, soil and water. It is also produced by humans and animals as part of normal biological processes¹. Animal husbandry contributes to the presence of dangerous ammonia in the environment that comes from the biological processes of animals in it. Ammonia is a constituent of animal feces and urine when nitrogen-
rich proteins in feed are not fully converted into animal products such as meat, milk, wool, and eggs.

Ammonia can react directly at certain levels of exposure. At a level of 5 ppm it is almost undetectable. At 20 ppm ammonia can have a different odor but can still be tolerated. 100 ppm ammonia can now be very visible and somewhat uncomfortable when inhaled. At 500 ppm ammonia will irritate the throat, lungs, mucous membranes, skin and eyes that breathing equipment is needed at this level for exposure in a very short time. At 1000 ppm or 0.1% ammonia becomes very toxic and a gas cartridge mask is required. At exposure rates above 2000 ppm, death can occur in less than 30 minutes.

Based on health effects and the dangers that can arise due to exposure to ammonia, various regulations regarding the threshold value of ammonia exposure have been made through careful calculations. OSHA, ACGIH, and NIOSH determined ammonia exposure to workers at a maximum of 25 ppm with a duration of 8 hours and 35 ppm for ammonia exposure for 15 minutes. Indonesia also regulates the threshold value of ammonia exposure which is equal to 25 ppm or 17 mg/m³ through the Peraturan Menteri Ketenagakerjaan Number 5 of 2018 concerning Occupational Safety and Health at the Work Environment.

This journal draws references from the research of Desheila et al (2017) on the Analysis of the Risk of Ammonia Gas Exposure to Chicken Farm Workers in Lembak Village, South Sumatra. The present study discusses Reference concentration of ammonia (NH3) of 0.028 mg/kg/day, real time intake of respondents in the range 0.0020 (mg/kg)/day, and lifetime respondents’ responses in the range of 0.7671 (mg/kg)/day, as well as the risk received by respondents to exposure to ammonia gas (RQ <1). The previous research explained that the results of the measurement of ammonia gas concentrations in 14 average air sample points were 0.003214 mg/m³. Compared to the threshold value stated in PERMENAKER No. 5 of 2018, this level is still far below the threshold value of 25 ppm or 17.41 mg/m³.

Previous research on the Analysis of Ammonia Gas Exposure Risks at Chicken Farm Workers in Lembak Village, South Sumatra, did not explain the safe limits of ammonia gas concentrations in chicken farm workers and Rfc calculations using No Observed Adverse Effect Level (NOAEL). In the present study, the authors calculated Rfc and safe concentration of exposure to ammonia gas in the air using No Observed Adverse Effect Level (NOAEL).

Material and Method

This study is an observational study which aimed to determine the safe concentration of exposure to ammonia gas in chicken farm workers in Lembak Village, South Sumatra. The study population was chicken farms in Lembak Village, the subject sample was chicken farm workers taken by purposive sampling which was 14 workers, and object samples was ammonia level in the chicken farm air. Data collection was carried out by interviews using questionnaires, weight measurements using scales, and direct measurement of ammonia concentration.

The variables of this study were the weight of experimental animals (W animals), body surface area of experimental animals (BSA of experimental animals), body weight (W), body surface area of workers (BSA), workers breathing rate (BR), ammonia gas concentration in workplace, Km enzen in animals (Animal Km), Enzen Km in humans (Human Km), highest dose of toxin without effect on experimental animals (NOAEL), enzene reference concentration on workers (RFC), and safe concentration of ammonia gas in air for workers (C safe). Analysis of research data to determine the safe concentration of ammonia gas in the air for workers (C safe) was conducted manually.

Result

A. Characteristics and Surface Area of Experimental Animal Bodies: Toxicity testing of a compound is generally carried out using experimental animals. This is because the response to toxic compounds between humans and animals is similar. The experimental animals used in this study were white mice. Below is the table of characteristics and surface area of white rats as experimental animals:

<table>
<thead>
<tr>
<th>Experimental animals (white mice)</th>
<th>W (Kg)</th>
<th>BSA (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024050</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
</tr>
<tr>
<td>Average</td>
<td>0.14067</td>
<td>0.024165</td>
</tr>
</tbody>
</table>
The surface area of white mice is calculated using the following formula.

\[ BSA = 0.09 W^{0.67} \]

Where

BSA: Body Surface Area (m²)
W: Weight (kg)

B. Workers’ Characteristics, Body Surface Area, and Respiratory Rate:

As many as 14 workers of chicken farm in Lembak Selatan Selatan Village participated in this study with the lowest body weight of 14 kg, the highest body weight of 75 kg and an average body weight of 51.85 kg. Based on the results of the respondent’s questionnaire, the exposure duration was 24 hours. This is because the workers stayed in the farm area that they were continuously exposed to ammonia gas produced by chickens. In the present study, the average height used was the average height of Indonesian adults of 159 cm. Body surface areas and officer breathing rate were calculated by using the following formula.

1. The average body surface area of the workers

\[ BSA = \sqrt{W \times h / 3600} = \sqrt{51.85 \times 159 / 3600} = 1.51 \text{ (m²)} \]

Where

BSA: Body Surface Area (m2)
W: Weight (kg)
h: Height (cm)

2. Average workers’ breathing rate

\[ BR = \frac{5.3 \ln W - 6.9}{24} = \frac{5.3 \ln 51.85 - 6.9}{24} = 0.58 \text{ m}^3/\text{jam} \]
where

BR : Breathing Rate (m³/hour)
W : Weight (kg)

Based on calculations carried out on chicken farm workers in Lembak Village, South Sumatra, the average body surface area of workers was 1.51 (m²) and the respiratory rate of workers was 0.58 m³/hour on average.

C. Concentration of Ammonia Gas:

The highest concentration of ammonia gas in the chicken farm in Lembak South Sumatra is 0.006 mg/m³ (0.0086 ppm) and the average concentration of ammonia gas from 14 measurement points on chicken farms was 0.003214 mg/m³ (0.0046 ppm). The mg/m³ conversion to ppm was calculated by the following formula.

\[ C = 24.45 \times \frac{C \text{ (mg/m³)}}{\text{mol}} \]

Where:

C : Concentration in the air (mg/m³)
MW : Molecular Weight Amonia (17.031 g/mol)

The highest \( C \) = 24.45 × 0.006 mg/m³ ÷ 17.031 = 0.0086 ppm
C average = 24.45 × 0.003214 mg/m³ ÷ 17.031 = 0.0046 ppm

D. Animal Km and Human Km:

Determination of animal km and human km is the first step in determining the safe limit of ammonia gas toxin dose. Calculation of animal km and human km are as follows:

1. Animal km

\[ \text{Animal Km} = \frac{w_{\text{animal}}}{\text{BSA animal}} \]

Where:

Animal Km: Km factor in experimental animals
W : Weight (kg)
BSA : Body Surface Area (m2)

Table 2: Distribution of Characteristics, Respiratory Rate, and duration of Working at Chicken Farm Workers in Lembak Village, South Sumatra

<table>
<thead>
<tr>
<th>Number of sample</th>
<th>W (Kg)</th>
<th>h (cm)</th>
<th>BSA (m²)</th>
<th>BR (m³/hour)</th>
<th>t (hour/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>51.85</td>
<td>159</td>
<td>1.51</td>
<td>0.58</td>
<td>24</td>
</tr>
</tbody>
</table>

Table 3: Calculation Results of Animal Km in White Mice

<table>
<thead>
<tr>
<th>Experimental animal (white mice)</th>
<th>W (Kg)</th>
<th>BSA (m²)</th>
<th>Animal Km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.814194082</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.814194082</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
<td>5.820914007</td>
</tr>
</tbody>
</table>
Based on the calculation of animal km above, the average animal km yield of chicken farm workers in Lebak Village, South Sumatra Indonesia is 5.82.

**2. Human km s**

\[
\text{Human Km} = \frac{w}{\text{BSA}}
\]

Where

- Human Km : Km factor in humans
- W : Weight (kg)
- BSA : Body Surface Area (m²)

<table>
<thead>
<tr>
<th>Number of sample</th>
<th>W (Kg)</th>
<th>BSA (m²)</th>
<th>Human Km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>51,85</td>
<td>1,51</td>
<td>34,3</td>
</tr>
</tbody>
</table>

The above human km calculation is obtained from the average body weight of the worker. Based on the above calculations the results of human km chicken farm workers in Lembak Sumatra Selatan Indonesia are 34.3.

**E. No Observed Adverse Effect Level (NOAEL):**

NOAEL can be defined as the highest experimental point without side effects. According to U.S. The Environmental Protection Agency (EPA), No Observed Adverse Effect Level (NOAEL) from ammonia is 4.9 mg/m³ (0.036 mg/kg). Calculation of conversion from mg/m³ to mg/kg is as follows:

\[
\text{NOAEL ammonia (mg/m³)} = \frac{4.9 \times 0.00013 \times 8}{0.1405} = 0.036 \text{ mg/kg}
\]

**F. Inhalation Reference Concentration (RfC):**

Shaw et al. (2007) in Saridewi and Tualeka (2017) also explain that the determination of reference concentration on workers or the Inhalation Reference Concentration (RfC) can use the following formula:

\[
RfC = \frac{\text{NOAEL}}{\text{animal Km}} \times \frac{\text{human Km}}{}
\]

Where:

- RfC : Inhalation Reference Concentration (mg/kg)
- Animal Km : Km factor in experimental animals
- Human Km : Km factor in humans

Calculation of Inhalation Reference Concentration (RfC) obtained from the NOAEL value, Animal Km average, and the Human Km average shows the following results:

\[
RfC = \frac{\text{0.036}}{5.82} = 0.0061 \text{ mg/kg}
\]

**G. Safe Concentration of Ammonia Gas in Chicken Farm Workers in Lembak Village, South Sumatra Indonesia**

The following is a safe C calculation with Rfc using No Observed Adverse Effect Level (NOAEL):

\[
C_{\text{safe (mg/m³)}} = \frac{(rfc)(W)}{(\delta)(BR)(t)}
\]

Where:

- C safe : concentration of toxin in the air that is safe for the community (mg/m³)
- RfC : Inhalation Reference Concentration (mg/kg)
- W : Weight (kg)
- δ : % of substances absorbed by the lungs if unknown then 100%
- BR : Human breathing rate (m³/hour)
- t : Working duration (hour)
- MW : Molecular Weight

\[
C_{\text{safe (mg/m³)}} = \frac{0.0061 \times 51.85}{100 \times 0.58 \times 24} = 0.022 \text{ mg/m³}
\]

In ppm, the conversion calculation is as follows:

\[
C_{\text{safe (ppm)}} = \frac{0.022 \times 24.45}{17.031} = 0.031 \text{ ppm}
\]
Based on the above calculations, the safe concentration of exposure to ammonia gas in Lembak village, West Sumatera Indonesia chicken farm workers is 0.022 mg/m$^3$ (0.031 ppm).

**Discussion**

Determination of the safe concentration of ammonia gas in the chicken farm workers in Lembak South Sumatra Indonesia is based on calculations involving No Observed Adverse Effect Level (NOAEL) in it. No Observed Adverse Effect Level (NOAEL) used in this study came from U.S. The Environmental Protection Agency (EPA) is equal to 4.9 mg/m$^3$ or equivalent to 0.036 mg/kg$^1$. In the study conducted by Abdul Rohim Tualeka and Juliana Jalaludin (2018) by using white mice, it was determined that NOAEL ammonia was 0.0154 mg/kg/weight$^{14}$. Another study by Abdul Rohim Tualeka, Jihan Faradisha and Rizky Maharja (2018) stated that NOAEL obtained from calculations with experimental animals was 0.0103 mg/kg/body weight$^{10}$.

Calculation of Inhalation Reference Concentration (Rfc) was carried out by using NOAEL originating from U.S. The Environmental Protection Agency (EPA) shows value of 0.0061 mg/kg. These results are smaller than that of ammonia gas Rfc found in previous studies on the Analysis of the Risk of Ammonia Gas Exposure to Chicken Farm Workers in Lembak Village, South Sumatra by 0.028 mg/kg. The results of ammonia Rfc gas in the present study is higher than the chronic Rfc determined by U.S. Environmental Protection Agency (EPA) of 0.5 mg/m$^3$ (0.0037 mg/kg).

Based on the results of this study, the value of safe concentration of ammonia gas for chicken farm workers in Desa Lembak, South Sumatra Indonesia is 0.022 mg/m$^3$ (0.031 ppm). This value is higher than the average concentration of ammonia gas from 14 measurement points in the Lembak Village farm in South Sumatra, which is 0.003214 mg/m$^3$ (0.0046 ppm). Ammonia gas in the chicken farms of Desa Lembak, South Sumatra Indonesia is in safe category for workers.

While ammonia gas in the Lembak Village chicken farm is within safe concentration limits, an increase in the number of livestock will potentially increase the exposure of ammonia gas to workers. The presence of ammonia gas exposure is possible to disturb the comfort of workers and local residents. Therefore, it is necessary to attempt the use of personal protective equipment such as masks to reduce the level of ammonia gas inhalation for workers as well as cleaning livestock from urine and manure regularly and periodically. If it is possible, it is necessary to check regularly for checking the concentration of ammonia gas and checking the health of workers regularly.

**Conflict of Interest:** All authors have no conflicts of interest to declare.

**Source of Funding:** This is an article “Determination of Ammonia Gas Safe Concentration in Chicken Farm Workers in Lembak Village, South Sumatra Indonesia” of Occupational Health and Safety Department that was supported by Faculty of Public Health, Airlangga University.

**Ethical Clearance:** The study was approved by the institutional Ethical Board of the Public Health, Sriwijaya University.

**REFERENCE**


5. LLC GAPS. AMMONIA HAZARDS. 2015;


ABSTRACT

A descriptive correlational design was used. This study aims to (1) assess body image, and (2) find out the association between body image and some sociodemographic characteristics for primiparous women. The study included a convenience sample of 200 primiparous women who were selected from four maternity hospitals in Baghdad City. The study instrument consists of the sociodemographic characteristics, the reproductive information and Body Appreciation Scale. Data were collected using a self-report tool. Data were analyzed using the statistical package for social sciences (SPSS) for windows, version 24.

The study results revealed that more than a half perceive themselves as having; from their point of view, good body image (n = 111; 55.5%). The researcher concluded that more than a half perceive themselves as having; from their point of view, good body image.

Keywords: Body Image, Primiparous Women

Introduction

A woman’s body undergoes many transformations during the nine months of pregnancy. Some of these physical changes are visible, such as an expanding belly and weight gain, while others are well known, such as an enlarged uterus, morning sickness and backaches. However, a few bodily changes may be unexpected and catch some women by surprise (1).

During pregnancy mothers reported how they felt about their changing shape and appearance and their concerns for their body after the birth alongside considering how they would feed their baby after it was born. Those who held higher concerns for their appearance or who were trying to limit their food intake during pregnancy were less likely to plan to or start breastfeeding at birth, or if they did so, only breastfed for a short period of time (2).

Body image describes the cognitive, affective and behavioral aspect of one’s body. Negative body image is common during pregnancy and extends to the postnatal period. Women can be distressed by bodily changes in pregnancy, although the association between breastfeeding and maternal weight and body image such as changing shape and weight gain and breastfeeding duration (3).

It traditionally has focused on describing and predicting negative body image such as body dissatisfaction, body shame, and body preoccupation, body appearance has been defined as accepting, holding favorable opinions toward, and respecting the body, while also rejecting media-promoted appearance ideals as the only form of human beauty (4). Body image concerns to be high among postpartum women (5) and are a source of significant psychological distress. In addition, body image concerns have been shown to be associated with to negative eating and feeding related outcomes including maternal disordered eating, and lower rates and shorter duration of breastfeeding (6).
Weight gain (within the recommended range) and changes in body shape and appearance are an expected and healthy element of pregnancy. However, growing numbers of women appear to be concerned about their weight gain and appearance during pregnancy and may be at risk of developing a negative body image\(^7\).

Body image describes the cognitive, affective and behavioral aspects of one’s body\(^8\). Negative body image is common during pregnancy and extends to the postnatal period \(^9\). Women can be distressed by bodily changes in pregnancy, although some report feeling liberated \(^10\). Pregnancy can trigger or intensify negative feelings about the body or disordered eating \(^11\).

Body image dissatisfaction during pregnancy can have a negative impact on both mother and baby. It can be linked to unhealthy eating, dieting and purging behaviors. In turn these behavior’s increase the risk of low infant birth weight and premature delivery \(^12\) with higher levels of miscarriage and caesarean delivery\(^13\) amongst pregnant women with disordered eating. Conversely, poor body image can sometimes be associated with increased weight gain as the woman binges or comfort eats\(^14\). A factor that has been associated with infant macrosomia, caesarean section and later childhood overweight\(^15\).

An extant literature suggests that body dissatisfaction may increase new mothers’ risk for depression. These depressive symptoms may contribute to body dissatisfaction by increasing negative attributions and evaluations related to body weight and shape, as well as decreasing the likelihood of women engaging in positive body-related activities including physical exercise and self-care\(^16\). Conversely, prenatal and postpartum depression may contribute to body image concerns\(^7\). This study aims to (1) assess body image, and (2) identify the association between body image and some sociodemographic characteristics for primiparous women.

**Method**

**Study Design:** A descriptive correlational design was used.

**Setting:** The study was conducted in either obstetric ward or delivery room at stage four of labor in four hospitals at Baghdad City.

**Sample and Sampling:** A purposive sample of (200) postnatal primiparous women who were delivered in four maternity hospitals. The (200) of study sample distribute in Al-karkh Maternity Hospital at (50 sample) Al-karkh side and three Maternity hospitals (150 women) in Al-Russafa side.

**Inclusion Criteria:** The inclusion criteria included (1) Postnatal primiparous woman, and (2) normal vaginal delivery or caesarean section.

**Study Instrument:** The study instrument includes women’s age, levels of education, occupation, family monthly income, BMI, and residency. Body mass index was computed by dividing the weight (kg) on height (cm)\(^2\). The score of less than 18.5 is underweight, 18.5-24.9 is within normal, 25-29.9 is overweight, 30-34.9 is class I obesity, 35 or greater is class II obesity.

**Reproductive Status:** This part includes woman’s age on marriage, abortion, mode of delivery, indication of CS, baby’s condition after birth, baby’s weight on delivery, and baby’s gender.

**The Body Appreciation Scale:** The body appreciation scale (BAS) is based on (Avalos et al, 2005). This scale is a 5-point Likert type scale that is composed of 10 items. These items were measured on a 5-point Likert scale. Responses on this scale range from (Never=1) to (Always=5). Total scores range from 10 to 65 degree, with a higher score indicating greater body appreciation.

**Data Collection:** Data were collected for the period from December 30\(^{th}\), 2018 to February 10\(^{th}\), 2019. Data were collected through either a self-report or structured interview during morning shift. It took 20-30 minutes.

**Data Analyses:** Data were analyzed using the statistical package for social science (SPSS) for windows, version 24. The statistical measure of frequency, percent, Mean, and standard deviation (SD), linear regression, ANOVA, and independent-sample t-test were used.

![Figure 1: Study sample body mass index](image-url)
With respect to study sample BMI, the mean BMI is 26.7 ± 4.0; less than a half are overweight (n = 94; 47.0%), followed by those who are within normal limit (n = 63; 31.5%), those who are obese class I (n = 36; 18.0%), those who are obese class II (n = 4; 2.0%), and those who are underweight (n = 3; 1.5%).

Table 1: Women’s Reproductive Profile (N = 200)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age on marriage: Mean (SD): 19.1 ± 0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14-20</td>
<td>111</td>
<td>55.5</td>
</tr>
<tr>
<td>21-27</td>
<td>75</td>
<td>37.5</td>
</tr>
<tr>
<td>28-34</td>
<td>10</td>
<td>5.0</td>
</tr>
<tr>
<td>35-42</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>Abortion (n = 44): Mean (SD): 1.22 ± 4.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>37</td>
<td>84.1</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>11.3</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>Child’s weight on delivery (Gram): Mean (SD): 2424.4 ± 612.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 2000</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td>2000-2.500</td>
<td>141</td>
<td>70.5</td>
</tr>
<tr>
<td>2.550-3.000</td>
<td>38</td>
<td>19.0</td>
</tr>
<tr>
<td>3.050-3.500</td>
<td>11</td>
<td>5.5</td>
</tr>
<tr>
<td>&gt; 3.500</td>
<td>8</td>
<td>4.0</td>
</tr>
</tbody>
</table>

The mean of women’s age on marriage is 19.1 ± 0.6; more than a half reported that they get married between 14-20-years-old (n = 111; 55.5%), followed by those who get married between 21-27-years-old (n = 75; 37.5%), those who get married between 28-34-years-old (n = 10; 5.0%), and those who get married between 35-42-years-old (n = 4; 2.0%).

Concerning the number of abortions, the mean number of abortions is 1.22 ± 4.1; the majority of women who experienced abortion have one abortion (n = 37; 84.1%), followed by those who have two abortions (n = 5; 11.3%), and those who have each of three and four abortions (n = 1; 2.3%) for each of them.

Concerning child’s weight on delivery, the mean weight was 2424.4 ± 612.7 gram; most of children weigh between 2.000-2.500 gram (n = 141; 70.5%), followed by those who weigh 2.550-3.000 gram (n = 38; 19.0%), those who weigh 3.050-3.500 gram (n = 11; 5.5%), those who weigh above 3.500 gram (n = 8; 4.0%), and those who weigh less than 2.000 gram (n = 2; 1.0%).

Table 2: Mean and standard deviation of body image items

<table>
<thead>
<tr>
<th>List</th>
<th>Items</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I respect my body.</td>
<td>3.65 ± 1.36</td>
</tr>
<tr>
<td>2</td>
<td>I feel good about my body.</td>
<td>3.56 ± 1.32</td>
</tr>
<tr>
<td>3</td>
<td>I feel that my body has at least some good qualities.</td>
<td>3.70 ± 1.14</td>
</tr>
<tr>
<td>4</td>
<td>I take a positive attitude towards my body.</td>
<td>3.77 ± 1.18</td>
</tr>
<tr>
<td>5</td>
<td>I am attentive to my body’s needs.</td>
<td>4.26 ± 1.08</td>
</tr>
<tr>
<td>6</td>
<td>I feel love for my body.</td>
<td>3.59 ± 1.35</td>
</tr>
<tr>
<td>7</td>
<td>I appreciate the different and unique characteristics of my body.</td>
<td>3.61 ± 1.20</td>
</tr>
<tr>
<td>8</td>
<td>My behavior reveals my positive attitude toward my body; for example, I hold my head high and smile.</td>
<td>3.93 ± 1.24</td>
</tr>
<tr>
<td>9</td>
<td>I am comfortable in my body.</td>
<td>3.52 ± 1.29</td>
</tr>
<tr>
<td>10</td>
<td>I feel like I am beautiful even if I am different from media images of attractive people (e.g., models, actresses/actors).</td>
<td>2.80 ± 1.32</td>
</tr>
</tbody>
</table>

The highest scores for body appreciation are for the items “My behavior reveals my positive attitude toward my body; for example, I hold my head high and smile”, “I take a positive attitude towards my body”, “I feel that my body has at least some good qualities”, “I respect my body” (Mean [SD] = 3.93 ± 1.24; 3.77 ± 1.18; 3.70 ± 1.14; 3.65 ± 1.36) respectively.

Figure 2: Study sample distribution according to body image appreciation

More than a half perceive themselves as having; from their point of view, good body image (n = 111; 55.5%), followed by those whose body image as average (n = 64; 32.0%), and those whose body image as poor (n = 25; 12.5%).
Table 3: Difference in body image among certain variable

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age groups</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>93.581</td>
<td>3</td>
<td>31.194</td>
<td>.285</td>
<td>.836</td>
</tr>
<tr>
<td>Within Groups</td>
<td>21447.294</td>
<td>196</td>
<td>109.425</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21540.875</td>
<td>199</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Level of education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>1228.534</td>
<td>6</td>
<td>204.756</td>
<td>1.946</td>
<td>.075</td>
</tr>
<tr>
<td>Within Groups</td>
<td>20312.341</td>
<td>193</td>
<td>105.245</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21540.875</td>
<td>199</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Women’s occupation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>306.071</td>
<td>2</td>
<td>153.036</td>
<td>1.420</td>
<td>.244</td>
</tr>
<tr>
<td>Within Groups</td>
<td>21234.804</td>
<td>197</td>
<td>107.791</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21540.875</td>
<td>199</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Family’s monthly income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>337.818</td>
<td>5</td>
<td>67.564</td>
<td>.618</td>
<td>.686</td>
</tr>
<tr>
<td>Within Groups</td>
<td>21203.057</td>
<td>194</td>
<td>109.294</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21540.875</td>
<td>199</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>626.162</td>
<td>4</td>
<td>156.541</td>
<td>1.460</td>
<td>.216</td>
</tr>
<tr>
<td>Within Groups</td>
<td>20914.713</td>
<td>195</td>
<td>107.255</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21540.875</td>
<td>199</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is no statistically significant difference in women’s body image among the groups of age, level of education, women’s occupation, family’s monthly income, and BMI.

Table 4: Association between women’s age, BMI, age on menarche, abortion and body image

<table>
<thead>
<tr>
<th></th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.322</td>
<td>.602</td>
<td>.231</td>
<td>.535</td>
</tr>
<tr>
<td>BMI</td>
<td>-.093-</td>
<td>.299</td>
<td>-.051-</td>
<td>-.310-</td>
</tr>
<tr>
<td>Age on marriage</td>
<td>-.067-</td>
<td>.685</td>
<td>-.038-</td>
<td>-.099-</td>
</tr>
<tr>
<td>Abortion</td>
<td>-2.526-</td>
<td>3.250</td>
<td>-.186-</td>
<td>-.777-</td>
</tr>
</tbody>
</table>

There is no association between women’s age, BMI, age on menarche, abortion and their body image.

**Discussion**

The highest scores for body appreciation are for the items “My behavior reveals my positive attitude toward my body; for example, I hold my head high and smile”, “I take a positive attitude towards my body”, “I feel that my body has at least some good qualities”, “I respect my body” respectively.

More than a half perceive themselves as having; from their point of view, good body image, followed by those whose body image as average, and those whose body image as poor.

The result shows that the higher body appreciation scale and the study sample satisfied in their body image.

There is no statistically significant difference in women’s body image among the groups of age, level of education, women’s occupation, family’s monthly income, and BMI. These findings indicate that these
women, regardless of their age, level of education, women’s occupation, family’s monthly income, and BMI have almost invariant perception of body appreciation.

Conclusions

Women perceive themselves as having form their point of view good body image, however body image has no influence on women’s breastfeeding self-efficacy.

Recommendations

There is a need to raising women’s awareness about the importance of health, well-being, and function of the body. This can help in improving body image postnatally through prenatal health centers. Also, support new mothers, family, peer, and health professional, by focusing at body image women’s needs and de-stigmatizing weight issues through sport classes during postnatal period.

Acknowledgement

I’d like to thank my husband for his continuous, incessant encouragement and support in accomplishing this study.

Conflict of Interest: The researchers report no conflict of interest.

Source of Funding: This study did not receive any funding from any agency.

Ethical Clearance: A permission to conduct this study was obtained from the ethical committee in the College of Nursing, University of Baghdad.

REFERENCES


Role of Adropin in Women with Polycystic Ovary Syndrome

Rana Ali Hamdi1, Hanan Naama Abas2, Fatin Abdul Aziz Alsaeed2
1Department of Biochemistry, College of Medicine, University of Baghdad; 2Infertility Center, Baghdad Teaching Hospital

ABSTRACT

Objective: Evaluate serum adropin levels in women with polycystic ovary syndrome (PCOS) and compare their levels with BMI matched healthy controls. Also investigate the relation between serum adropin levels with insulin resistance and lipid profile.

Materials and Method: A case-control study included 78 women from 21 to 40 years of age. Women were divided into two groups: group (1) included 39 women with PCOS and group (2) included 39 healthy women (as controls). Each serum sample was analyzed for assessing adropin, fasting glucose, fasting insulin, HOMA-IR, and lipid profile.

Results: Mean serum adropin levels was significantly lower in women with PCOS as compared to healthy controls (P=0.001). Additionally, significant negative correlations were found between serum adropin levels and serum triglyceride (r= -0.418, P=0.04), total cholesterol (r= -0.842, P=0.0001) and HOMA-IR (r= -0.436, P=0.03) in patients group.

Conclusion: Low serum adropin may participate in the metabolic defects seen in polycystic ovary syndrome such as dyslipidemia and insulin resistance that in turn associated with other health problems such as hypertension, diabetes mellitus, and cardiovascular disease.

Keywords: Polycystic ovary syndrome, adropin, insulin resistance, lipid profile, insulin

Introduction

Polycystic ovary syndrome (PCOS) is a common hormonal disorder in women of reproductive age characterized by irregular menstrual periods, hyperandrogenism, and polycystic ovaries defined by ultrasound 1. Insulin resistance (IR) and metabolic syndrome are more prevalent in PCOS women 1. Dyslipidemia is a common metabolic defects in women with this syndrome which include decreased serum high density lipoprotein-cholesterol (HDL-C) and elevated serum cholesterol, triglycerides (TG), low density lipoprotein-cholesterol (LDL-C), and very low- density lipoprotein cholesterol (VLDL-C) 2. Thus, PCOS women more prone to cardiovascular disease, hypertension, diabetes mellitus type 2, and obesity 3,4.

Adropin is a peptide hormone 5 which has a role in energy homeostasis and maintain the metabolism of glucose and fatty acid 6,7. Previous study found that adropin has a role in controlling the expression of hepatic lipogenic genes and the PPARγ receptor (peroxisome proliferator-activated receptor gamma), which have important role in lipogenesis 7. Furthermore, an animal study showed that adropin affects angiogenesis, raised blood flow and capillary density, and has important role in endothelial cells protection 8. According to above information the present study aimed to evaluate serum adropin levels in women with polycystic ovary syndrome and compare their levels with body mass index matched healthy controls. Also investigate the relation between serum adropin levels with insulin resistance and lipid profile in women with this syndrome.

Method

This case-control study included 78 women from 21 to 40 years of age. Women attended to Infertility Center in Baghdad Teaching Hospital during the period from
June 2017 to October 2017. Informed consent was taken from each women. The present study was approved by the Ethical Committee of the College of Medicine/University of Baghdad.

Women were divided into two groups: group (1) included 39 women with PCOS and group (2) included 39 healthy women (as controls).

Diagnosis of PCOS were done according to Rotterdam criteria when two of three criteria are present, these involve oligoovulation and/or anovulation, clinical and/or biochemical hyperandrogenism and polycystic ovaries as shown by ultrasound.

Exclusion criteria included women with hyperprolactinemia, Cushing’s syndrome, congenital adrenal hyperplasia, androgen secreting tumors, and thyroid diseases.

Serum investigations involved adropin which was measured by enzyme linked immunosorbent assay (ELISA) (Kamiya Biomedical Company), fasting serum insulin was measured by ELISA kit (Monobind Company), and fasting serum glucose was measured by spectrophotometer using kit supplied by (Human Company). In addition, lipid profile including total cholesterol, triglycerides, HDL-C were measured by spectrophotometer using kit supplied by (Human Company) while LDL-C and VLDL-C were measured by following equations:

\[
LDL - c = \text{Total Cholesterol} - (\text{VLDL} + \text{HDL})
\]

\[
\text{VLDL} = \frac{\text{TG}}{5}
\]

Likewise, homeostasis model assessment of insulin resistance (HOMA-IR) calculates the IR according to following formula:

\[
\text{HOMA-IR} = \frac{\text{Fasting plasma glucose (mg/dL)}}{\text{Fasting plasma insulin (μU/mL)/405}}
\]

A HOMA-IR value of 2.5 or above were considered as insulin resistant.

Furthermore, body mass index (BMI) was calculated as weight in kilograms per height (square meter) [weight/(height\(^2\)], women were considered as normal weight at BMI (18.5-24.9 kg/m\(^2\)), overweight women at BMI (25-29.9 kg/m\(^2\)) and obese women at BMI ≥30kg/m\(^2\)

**Statistical Analysis:** Data were analyzed using computer facility of SPSS-20 (Statistical Package for Social Science – version 20). The results were expressed as numbers, range, and mean ± SD (standard deviation). Significance of difference of quantitative data was assessed using Student-t test. Also, Pearson correlation was calculated for the correlation between two quantitative variables with its t-test for testing the significance of correlation. Statistical significance was considered whenever the P value was equal or less than 0.05.

**Results**

Patients and controls were matching for age and BMI. In addition, significantly higher fasting serum glucose, insulin, HOMA-IR, total cholesterol, TG, LDL-C, and VLDL-C levels were found in patient’s compared to controls. However, serum adropin and HDL-C levels were significantly lower in patients compared to controls as shown in Table 1.

**Table 1: Mean value of fasting serum glucose, insulin, HOMA-IR, lipid profile and adropin for patients and controls**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Patients (n = 39)</th>
<th>Controls (n = 39)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>Range</td>
<td>Mean ± SD</td>
<td>Range</td>
</tr>
<tr>
<td>Age</td>
<td>30.2 ± 5.45</td>
<td>(21-40)</td>
<td>31.1 ± 5.03</td>
</tr>
<tr>
<td>BMI (kg/m(^2))</td>
<td>28.33 ± 4.3</td>
<td>(22.68-38.46)</td>
<td>27.52 ± 3.4</td>
</tr>
<tr>
<td>Serum total cholesterol (mg/dl)</td>
<td>188.49 ± 2.72</td>
<td>(178.8-192.3)</td>
<td>152.91 ± 4.16</td>
</tr>
<tr>
<td>Serum TG (mg/dl)</td>
<td>140.44 ± 1.25</td>
<td>(138.8-143.3)</td>
<td>101.14 ± 3.62</td>
</tr>
<tr>
<td>Serum HDL-C (mg/dl)</td>
<td>42.87 ± 1.219</td>
<td>(40.2-44.3)</td>
<td>61.04 ± 1.7</td>
</tr>
<tr>
<td>Serum LDL-C (mg/dl)</td>
<td>117.53 ± 3.05</td>
<td>(107.14-122.9)</td>
<td>71.64 ± 4.74</td>
</tr>
<tr>
<td>Serum VLDL-C (mg/dl)</td>
<td>28.08 ± 0.25</td>
<td>(27.76-28.66)</td>
<td>20.22 ± 0.72</td>
</tr>
<tr>
<td>Fasting serum Insulin (μU/m)</td>
<td>13.47 ± 1.33</td>
<td>(10.66-15.6)</td>
<td>5.81 ± 0.8</td>
</tr>
</tbody>
</table>
Conted…

<table>
<thead>
<tr>
<th></th>
<th>Fasting serum glucose (mg/dl)</th>
<th>(86-97)</th>
<th>86.02 ± 3.91</th>
<th>(80-94)</th>
<th>.001 (S)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HOMA-IR</td>
<td>3.01 ± 0.32</td>
<td>(2.5-3.6)</td>
<td>1.25 ± 0.22</td>
<td>(0.83-2.04)</td>
</tr>
<tr>
<td>Serum adropin (pg/ml)</td>
<td>9.97 ± 1.81</td>
<td>(7.02-12.2)</td>
<td>15.85 ± 1.64</td>
<td>(13.06-18.8)</td>
<td>.001 (S)</td>
</tr>
</tbody>
</table>

In addition, significant negative correlations were found between serum adropin levels and serum triglyceride ($r = -0.418$, $P = 0.04$), total cholesterol ($r = -0.842$, $P = 0.0001$) and HOMA-IR ($r = -0.436$, $P = 0.03$) in patients group as illustrated in Figure (1-1), Figure (1-2), and Figure (1-3), respectively.

Figure 1: Significant negative correlation between serum adropin and serum triglyceride in patients group ($r = -0.418$, $P = 0.04$).

Figure 2: Significant negative correlation between serum adropin and serum total cholesterol in patients group ($r = -0.842$, $P = 0.0001$).

Figure 3: Significant negative correlation between serum adropin and serum HOMA-IR in patients group ($r = -0.436$, $P = 0.03$).
Discussion

In the present study, higher levels of fasting serum glucose, insulin, and HOMA-IR were found in women with PCOS as compared with BMI matched healthy controls. This results are in agreement with previous studies \(^{11, 12}\). Hyperinsulinemia, peripheral IR, and impaired glucose tolerance are major metabolic disturbance seen in PCOS \(^{13}\). Hyperinsulinemia found in PCOS may cause by functional problems in the insulin \(^{14}\). Insulin receptors have been expressed in ovaries \(^{15}\). Thus, insulin has the ability for enhancing the synthesis of sex steroid hormone and ovarian growth, leading to increased intra ovarian androgens and disrupting the normal folliculogenesis. The resultant, development of numerous ovarian cysts and ovarian enlargement \(^{14}\).

This study also revealed that higher serum levels of total cholesterol, TG, LDL-C, and VLDL-C, with lower levels of HDL-C in women with PCOS compared to BMI matched healthy controls similar to the results of other studies \(^{16, 17}\). It was shown that dyslipidemia is common in PCOS independent to BMI. Insulin resistance has important role by enhancing lipolysis and altered expression of lipoprotein lipase and hepatic lipase which are important enzymes in lipid metabolism \(^{18}\).

In addition, our findings showed that serum adropin levels were significantly lower in women with PCOS as compared with those BMI- matched healthy controls. This result agrees with previous studies done by Yildirim et al \(^{19}\) and Sen et al \(^{20}\) who showed low levels of serum adropin associated with metabolic feature of PCOS \(^{19, 20}\).

Moreover, our study found significant negative correlations between serum adropin levels and serum TG, total cholesterol, and HOMA-IR in women with PCOS which consist with previous report done by Yildirim et al \(^{19}\).

In this regard, Butler et al noticed that decreased adropin level regarded as risk factor for IR and other characteristics of the metabolic syndrome, such as dyslipidemia \(^{21}\). Moreover, study by Kuhla et al proposed that increased expression of adropin gene lead to reduce lipogenesis in an animal’s study \(^{22}\).

On the other hand, prior research found that lipid abnormalities in PCOS were associated with IR independent of obesity \(^{23}\). Insulin resistance found in PCOS leads to raised TGs average that caused by raised lipogenesis, reduced clearance, decreased fatty acids oxidation, and raised releasing of VLDL by the liver, leading to increased circulated TGs concentration. Additionally, IR may be involve in catabolism of HDL-C and formation of LDL-C particles \(^{24}\).

Conclusion

Low serum adropin may participate in the metabolic defects seen in polycystic ovary syndrome such as dyslipidemia and insulin resistance that in turn associated with other health problems such as hypertension, diabetes mellitus, and cardiovascular disease.

Conflict of Interest: None

Ethical Clearance: Informed written consent was obtained from all the participants in the study, and the study and all its procedure were done in accordance with the Helsinki Declaration of 1975, as revised in 2000. The study was approved by the College of Medicine/University of Baghdad.

Source of Funding: The work were supported by authors only.

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The Alcoholic Extract of Carrot (*Daucus carota L.*) Seeds as Antioxidant in Male Albino Mice Treated with H$_2$O$_2$

Roaa M. Al-Saadi, Sabah A.R. Al-Obaidi, Waleed H. Yousif

1The National Center of Hematology. Al-mustansiriyah University. IRAQ; 2Department of Biology, College of Sciences for Women, University of Baghdad; 3Biotechnology Applications College, Al-Nahrain University

ABSTRAcT

This study was designed to research activity *Daucus carota* seeds alcoholic extract on the fertility of male albino mice that treated with H$_2$O$_2$ by changing the body weight, testis, secondary sex organ weights and sperm parameter and hormonal changes (Testosterone, FSH, and LH). This experiment used thirty-two (8-10) weeks’ old albino male mice. These mice were separated into four sets; the first negative group was given physiological saline, the second group was given the alcoholic extract (400mg/kg), the third group was given H$_2$O$_2$ (0.05%) in the drinking water, the fourth group was given both H$_2$O$_2$ (0.05%) and the alcoholic extract (400mg/kg) during (35) days. The results showed: The third group (H$_2$O$_2$) showed significant (P<0.05) decrease the weight of bodies, and significant (P<0.05) increase in testes, prostate and seminal vesicle weights by comparing with control and second group. The result shows a significant decrease in ratios of motility, live sperms and sperm concentration. Also, the concentration of Testosterone, FSH and LH show a significant reduction in the first group when equated with control. While fourth group (H$_2$O$_2$ (0.05%) and the alcoholic extract (400mg/kg) gave significant increase in weights of body and testes, prostate, seminal vesicle weight; this group gave results nearly that in control group result in all reproductive parameters such as hormones concentration, sperms motility and concentration so that the alcoholic extract could provide protection for oxidative stress of H$_2$O$_2$.

Keywords: Carrot seeds, sperm parameters, sex hormones, Hydrogen peroxide.

Introduction

Carrot generally belongs to Umbelliferae, and it mostly limited to the moderate regions of Asia, Europe and Africa. Distinctive parts of this plant are utilized as a part of the treatment of a wide range of illnesses containing kidney failure, asthma, dropsy, infection, leprosy, worm troubles, etc. In perspective of various physiological and pharmacological activity of carrot extract including antibacterial, antifungal, anthelmintic, and, hepatoprotective. Pharmacological impacts demonstrated that carrot exhibited anti-fertility properties in female as a contraceptive the extracted root of carrot has the activity to be hypolipidemic effect, and anticancer. Carrot has experienced expansive phytochemical activity by containing active ingredients that have been isolated. These include volatile oils, steroids, triterpenes. Recently, in reproduction, the pharmacological researches show that *Daucus carota* seeds reveal anti-fertility possessions in females.

It has been demonstrated that the extract carrot seeds and their fatty acids can identify the estrogen cycle of the adult female mice and decrease an ovary mass substantially. They likewise originate when they used the extract of carrot seed (CSE) that lead to the reserve of 5,3-β-hydroxysteroid dehydrogenase and glucose-6-phosphate dehydrogenase, both necessary primary enzymes complicated in ovarian steroidogenesis, in ovaries of mice. In an additional report, it was significantly diminished after the desperate nourishing of carrots by utilizing a sequestered rabbit ovarian, and it was formed from human chorionic gonadotropin-induced progesterone secretions and progesterone.

Materials and Method

Plant Collection: The carrot seeds utilized in the extraction were processed by drying the plant rosette and collect the seed only, washing the seed and drying in the room temperature.
Preparation of the Alcoholic Extract: The carrot seeds (100 g) were macerated ethanol (95.5%) for 6-8 hours. The method was repeated thrice. Later the filtration, and the deposit concentrated by vacuum in a rotational evaporator yielding a 24.31% at 50°C ethanolic extract of carrot seeds.

Experimental Animals: Forty adult male albino mice weighing (30-36) g were acquired from Biotechnology Research Center, and treated mice were rendered with food and water ad libitum. Male mice were indiscriminately separated into four groupings in table 1, containing eight mice in each group. Which incorporate; first negative group was given physiological saline, the second group was given the alcoholic extract (400mg/kg), the third group was given H2O2 (0.05%) in the drinking water, the fourth group was given both H2O2 (0.05%) and the alcoholic extract (400mg/kg) during (35) days In each group animals were killed by vertebrate disengagement. Testes fixed with Bouin fluid (BDH Inc, Toronto, Canada). Then obtained Spermatozoa from the second ends of epididymides by crumbling in 500 µl TCM199, and kept at 37°C in incubator5% CO2 and the percentages of motility and dead and abnormalities of spermatozoa were measured.

Table 1: Summary of the study design

<table>
<thead>
<tr>
<th>Group</th>
<th>Treatment</th>
<th>Mean ± SE (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The first group</td>
<td>Physiological saline</td>
<td>24.12 ± 0.78</td>
</tr>
<tr>
<td>(control)</td>
<td></td>
<td>26.12 ± 0.74</td>
</tr>
<tr>
<td>The second group</td>
<td>Alcoholic extract (400mg/kg)</td>
<td>27.62 ± 0.94</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29.75 ± 0.94</td>
</tr>
<tr>
<td>The third group</td>
<td>H2O2 (0.05%) in the drinking water</td>
<td>27.00 ± 1.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24.75 ± 1.13</td>
</tr>
<tr>
<td>The fourth group</td>
<td>given both H2O2 (0.05%) and the alcoholic extract (400mg/kg)</td>
<td>26.75 ± 0.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>28.37 ± 0.78</td>
</tr>
<tr>
<td>LSD value</td>
<td></td>
<td>2.773*</td>
</tr>
</tbody>
</table>

* refer to significant differences between treatment (P<0.05).

Microscopical Examination: Spermatozoa were surveyed by WHO laboratory manual for capability, motility rate of life to dead sperm and abnormal sperm.

Statistical analysis: The analysis was achieved to relate the different groups by using ANOVA-test. That was determined at P<0.05.

Hormonal Analysis: The intracardiac Blood collect from the animals was centrifuged at 2,000 rpm to isolated serum for measuring FSH, LH, Testosterone hormones.

Results

The result in tables (2), (3) refers to the effects of carrot seeds alcoholic extract (ACSE) administration on body weight show a significant increase in the body weight and in the (testis, prostate, seminal vesicle) weight when related to the control. Administration of H2O2 (0.05%) a negative reactive oxygen producing aminoglycoside (15), affected a reduction in the body weight and (testis, prostate, seminal vesicle) weight significantly at what time equated to the control. When this running of H2O2 (0.05%) was administrated together with (ACSE 400 mg/kg) the body weight and (testis, prostate, seminal vesicle) weight was significantly (p<0.05) elevated from (292.65 ± 14.17, 320.12 ± 50.92, 367.26 ± 18.61) into (329.68 ± 17.16, 267.16 ± 20.90, 406.02 ± 26.35).

Table 2: The differences between Body weight before and after treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Body weight before treatment</th>
<th>Body weight before treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>24.12 ± 0.78</td>
<td>26.12 ± 0.74</td>
</tr>
<tr>
<td>Alcoholic extract (400mg/kg)</td>
<td>27.62 ± 0.94</td>
<td>29.75 ± 0.94</td>
</tr>
<tr>
<td>H2O2 (0.05%) in the drinking water</td>
<td>27.00 ± 1.18</td>
<td>24.75 ± 1.13</td>
</tr>
<tr>
<td>was given both H2O2 (0.05%) and the alcoholic extract (400mg/kg)</td>
<td>26.75 ± 0.75</td>
<td>28.37 ± 0.78</td>
</tr>
<tr>
<td>LSD value</td>
<td>2.773*</td>
<td>2.718*</td>
</tr>
</tbody>
</table>

* refer to significant differences between treatment (P<0.05).
sperms compared to the control group. It is indicating the protective effect of (ACSE) against Hydrogen Peroxide-induced necrosis. The motility value directs the efficacy of the extract in the repairs of motility of sperm in mice as the expression of Hydrogen Peroxide running.

**Discussion**

The increase of body weight belongs to the effect of (ACSE) by increasing the activity in some hormones that essential to raise the rate of metabolism include growth hormone and thyroid hormone, that increase the appetite, facilitate the digestion, as well as (ACSE) was characterized as appetizing, and it was included high protein and carbohydrate content that agree with \(^{16}\), in addition the increase in (testis, prostate, seminal vesicle) weight belong to the positive relation between the increase in body weight and the reproductive organs \(^{17}\) as well as this increase belong to the increase in the Testosterone which refer to the rise in the Testosterone levels cause increase in the reproductive organs weights and size \(^{18}\) while the decrease occurred by using \(\text{H}_2\text{O}_2\) agree with \(^{19}\) that observe the rats treated with alloxan (the same effect of \(\text{H}_2\text{O}_2\) as oxidative stress) cause absence of Insulin which effects the (Epinephrine and Glucagon)hormones were stimulated lipolysis.

### Table 3: The percentage of the Testis, Prostate, seminal vesicle weights in treatments and control

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Testis wt.</th>
<th>Prostate wt.</th>
<th>Seminal vesicle wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>205.15 ± 4.22</td>
<td>123.49 ± 3.74</td>
<td>205.15 ± 4.22</td>
</tr>
<tr>
<td>Alcoholic extract (400mg/kg)</td>
<td>384.41 ± 16.69</td>
<td>293.55 ± 8.49</td>
<td>472.78 ± 13.79</td>
</tr>
<tr>
<td>(\text{H}_2\text{O}_2) (0.05%) in the drinking water</td>
<td>292.65 ± 14.17</td>
<td>320.12 ± 50.92</td>
<td>367.26 ± 18.61</td>
</tr>
<tr>
<td>was given both (\text{H}_2\text{O}_2) (0.05%) and the alcoholic extract (400mg/kg)</td>
<td>329.68 ± 17.16</td>
<td>267.16 ± 20.90</td>
<td>406.02 ± 26.35</td>
</tr>
</tbody>
</table>

LSD Value: 38.138 * 270.90 * 54.701 *

* refer to significant differences between treatment (P<0.05)

### Table 4: Percentage of sperms motility, live sperms and sperms abnormalities in treatments and control group

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Motility %</th>
<th>Live sperms%</th>
<th>Abnormal Sperms %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>68.75 ± 1.25</td>
<td>77.12 ± 1.18</td>
<td>13.87 ± 0.44</td>
</tr>
<tr>
<td>Alcoholic extract (400mg/kg)</td>
<td>80.00 ± 1.33</td>
<td>83.75 ± 0.72</td>
<td>10.50 ± 0.42</td>
</tr>
<tr>
<td>(\text{H}_2\text{O}_2) (0.05%) in the drinking water</td>
<td>48.75 ± 1.83</td>
<td>53.50 ± 1.13</td>
<td>19.25 ± 0.67</td>
</tr>
<tr>
<td>was given both (\text{H}_2\text{O}_2) (0.05%) and the alcoholic extract (400mg/kg)</td>
<td>76.87 ± 1.87</td>
<td>77.27 ± 1.68</td>
<td>14.25 ± 0.59</td>
</tr>
</tbody>
</table>

LSD Value: 4.665 * 3.198 * 1.352 *

* refer to significant differences between treatment (P<0.05).

In addition the deficiency of Insulin in the blood cause cells starvation and decrease in calories that lead to decrease in body weight \(^{20}\) the deficiency of glucose concentration in the cells exhaustion the energy causes catabolism so that cause a decrease in body weight and make changes in reproductive organs (testis, prostate, seminal vesicle) \(^{20}\). The counting of sperm is a vital consideration for the evaluation of the properties of chemicals on spermatogenesis \(^{21},^{22}\). The cause of increase the motility and live sperms in the treated group with (ACSE) belong to the same reasons such as hormonal effect that share in the regulation of male reproductive system, as well as the extract, contain several materials like carotenoids \(^{23}\), flavonoids, vitamins (A,B, C, D, E) and As carrot seeds are rich of antioxidants \(^{10},^{23}\), that were pr otected the plasma membrane of sperm against the oxidative

Stress comes from the presence of free radicals in the seminal fluid, while the decrease the motility and live sperms and
Table 5: percentage of Serum (Testosterone, FSH and LH) Concentration in control and treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean ± SE</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Testosterone</td>
<td>LH</td>
<td>FSH</td>
</tr>
<tr>
<td>Control</td>
<td>1.43 ± 0.12</td>
<td>0.487 ± 0.037</td>
<td>0.512 ± 0.045</td>
</tr>
<tr>
<td>Alcoholic extract (400mg/kg)</td>
<td>2.53 ± 0.24</td>
<td>0.884 ± 0.096</td>
<td>0.891 ± 0.11</td>
</tr>
<tr>
<td>H2O2 (0.05%) in the drinking water</td>
<td>0.686 ± 0.042</td>
<td>0.323 ± 0.027</td>
<td>0.438 ± 0.043</td>
</tr>
<tr>
<td>was given both H2O2 (0.05%) and the alcoholic extract (400mg/kg)</td>
<td>1.70 ± 0.16</td>
<td>0.620 ± 0.041</td>
<td>0.671 ± 0.028</td>
</tr>
<tr>
<td>LSD Value</td>
<td>0.474 *</td>
<td>0.133 *</td>
<td>0.160 *</td>
</tr>
</tbody>
</table>

* refer to significant differences between treatment (P<0.05).

Increase in abnormal sperms in the group treated with H2O2 belongs to the effect of H2O2 in the cells which was called oxidative stress that mean the effect of producing the free radicals generated via metabolism in the presence of O2 24. The oxidation destruction raised peroxidation of lipid and caused the modification in the membrane possessions resulting in germ cell death at all phases of development, and a reduction in sperm counting 22, the using was with H2O2 in the same time give protective activity against H2O2 and give results near the normal state when compare with control the extract contain several materials like carotenoids 23, flavonoids, vitamins (A, B, C, D, E) and other compounds work as antioxidants 10 these antioxidants can release the free radicals, prevent producing them and make it inactive 26. Hormones elevate in the hormones (Testosterone, FSH and LH) level during treatment with (ACSE). This reveals that extract applies its impacts on the male reproductive system via sex hormones 27. Hormones were raised after administering the extracted representative, the heightening impact of the extract on the hormones was very essential in spermatogenesis 21 and positive effect on the interstitial tissues that were containing Sertoli and Leydig cell responsible of producing the hormone, as well as the extract containing (choline) 28. Which consider the essential substance to produce (Acetylcholine) important in stimulating the gonads so increase the level of (FSH, LH), whereas the extract containing chemical compounds such as cholesterol, Ascorbic acid was necessary to produce Testosterone from (pregnenolone and androstenedione) 29. The presence of (Zn) in the extract has an active role in Testosterone production that agrees with 30. This is possible that interstitial cell necrosis crops up from a decrease in this hormone. The decrease the hormones (Testosterone, FSH and LH) in the group treated with H2O2 belong to the oxidative stress of H2O2 on the spermatogenesis and induction of apoptosis and oxidative damage 31.

Ethical Clearance: Taken from Al-mustansiriya University, IRAQ committee

Source of Funding: Self

Conflict of Interest: None

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The Ethanolic Extract of Ajwa Fruits inhibits Nephrotoxicity and Deterioration of Some Blood Biochemical Properties Induced by Gentamicin in Male Rats

Saher Mahmood Jwad¹, Wijdan Kamal Noor², Bushra Abbas ALzubaidi²
¹Professor, ²Assist.Prof., Biology Department, Faculty of Education for Girls, University of Kufa, Iraq

ABSTRACT

The current study was designed to assess the probable preventive influences of extract of Ajwa fruits on the renal functional performance and some biochemical parameters of the blood, so this investigation was performed in the Biology department animal house/Faculty of Education for Girls. Sixty male Albino rats of Sprague–Dawley were equally divided into four groups, each group was comprised fifteen males: the first group was (the control), that orally submitted to 0.9% normal saline solution, the second group was intraperitoneally injected with 80 mg/kg of Gentamicin, the third group was subjected to 1 mg/kg of Ajwa fruits alcoholic extract orally + 80 mg/kg of Gentamicin antibiotic intraperitoneally, the last group was orally treated with Ajwa dates alcoholic extract (1mg/kg). The treatments of all laboratory animals were one time at day and continued for three weeks. Regarding the statistical analysis of study, there was a noticeable decline in the levels of erythropoietin hormone, total protein, albumin, as well as reduced glutathione (GSH) in serum, in the opposite, urea, creatinine and malondialdehyde (MDA) levels in serum were significantly raised at the group that intraperitoneally injected with Gentamicin when compared with the other groups of the experiment, the other groups, that orally given Ajwa fruits extract + gentamicin antibiotic, and the extract of Ajwa dates only, no differences were noted in these criteria in compared with control group.

Keywords: Ajwa fruit extract, Gentamicin, Erythropoietin.

Introduction

The group of antibiotic that named aminoglycosides especially Gentamicin have been exerted potent efficacy against severe infections of the bacterial micro-organisms which include whole gram–negative and few gram positive bacterial types¹². Many researchers reported that both groups of antibiotics, the aminoglycosides and aminocyclitols might cause adverse alterations in the blood parameters that related to functions of the kidneys, particularly the increment in the serum creatinine³ and extensive changes in cells of the proximal tubules, which diagnosed before the appearance of this modification in the blood markers⁴.

1. Preparation of laboratory animals: Sixty male rats from Sprague –Daley strain were used in the study, weighing 185–224g, and their ages less than three (12) weeks, had been purchased from the(National Center for Control and Pharmaceutical Research)–Baghdad/Iraq.

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after that they housed in special steel cages for the laboratory animals to care under the typical controlled laboratory conditions, moreover the sawdust of animal cages’ displaced for 2 to 3 times at week. In relation to the water and feed (that was enriched with protein), provided for ad libitum consumption.

When the males became sexually matured, (their ages 12 weeks) the experiment was performed.

2. Preparation of Gentamicin: This antibiotic with the dose of 80mg/kg brought from Baghdad pharmacy/Alnajaf, and then each animal intraperitoneally given the proper concentration according to its body weight.

3. Ajwa dates: Concern to Ajwa dates, were brought from Saudi Arabia (AL-Madinah AL-Munawwarah), after that the fruits identified and classified by the Biology department taxonomist in the Faculty of Education for girls.

4. Preparation of Ajwa dates alcoholic extract: The alcoholic extract of Ajwa dates was prepared according to\(^{11}\)

5. Grouping of the study

A. The I group was a control, comprised (15) of males that were orally treated 0.9% physiological normal saline solution (once daily) for three weeks.

B. The II group was injected with Gentamicin antibiotic (80mg/kg) intraperitoneally one time at day for the period of three weeks, contained (15) male rats.

C. The III group was orally administrated with Ajwa dates alcoholic extract (1 mg/kg)+Gentamicin (80 mg/kg) by intraperitoneally injecting once daily, for three weeks, and composed of (15) males.

D. Finally the III group was (15) male Albino rats, orally subjected to (1 mg/kg) of Ajwa dates alcoholic extract, one time at day, as well as for three weeks.

Regarding the concentration of Ajwa dates alcoholic extract that used in the study according to\(^{12}\), whereas the Gentamicin concentration determined by the study\(^{13}\).

6. Animals sacrificing and collection of blood samples: The laboratory animals were anesthetized by using diethyl ether, after that the blood taken from each male by the heart puncture to get (5 ml) blood, then the blood was put in gel tubes for the estimation.

7. The biochemical analysis of the blood

A. Serum erythropoietin level evaluation: To estimate the erythropoietin level in serum, the Enzyme–Linked Immunosorbent assay, and the kits that were used in this investigation purchased from Biomerieux, furthermore the absorbance was 450 nm\(^{14}\).

B. Serum urea level estimation: In relation to urea level in serum, the method of\(^{15}\) was depended and the kits were equipped from Biomerieux France Company, as well as the absorbance was read at 580 nm.

C. Serum creatinine level estimation: The creatinine level in serum was evaluated according to\(^{16}\) and the reagents were purchased from Biomerieux (France Company), while the absorbance (490) nm by using the spectrophotometer.

D. Serum total protein level estimation: The method\(^{16}\) was depended to estimate the total protein level in serum, and the kits were equipped from Biolabo Company at (550) nm.

E. Serum albumin level estimation: As regard with albumin level assessment, the method of\(^{18}\) was used, and the kits, as well as the Bromocresol green reagent. In addition, the absorbance carried out by spectrophotometer at 650 nm.

F. Serum reduced glutathione level estimation: The level of reduced glutathione was assessed according to\(^{19}\) the kits and reagents were used in this evaluation purchased from BLH50-USA Company, concerning the absorbance (405 to 414) nm by using the spectrophotometer.

G. Serum malondialdehyde level estimation: As regard to the malondialdehyde level in the serum, the method of\(^{20}\) used, and the kits, as well as the reagents were brought from Biolabo at 530 to 540 nm.
8. The statistical analysis of the study: To analyze the results of the study, version 26 of the Statistical Package Social Sciences (that was SPSS) and Analysis of Variance test were depended, moreover the Least Significant Difference named L.S.D used to extract the differences between the means, the probability level was P < 0.05(21).

Results

The analysis of the study results, indicated to a noticeable reduction (P < 0.05) in the following parameters, erythropoietin, total protein and albumin, as well as reduced glutathione levels in contrast, urea, creatinine, and malondialdehyde (MDA) levels in the serum were remarkably increased in the group that injected with Gentamicin intraperitoneally when compared with experimental groups, as shown in the tables 1 to 7 respectively.

Table 1: Impact of Gentamicin and the extract of Ajwa dates on erythropoietin level

<table>
<thead>
<tr>
<th>Experimental Groups</th>
<th>Number of samples</th>
<th>Levels of erythropoietin ML U/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control group</td>
<td>15</td>
<td>24.70 ± 0.14 a</td>
</tr>
<tr>
<td>2. Gentamicin group</td>
<td>15</td>
<td>13.11 ± 0.17 b</td>
</tr>
<tr>
<td>3. Group of Ajwa dates + Gentamicin</td>
<td>15</td>
<td>23.91 ± 0.47 a</td>
</tr>
<tr>
<td>4. Group of Ajwa dates</td>
<td>15</td>
<td>24.90 ± 0.22 a</td>
</tr>
</tbody>
</table>

L. S. D = 3.78

*Values represented as M SE

* Similar letters mean no notable differences in P < 0.05 level.

* Different letters mean notable differences in P < 0.05 level.

Table 2: Impact of Gentamicin and the extract of Ajwa dates on urea level

<table>
<thead>
<tr>
<th>Experimental Groups</th>
<th>Number of samples</th>
<th>Levels of urea mg/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control group</td>
<td>15</td>
<td>19.66 ± 0.04 a</td>
</tr>
<tr>
<td>2. Gentamicin group</td>
<td>15</td>
<td>43.11 ± 0.16 b</td>
</tr>
<tr>
<td>3. Group of Ajwa dates + Gentamicin</td>
<td>15</td>
<td>20.09 ± 0.32 a</td>
</tr>
</tbody>
</table>

L. S. D = 1.56

*Values represented as M SE

* Similar letters mean no notable differences in P < 0.05 level.

* Different letters mean notable differences in P < 0.05 level.

Table 3: Impact of Gentamicin and the extract of Ajwa dates on creatinine level

<table>
<thead>
<tr>
<th>Experimental groups</th>
<th>Number of samples</th>
<th>Levels of creatinine mg/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control group</td>
<td>15</td>
<td>0.50 ± 0.21 a</td>
</tr>
<tr>
<td>2. Gentamicin group</td>
<td>15</td>
<td>1.44 ± 0.36 b</td>
</tr>
<tr>
<td>3. Group of Ajwa dates + Gentamicin</td>
<td>15</td>
<td>0.43 ± 0.25 a</td>
</tr>
<tr>
<td>4. Group of Ajwa dates</td>
<td>15</td>
<td>0.33 ± 0.09 a</td>
</tr>
</tbody>
</table>

L. S. D = 0.45

*Values represented as M SE

* Similar letters mean no notable differences in P < 0.05 level.

* Different letters mean notable differences in P < 0.05 level.

Table 4: Impact of Gentamicin and the extract of Ajwa dates on total protein level

<table>
<thead>
<tr>
<th>Experimental groups</th>
<th>Number of samples</th>
<th>Levels of total protein mg/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control group</td>
<td>15</td>
<td>7.60 ± 0.43 a</td>
</tr>
<tr>
<td>2. Gentamicin group</td>
<td>15</td>
<td>5.24 ± 0.19 b</td>
</tr>
<tr>
<td>3. Group of Ajwa dates + Gentamicin</td>
<td>15</td>
<td>7.81 ± 0.31 a</td>
</tr>
<tr>
<td>4. Group of Ajwa dates</td>
<td>15</td>
<td>8.10 ± 0.03 a</td>
</tr>
</tbody>
</table>

L. S. D = 1.56

*Values represented as M SE

* Similar letters mean no notable differences in P < 0.05 level.

* Different letters mean notable differences in P < 0.05 level.
Table 5: Impact of Gentamicin and the extract of Ajwa dates on albumin level

<table>
<thead>
<tr>
<th>Experimental groups</th>
<th>Number of samples</th>
<th>Levels of albumin mg/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control group</td>
<td>15</td>
<td>4.360.11 a</td>
</tr>
<tr>
<td>2. Gentamicin group</td>
<td>15</td>
<td>2.17 0.34 b</td>
</tr>
<tr>
<td>3. Group of Ajwa dates + Gentamicin</td>
<td>15</td>
<td>4.52 0.46 a</td>
</tr>
<tr>
<td>4. Group of Ajwa dates</td>
<td>15</td>
<td>5.010.25 a</td>
</tr>
</tbody>
</table>

L. S. D = 0.98

*Values represented as M SE
* Similar letters mean no notable differences in P < 0.05 level.
* Different letters mean notable differences in P < 0.05 level.

Discussion

According to the results, there was a remarkable decline in the erythropoietin level at the group that injected with Gentamicin, this may be attributed to the adverse effects of this type of (aminoglycosides) on the renal tissues which is considered the primary site for erythropoietin bio-synthesis in the mature mammals, that confirmed by study of (22) Another study has been added that the mainly location(s) of erythropoietin production in laboratory animals which is a specialized peritubular cell, presented in proximal tubular region of the kidney(23-25)Furthermore, hydroxyl radicals may be mediated the (aminoglycosides) pathogenicity because the higher activity of Gentamicin to induce inhibition in both, activity of Na (+)–K (+) – ATPase pumping, and the DNA replication in renal proximal tubules of rat’s kidney, as well as a consequent renal injury(2).

A study by(26) had been demonstrated that, the nephrotoxicity of this type of antibiotic characterized by a decline in urine concentration capacity, mild glycosuria, tubular proteinuria, and reduced ammonia excretion, in addition to the glomerular filtration rate decrement. In relation to the observable increment in the oxidative stress index (MDA) and in the opposite, the reduced level of glutathione(GSH) at the experimental group that intraperitoneally injected with Gentamicin in compared with the other groups of study may be proposed to the toxic impacts of antibiotic on all body tissues especially the sensitive renal tissues, and consequent increased production of detrimental free radicals because potent activation of phospholipids peroxidation, which causes substantial consumption of the glutathione molecules and responsible for detoxification process of various damaging reactive species particularly the end product of oxidative stress(MDA), thus serum glutathione levels accordingly decrease(27) These data could be suggested to potent preventive and curative properties of Ajwa dates including: antioxidant, anticancer and antiinflammatory, as well as antiabetic(28-30). Overall the effective potentialities of Ajwa dates, may explain to it’s strong chemical ingredients like: carbohydrate constituents, different types of proteins, lipids(31,32)Ajwa fruits possess active antioxidants including, carotenoids and numerous phenols(33) in addition to various necessary vitamins like C, B1, B2 and A(34).With regard to the essential phenols of dates, especially vital acids like p–coumaric, ferulic, and sinapic, as well as procyanidins, in

Table 6: Impact of Gentamicin and the extract of Ajwa dates on reduced glutathione level and its impact on malondialdehyde level

<table>
<thead>
<tr>
<th>Experimental groups</th>
<th>Number of samples</th>
<th>Levels of reduced glutathione µmole/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control group</td>
<td>15</td>
<td>50.190.39 a</td>
</tr>
<tr>
<td>2. Gentamicin group</td>
<td>15</td>
<td>15.16 0.18 b</td>
</tr>
<tr>
<td>3. Group of Ajwa dates + Gentamicin</td>
<td>15</td>
<td>51.14 0.27 a</td>
</tr>
<tr>
<td>4. Group of Ajwa dates</td>
<td>15</td>
<td>58.790.35 a</td>
</tr>
</tbody>
</table>

L. S. D = 12.16

<table>
<thead>
<tr>
<th>Experimental groups</th>
<th>Number of samples</th>
<th>Levels of malondialdehyde ng/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control group</td>
<td>15</td>
<td>24.520.32 a</td>
</tr>
<tr>
<td>2. Gentamicin group</td>
<td>15</td>
<td>135.67 0.29 b</td>
</tr>
<tr>
<td>3. Group of Ajwa dates + Gentamicin</td>
<td>15</td>
<td>21.65 0.28 a</td>
</tr>
<tr>
<td>4. Group of Ajwa dates</td>
<td>15</td>
<td>13.410.10 a</td>
</tr>
</tbody>
</table>

L. S. D = 20.93

*Values represented as M SE
* Similar letters mean no notable differences in P < 0.05 level.
* Different letters mean notable differences in P < 0.05 level.
Conclusions: The extract of Ajwa fruits exhibited protective and ameliorative effects on some biochemical and oxidative stress parameters, it alleviated or prevented the erythropoietin level reduction that induced by Gentamicin antibiotic, therefore, we recommend to use Ajwa variety to reduce nephrotoxicity and hemotoxicity of aminoglycoside group because its natural, nutritional and strong bioactive anti-oxidative contents.

Conflict of Interest: There is no any Conflict of Interest

Ethical Clearance: Ethics committee refer that there is no plagiarism and there is no mistakes or wrong results in this work.

Source of Funding: Self funding.

REFERENCES


Correlated Levels of Anti-Inflammatory Interleukins (IL-4 and IL-10) with Allergic Conjunctivitis (AC) in Iraqi Patients

Nihad Khalawe Tektook1, Osamah Jihad Abdul Qader2
1Assist Prof., Department of Medical Laboratory Techniques, College of Health and Medical Technics, Middle Technical University, Baghdad; 2Assist. Professor, M.B.Ch.B.–F.I.B.Ms.OPHTH.–F.I.CO, College of Medicine, Tikrit University, Iraq

ABSTRACT

Background: Allergic conjunctivitis (AC) is caused by an allergic reaction, most common form was hypersensitivity reaction (type 1), that caused to perennial or seasonal AC. Current study was done in the Hospital of Ibn-AL-Hythem for eyes infections in Baghdad from September-August of 2018, one hundred and thirty-two serum were collected from allergic conjunctivitis patients after diagnostic by a specialist ophthalmologist according to have symptoms, who included 60 male and 72 female, with range age (15-51) years. Used the enzyme-linked immunosorbent assay (ELISA kit) from (Pepro-Tech Company, UK) for estimating levels of both Interleukins (IL-4 and IL-10) in patients serum.

Results: Current study showed higher significant in age group (≥ 35 years) as percentage (57.6%) compare to age group (25- 35) as (28.1%), also significantly higher in females (54.5%) than males (45.5%), also level of IL – 4 in allergic conjunctivitis patients was (23.91 ± 2.09) compare to control (21.02 ± 2.99), so significantly increased levels of IL-10 in allergic conjunctivitis patients (14.99 ± 2.30) than control (11.10 ± 1.99).

Conclusions: Current study were concluded higher significant of allergic conjunctivitis Iraqi patients in age group (≥ 35 years), and the AC in females higher than males, as well as level of IL – 4 in allergic conjunctivitis patients were significant with control, and significantly increased levels of IL-10 in allergic conjunctivitis patients compare to control.

Keywords: interleukins (IL-4; IL-10) ; allergic conjunctivitis(AC) ; Iraqi patients

Introduction

Allergic conjunctivitis(AC) (or name as “allergic rhinoconjunctivitis,” was most commonest allergic eye disorder, in the last decades in Iraqi patients, so allergic diseases were increased dramatically (1). Allergic eye usually are associated with others allergic conditions, such as dermatitis (atopic eczema) and allergic rhinitis (hay fever) , so th causing of eye allergies are similar to the allergic rhinitis (hay fever) and allergic asthma(2).

Allergic conjunctivitis is type of IgE-mediated hypersensitivity a wide term that recognised as 6 types including perennial allergic conjunctivitis(PAC);seasonal allergic conjunctivitis (SAC), contact lens-induced; atopic keratoconjunctivitis (AKC) drug-induced, and vernal keratoconjunctivitis (VKC) (3). However, both (VKC) and (AND) have pathophysiological and clinical pathophysiological characteristics completely different from (PAC) and (SAC), although some common markers of allergy (4). AC common manifests as itchy, red eyes, or watering which included the symptoms of ocular symptom scores(5).

Cosmetics and Medication can play important role in causing of eye allergies, Any types of irritant, whether infectious, environmental, or manmade, can cause symptoms that consistent with an allergic of an eye, AC is caused by allergen-induced inflammatory response(AIIR), that allergen (such as animal dander...
pollen; and other environmental antigens\(^6\) will be interacting with antibody (IgE bound to sensitized mast cells) causing clinical ocular allergic expression (COA). The pathogenesis of (AC) is predominantly an IgE-mediated hypersensitivity reaction. Activation of mast cells WHICH induces enhanced tear levels of the histamine; leukotrienes; prostaglandins and tryptase, and this early response lasts clinically (20 minutes –30 minutes) \(^2\), also, the degranulation of Mast cell to induces activated the vascular endothelial cells, that turn the expresses chemokines and adhesion molecules such as vascular cell adhesion molecules (VCAM) and intercellular adhesion molecules (ICAM), so the other chemokines secreted \(^2\).

Many cytokines that derived from Th1, such as IL(2, 3) and IFN-\(\gamma\), that mediates recruitment of the macrophages, while the cytokine that derived from Th2, such as IL (4 and 5), that participates in both chemotaxis and activation of the eosinophils \(^7\), therefore aim of current study to assess levels of cytokine interleukin 10 (IL-10) and IL-4 in allergic conjunctivitis (AC) patients.

### Material and Method

**Sample Collected:** Current study was done in the Hospital of Ibn-AL-Hythem for eyes infections in Baghdad from September - August of 2018. One hundred and thirty-two serum were collected from allergic conjunctivitis patients after diagnostic by a specialist ophthalmologist according to have symptoms such as Redness in inner eyelid or white of eye; Itchy eyes; Blurred vision; Increased amount of tears; and Swelling of the eyelid (fig.1), who include 60 male and 72 female, with range age (15-51) years.

![Figure 1: Symptoms of allergic conjunctivitis](image)

Estimation levels of Interleukins (IL-4 and IL-10) in patients serum

Used the enzyme-linked immunosorbent assay (ELISA kit) from (Pepro-Tech Company, UK) for estimating levels of both Interleukins (IL-4 and IL-10) in patients serum according to the manufacturer’s instructions.

### Findings

**Table 1: Distribution of allergic conjunctivitis patients according to age groups and gender**

<table>
<thead>
<tr>
<th>Age groups (years)</th>
<th>Patients</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. = 132</td>
<td>%</td>
</tr>
<tr>
<td>≤ 25</td>
<td>19</td>
<td>14.3</td>
</tr>
<tr>
<td>25-35</td>
<td>37</td>
<td>28.1</td>
</tr>
<tr>
<td>≥ 35</td>
<td>76</td>
<td>57.6</td>
</tr>
<tr>
<td>Total</td>
<td>132</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Patients</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>60</td>
<td>45.5</td>
</tr>
<tr>
<td>Female</td>
<td>72</td>
<td>54.5</td>
</tr>
<tr>
<td>Total</td>
<td>132</td>
<td>100</td>
</tr>
</tbody>
</table>
Results in table (1) showed the range age of allergic conjunctivitis patients was (15-51) years, also Majority of allergic conjunctivitis patients within age groups of (≥ 35) years as percentage (57.6%) compare to age group (25-35) as (28.1%), also significantly higher in females (54.5%) than males (45.5%). These results are shown in Figure(2 &3).

Figure 2: Allergic conjunctivitis patients according to age groups

Figure 3: Allergic conjunctivitis patients according to gender

Table 2: Comparative of interleukins Level (IL – 4 and IL – 10) in patients (Study group) and healthy (Control)

<table>
<thead>
<tr>
<th>Levels of interleukins (pg/ml)</th>
<th>Study group (M ± S.D)</th>
<th>Control (M ± S.D)</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL - 4</td>
<td>23.91 ± 2.09</td>
<td>21.02 ± 2.99</td>
<td>No significant</td>
</tr>
<tr>
<td>IL - 10</td>
<td>14.99 ± 2.30</td>
<td>11.10 ± 1.99</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Results in table (2) showed the level of IL – 4 in allergic conjunctivitis patients was (23.91 ± 2.09) compare to control (21.02 ± 2.99), so significantly increased levels of IL-10 in allergic conjunctivitis patients (14.99 ± 2.30) than control (11.10 ± 1.99), these results were shown in Fig.4.

Figure 4: Comparative levels of interleukins (IL–4 and 10) in allergic conjunctivitis patients and healthy

Discussion

Current study showed more prevalence of allergic conjunctivitis patients in age group (≥ 35 years) as percentage (57.6%) compare to age group (25-35) as (28.1%), this similar results with Fasasi et al., 2014 who showed more prevalence of AC in age groups (17 -33) years as (43.6%), followed by ≥16 years as (42.3%) (8). Ocular allergy is a higher prevalence in the western countries comparing to Africa and Asia (9). Allergic conjunctivitis(AC) in (12–13) year old schoolchildren, was(19%), about (6–30) % of general population, who diagnoses with Allergic conjunctivitis(10), who represents ≥ 90% of all ocular allergies(12).

The current study showed the allergic conjunctivitis are commoner in females (54.5%) than males (45.5%). These results are consistent with the results of previous studies as (13;14;8), whilst differ with the results of researcher Hall and Shilio, 2005, who showed males more predominate than females (15).

Both Interleukin (4 and 10) are anti-inflammatory cytokines which mainly functions via suppressing the pro-inflammatory (16).

During active the inflammatory of allergic eye diseases, the cytokines of T-helper cell (Th1 and Th2) were secretion and over expressed (17). cytokines of Th2 as interleukins (IL- 4; IL-5 ; IL- 9 ; IL -10 and IL-13) will promoting different elements of allergic inflammation as (isotype-switching from IgG1 ; propagation of the
Th2 phenotype) to mobilization eosinophil; maturation and activation mast cell and synthesis immunoglobulin (IgE), that important for allergy \(^{(18)}\).

Interleukin (IL)-4 plays a very important role in inflammatory and fibrotic events in many human diseases \(^{(19)}\). In Inflammation, such as post-cataract surgical or non-allergic cause slightly increased in production level of IL-4, but high produced level from IL-4 were related to allergic reactions \(^{(20)}\), and increased level in the serum of allergic individuals \(^{(21)}\), so IL-10 an anti-inflammatory cytokine (Th2-type cytokine) is secreting by different cell types as (B-cells; T cells; macrophages and monocytes under various conditions of immune activation \(^{(22)}\)). although IL-10 is been shown to suppress a broad range of inflammatory responses and is known to be an important factor in maintaining a balance of overall immune responses \(^{(23)}\). Thus, used IL-10 in developed novel therapy for many human diseases such as autoimmune diseases and allergic responses \(^{(24)}\).

**Conclusions**

1. Significantly higher of allergic conjunctivitis patients in age group (≥35 years), also significantly higher in females than males.
2. High level of IL-4 in allergic conjunctivitis patients was (23.91 ± 2.09) compare to control, so significantly increased levels of IL-10 in allergic conjunctivitis patients compare to control.

**Conflict of Interest:** None

**Source of Funding:** Self

**Ethical Clearance:** The sample taken after patient approval

**REFERENCES**


Costal Cartilage Graft Combination with V-Y Composite Chondromucosal Advancement Flap for Correction Unilateral Cleft Lip Nasal Deformity

Ali Adwal Ali¹, Yasir Naif Qassim²

¹Department of Surgery, College of Medicine, University of Kirkuk, Kirkuk, Iraq; ²Department of Surgery, College of Medicine, University of Baghdad, Baghdad, Iraq

ABSTRACT

Background: Cleft lip nasal deformity is a complex deformity that involves nasal skeleton and soft tissue envelop. This study attempts to improve suboptimal results.

Aim: The main goal of this work is to correct the nasal shape to be relatively normal.

Patients and Method: The sample consisted of (25) patients who have post cleft lip nose deformity. The patients have repaired unilateral cleft lip in infancy but still have a nasal deformity. This study was done during the period from March 2013 to March 2018 using a combination of chondromucosal advancement flap and costal cartilage graft. The patients selected were (17) females and (8) males whose ages ranged between 18 to 28 years.

Result: The study was conducted on patients with post cleft lip nasal deformity in order to obtain a relatively normal-looking nose. Costal cartilage graft was applied to all patients. The good-looking outcome was achieved from the combination of V-Y chondromucosal flap and costal cartilage graft.

Conclusion: V-Y chondromucosal flap when combined with a tough and rich source of cartilage, such as costal cartilage, will increase the rate of patient’s satisfaction.

Keywords: Cleft lip nose, Costal, Cartilage graft, Chondromucosal flap.

Introduction

The deformity of the cleft lip nasal is the result of tissue hypoplasia and malposition of the nasal structures. Considerable debate is one of the etiologic factors of the deformity of the nasal cleft. An intrinsic factor attributes the cause of deformity to the cartilage hypoplasia. Furthermore, another theory relates it to extrinsic factors. However, Sadov et al. proved that there is no histological difference between the non-cleft side and cleft side lower lateral cartilage (LLC). Atheron et al. related nasal deformity to the deformed LLC rather than cartilage deficiency. The studies of Kim et al. and Ai-Qun et al. supported these findings. Huffman and Lierle attributed nasal deformity to extrinsic factors that alter nasal structures. Mainly, from the upper lateral cartilage (ULC), the LLC is drawn downward and outward and away. The most significant defect is the malposition of the alar cartilage. The alar cartilage is displaced in a posterior and caudal position, carrying with it the medial crus which in turn displaced downwards. Hence, the nose adopts the flat appearance, and the nostril is horizontally oriented. Table (1) lists the distinctive unilateral cleft nasal abnormalities.

<table>
<thead>
<tr>
<th>No.</th>
<th>Nasal deformity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Caudal and posterior displacement of alar cartilage genu.</td>
</tr>
<tr>
<td>2.</td>
<td>Shortened cleft side columella with introversion of lateral crus.</td>
</tr>
</tbody>
</table>
3. Lateral bowing of medial crus.
4. Cutaneous webbing between the ala and columella.
5. Lateral, inferior and posterior alar base displacement.
6. Decreased cleft side projection.
7. Deviation of the septum to the non-cleft side.
8. A symmetric maxillary base.

Several operative techniques and variation on the surgery time have been adopted. Each has its advantages and disadvantages. In this article, V-Y chondromucosal composite advancement flap that used by Basta et al. is taken to reposition the cleft side LL cartilage in combination with costal cartilage graft to support the projection of the tip.

**Patients and Method**

This is a prospective study, involving 25 patients with unilateral cleft nasal deformity of variable degrees of severity. There were 17 females, and 8 males with ages ranged between 18-25 years with a mean of 21.5 years. None of the patients underwent secondary rhinoplasty before 18 years of age. Pre-operative photographic documentation is performed for all patients in AP, lateral and basal views to obtain objective measurements of columellar length, nasal apex height and alar base width so as to have a standard measurement to compare them with the postoperative results.

**Surgical Technique:** A conventional open rhinoplasty was applied to all patients using columellar and rim incisions to expose the lower lateral cartilages and distal parts of upper lateral cartilages. After that, a superomedially based V-Y advancement composite chondromucosal flap was designed on the cleft side (see Figure 1).

As shown in Figure 2, once elevated and advanced medially, an interdomal stitch using prolene (5/0) is positioned to improve the cleft side LLC “V” flap and its adherent underlying nasal mucosa. Subsequently, Tajima stitch using prolene (5/0) is employed to hang the LLC to the contralateral ULC to improve the tip contour and projection and hence to improve the symmetry. The V flap is closed in Y fashion using interrupted 5/0 PDS or vicryl sutures. Columellar strut graft using costal cartilage is inserted between the medial crura of LLC and fixed in position using prolene 5/0. In some cases, L-strut costal cartilage graft is applied to those patients with severe nasal deformity. Then, the internal incisions are closed using vicryl 5/0 and skin incisions using prolene (5/0).

**Figure 2:** The V-Y chondromucosal composite advancement flap elevated and advanced medially

Then, addressing the malpositioned ala is performed through a full-thickness peri alar incision. The ala is brought into a position that nearly mirrors the contralateral side and then fixed in position using 5/0 prolene sutures.

Costal cartilage graft is used to enlarge the alar rim base and the retruded acute columello-labial angle. Tough alar rim graft was used to overcome skin and soft tissue deformities. Upside scored onlay graft is used on the LLC of the affected side to overcome the deformity of the lower lateral cartilage. While the diced cartilage graft is used on both sides to overcome the three-dimensional asymmetries on the LLC and ULC (see Figure 3).

**The Types and sites**

- **Dark blue:** extended columellar strut
- **Light blue:** up scored
- **Red:** onlay graft
- **Green:** alar rim graft
- **Yellow:** diced graft
- **Purple:** alar base graft

**Figure 3:** Types and sites of cartilage graft used with chondromucosal flap
Donor sites of cartilage graft are closed in layers after proper hemostasis. The patients were followed up for 6-18 months postoperatively. During the follow-up period (6-18 months), the objective measurements of the columellar length, nasal apex height and alar base width were assessed and compared with that of the preoperative measures. Patients were inquired about the overall aesthetic appearance.

**Results**

The study was carried out during the period from March 2013 to March 2018. 25 patients (17 females and 8 males) have enrolled with ages ranged between 18-28 years. In all patients, there was no skin membrane ischemia or cartilage graft infection. Costal cartilage graft was applied to all patients. The majority of these grafts were in the form of a columellar strut, onlay grafts, diced grafts, meshed grafts, alar rim graft and spreader grafts.

As shown in Figure 4, a comparison of pre-operative versus post-operative objective measurements revealed an increase in columellar length and nasal apex height with a decrease in alar base width (see Table 2).

![Figure 4: A comparison of pre-operative versus post-operative objective measurements. A: Alar base width; B: Nasal apex height; and C: Columellar length.](image)

<table>
<thead>
<tr>
<th>Table 2: Mean measurement obtained pre and post-operatively in the cleft side. (a mean for all cases)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Alar base width</td>
</tr>
<tr>
<td>Columellar length</td>
</tr>
<tr>
<td>Nasal apex height</td>
</tr>
</tbody>
</table>

As for the subjective perception, the majority of the patients (85%) were satisfied with postoperative results. Whereas the remaining patients (15%) were complaining of some residual nasal tip asymmetry and deviation. However, none of them seeks for any revision of the surgery. The mean follow-up period was extended to one year.

**Discussion**

Historically, surgeons showed hesitation to a surgical intervene during the early ages lest it restricts the nasal growth. However, over the past three decades, early and aggressive interventions have become standard practice. Currently, secondary rhinoplasty represents a complicated combination of the original deformity and the effect of initial attempts of repairing. The goals of nasal cleft reconstruction are to address the dysmorphic alar cartilage and vertically short columella on the cleft side and to restore nasal symmetry and projection.

Although different surgical procedures have been suggested to address the problem, only a few of them were well and consistent. V-Y advancement technique of LL cartilage is one of these procedures that reposition the deformed alar cartilage into the normal site. However, it works well in simple deformities, which means that this procedure did not have encouraging results in severe deformities.

In 1977, Nishimura and Ogino described two V-Y flaps to correct the deformity through a closed rhinoplasty approach. Their results were promising in restoring tip projection and nostril shape. However, the authors recognized stenosis as a late complication. This is most probably due to the extensive incisions that involve most part of nostril rim.

Besta et al. modified the approach of Nishimura et al. by adopting single V-Y chondromucosal composite advancement flap figure (2). This modification avoids incisions along the alar base. They achieved agreeable results in improving nostril symmetry and tip projection. However, there was a residual deformity in those patients with severe nasal deformity due to deformed cartilage and skin membrane.

Deviated septum is a key factor responsible for nasal tip deviation in a patient with unilateral cleft nasal deformity. Hence, excision of the curved caudal portion of the septum with columellar cartilage strut graft (fixed or hanging) is needed in almost all cases in addition to a spreader graft on the concave side.
From the above observation, the patients were approached by employing the approach of Besta et al. This was performed using V-Y chondromucosal composite advancement flap to reposition the lower lateral cartilage in normal position and rigidly buttressed the nasal tip using columellar strut with septal extension graft, placed in between the medial crura of lower lateral cartilages, sutured in place. Bilateral alar rim grafts were used to support alar rim and overcome severely deformed soft tissue; while spreader grafts were used routinely. On the other hand, diced grafts were used to fill the irregularities and symmetry on both sides in both vertical and horizontal planes. In this study, As shown in Figure 5 and 6, the costal cartilage of both case 1 and 2 seems to be an excellent source of cartilage grafts.

Agarawal and Chandra stated that residual tip deviation toward the cleft side post-operatively is attributed to the memory of the skin and soft tissue membrane over the cartilaginous tip vault. Hence, the use of an alar rim graft and scored onlay graft in this study seems to help overcome the memory of both skin and underlying cartilage.

Figure 5: Case (1): pre and post-operative photos for the 21 years old male patient, Costal cartilage graft used, spreader graft, columellar strut, alar rim, onlay graft above lower lateral cartilage, diced graft.
Figure 6: Case (2): pre and post-operative photos for the 18 years old female patient. Costal cartilage graft used, alar rim graft, alar base graft, L-strut graft, spreader graft, onlay graft on the LLC.

Conclusions

The V-Y chondromucosal composite advancement flap when combined with rigid columellar support using cartilage strut grafts provided aesthetically agreeable result in terms of tip projection and nostril morphology.

Conflict of Interest: The authors declare that we have no conflict of interest.

Source of Funding: The authors have no sources of funding, so it is self-funding research.

Ethical Clearance: This study was conducted with approval from the research ethics committee at the Department of Surgery, Faculty of Medicine, University of Kirkuk, Kirkuk, Iraq.
REFERENCES


Assessment of Barriers to Implement Nursing Processes

Tameem Thamir Mayouf1, Ahmed Zuhair Abd Al-Qader1, Mohammed Tariq Ali1

1College of Nursing, Mosul University, Mosul, Iraq

ABSTRACT

Background and Aim: Nursing process is a global concept because (it represents the corner stone) and the focus of nursing fundamentals, which make nursing activities coordinated and planned. However, nursing processes are not activated in our health agencies, although nurses have a good knowledge about nursing processes. Therefore, this study aims at assessing the obstacles that prevent the implementation of nursing processes in hospitals in the city of Mosul.

Materials and Method: A descriptive design was used from 10 of December 2017 until the 27 March 2018, the study samples were 313 nurses working at different medical wards.

To collect data, structured self-administered questionnaire was used, data were done by SPSS Version 24 software to identify factors in multivariate bivariate analysis.

Results: the majority of nurses had no prior implementation of nursing processes in clinical setting, about half of samples agreed that lack of cooperation between the nurses can be an obstacle to implement nursing processes, most nurses responded that there is no policy to implement nursing processes. In addition, there are no format, equipment and motivation to apply it.

Conclusion: Females are more than males in the study. Most samples agreed that lack of knowledge about the nursing process may be a hindrance to the nursing process as well as a lack of motivation to use it. About half of nurses had poor knowledge regarding nursing process. The study recommends increasing workshops and trainings for nursing process among practicing nurses through continuous nursing education and mentorship units.

Keywords: Assessment, Barriers, Nursing and Process.

Introduction

Nursing Process are a systematic and continuous method that enables the nurse to provide high-quality care to the patient through the use of problem-solving skills and critical thinking, since it adopts critical thinking to solve health problems, it follows different steps towards patient care.1

The nursing care based on the nursing process should include plans for actions, implementation and evaluation of the goals that are known to each patient. The nursing process meet the health needs of the community because of identification, diagnosis and solving health problems that help nurses make decisions using critical thinking.2

Nursing process include five Phases which are: Assessing, diagnosing, planning, implementing and evaluating. Assessment is a continuous, dynamic, integrated process include: collecting, organizing, validating and documenting data in a manner that can be retrieved when needed, Assessment includes collection of subjective and objective data from multiple sources can draw a close image of the patient’s condition and extent of progress, which identify the patient’s health problems and needs.

Nursing diagnosis is the process of analyzing the data collected by the nurse about the patient’s condition, the diagnosis helps in identifying the patient’s health problems and then determining his daily needs. The care and planning of the patient is the primary goal and purpose of the whole picture is what the patient needs.4

Planning begins to provide care to the patient by identifying the priorities and objectives that lead to achieve the expected outcomes desired by the patient where the results are achieved through the identification and then the application of nursing interventions.3
Implementation start when a nurse performs the pre-planned nursing interventions included in the nursing plan. In order to evaluate the patient’s changing needs, the nurse must have the knowledge, experience and skill that helps the nurse determine the progress of the patient’s condition by monitoring the patient’s response after the implementation of the nursing interventions identified in the pre-care plan.

The study aimed to determine the factors that affect the implementation of nursing process, and assess the level of nurses’ knowledge regarding nursing process.

Methodology

Study Design: A descriptive cross-sectional-design was used to assess the obstacles and factors that prevent the implementation of nursing process in Mosul hospitals.

Study Area: The study was carried out in four teaching hospitals in Mosul city, including several specialties such as medical-surgical, pediatric and maternity.

Study Population: The study samples were 313 nurses working at medical units, surgical units, maternity units, Psychiatry units, and Accident and Emergency departments.

Study Instruments: A pre-tested semi-structured questionnaire was used to collect data from nurses on barriers of the implementation of nursing process.

Tool I: Nursing Process Questionnaire: This tool includes two parts:

Part 1: General characteristics of nurses: including age, gender, academic achievement, years of practice and implementation of nursing process.

Part 2: Nurses ‘Knowledge of Nursing Operations: This section covers 23 MCQ questions that assess the level of nurses’ knowledge of nursing care.

Tool II: Factors affecting the implementation of nursing process

This tool was modified from (Akbari & Shamsi, 2011), and used to present the nurses’ view of the factors limiting the application of nursing process. Each nurse responds with yes or no to each of the 17 factors to answer yes (1) and no (0).

Period of study: From 10 December 2017 until the 27 March 2018

Data collection and entry: The questionnaire was administered by the researcher. Upon nurses filling the questionnaires, they were checked for completeness. Data was entered into the computer in preparation for data analysis.

Data analysis: Results were analyzed using SPSS version 24. Variables were measured using frequency and percentage. After obtaining official approvals from hospitals and during the period of data collection, written consent was obtained from the nurses participating in the study while maintaining the confidentiality of participation during the whole study.

Results

Table 1: Demographical Characteristics of the Study Sample N = 313

<table>
<thead>
<tr>
<th>Socio-demographic percentage</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (in years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 24</td>
<td>29</td>
<td>9.3</td>
</tr>
<tr>
<td>25–29</td>
<td>92</td>
<td>29.4</td>
</tr>
<tr>
<td>30–39</td>
<td>118</td>
<td>37.7</td>
</tr>
<tr>
<td>≥ 40</td>
<td>74</td>
<td>23.6</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>125</td>
<td>39.9</td>
</tr>
<tr>
<td>Female</td>
<td>188</td>
<td>60.1</td>
</tr>
<tr>
<td>Experience (in years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 4</td>
<td>36</td>
<td>11.5</td>
</tr>
<tr>
<td>5–9</td>
<td>79</td>
<td>25.2</td>
</tr>
<tr>
<td>10–14</td>
<td>72</td>
<td>23</td>
</tr>
<tr>
<td>15–19</td>
<td>84</td>
<td>26.8</td>
</tr>
<tr>
<td>≥ 20</td>
<td>42</td>
<td>13.5</td>
</tr>
<tr>
<td>Educational</td>
<td></td>
<td></td>
</tr>
<tr>
<td>high nursing school</td>
<td>141</td>
<td>45</td>
</tr>
<tr>
<td>Institute</td>
<td>94</td>
<td>30</td>
</tr>
<tr>
<td>College</td>
<td>78</td>
<td>25</td>
</tr>
<tr>
<td>Perform the nursing process in clinical situation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Does not apply</td>
<td>313</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Obstacles that limit the implementation of nursing process from the perspective of nurses

<table>
<thead>
<tr>
<th>Obstacles</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge deficient toward the nursing process</td>
<td>61.7</td>
<td>38.3</td>
</tr>
<tr>
<td>No enough motivation in using it</td>
<td>97.1</td>
<td>3.9</td>
</tr>
<tr>
<td>Staff professional qualification</td>
<td>88.2</td>
<td>11.8</td>
</tr>
<tr>
<td>non-cooperation between nursing staff</td>
<td>49.1</td>
<td>50.9</td>
</tr>
</tbody>
</table>
Table 3: Distribution of Nurses’ knowledge level about nursing process (N = 313)

<table>
<thead>
<tr>
<th>Knowledge Level</th>
<th>Freq.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor &lt; 12.5</td>
<td>153</td>
<td>48.9</td>
</tr>
<tr>
<td>Average 12.5- &lt; 16</td>
<td>115</td>
<td>36.7</td>
</tr>
<tr>
<td>Good ≥ 16</td>
<td>45</td>
<td>14.4</td>
</tr>
<tr>
<td>Total score = 25</td>
<td>313</td>
<td>100</td>
</tr>
</tbody>
</table>

Discussions

This study identify the Obstacles that limit the implementation of nursing process among nurses in selected hospitals, the socio-demographical results of the this study showed that females constitute the highest percentage of study samples, which constitute 60.1% in comparison with males which constitute 39.9%. These findings are similar to studies of Ndayi, Zeray, and Mbithi that found 77% of nurses were females, 61.5% of study participants were females and 66.4% of respondents were females, respectively.8,9,10 This study has different findings than those by Fadia which found 91% of study samples were females.7

In the current study, only 11.5% of nurses had less than 4 years of experiences, and these results are not supported with the studies that were conducted in Ethiopia which found that 36.6% of nurses’ experiences are below 5 years. They are also not supported with the study of Mbithi which contacted in Nairobi that found 26.5% of study participants had years of experiences below 5 years.11,9

The study represents that 25.2% of nurses had 5-9 years of experiences, these results are supported by Mbithi who found 29.4% of respondents had 5-9 years of experiences, also supported by Yihun that found 23.1% of nurses had 5-10 years of experiences.9,12

According to the educational level of the nurses, the result represents that 30% of nurses hold Institute degrees, while 25% of nurses hold baccalaureate degree in nursing. These results are not accepted by Mbithi, Fadia, Zeray, and Yihun studies in which they found 57.5% of nurses had Diploma degree while 30.6% of nurses had B.Sc. degree, about 94.0% of nurses hold BSc in nursing, 65.7% of Respondents were holding Diploma and 34.3% of Respondents were hold BSc in nursing, and 44.5% of study participant hold Diploma. Respectively.7,9,10,12

It was observed that the majority of the samples (100.0%) never implemented nursing process previously. The study revealed that most nurses (100%) have not carried out the practice of nursing process previously. This result strongly agreed with the study of Fadia which found that (100%) of samples had never performed nursing process in clinical situation, this result is not agreed with the studies of Yihun and Fisseha, both found (35%) and (18.7%) of respondents were implement nursing process respectively.7,12,13

Nurses should be aware of nursing process and their parts in order to be able to apply processes effectively and equitably. From the total number of nurses, (61.7%) of them have insufficient background about the nursing process or some part of it, this result may be explained by Fadia which represents that 63% of nurses were select lack of sufficient information as the obstacles that effect on implementations of nursing process, and may be unexplained by Zeray which found that 83.3% respondents’ opinion regarding lack of sufficient information as a factors that effect on implementations of nursing process.7,10

The majority of nurses (97.1%) indicated that there were no motivations to using nursing process in clinical setting, similar result by Fadia which found 100% of nurses agree about no enough motivation in using nursing process, while different result by Zeray that represent 58.8% of nurses indicate lack of motivation for implement nursing process.7,10

The result of the study showed that, 88.2% of Participants agreed that Staff qualification Can limit the application of nursing processes. This result is accepted with Fadia’s study that found 93% of nurses agree about lack of education can be barrier to implementation of nursing process, while this result is not accepted with
Dennis’s study that represented 59% of nurses agreed that educational level may effect on application of Nursing Process.7,14

Also, 49.1% of the Participants that gave their opinions on the lack of cooperation among them, which may be one of the reasons that prevent the practice of nursing process in clinical setting. This result may be explained by Fadia’s study that found 39% of nurses believe that lack of cooperation among them leads to non-application of the nursing process.7

All nurses (100%) who participated in the current study gave their opinions that there is no formal chart for writing nursing process in all health care agencies, this result is strongly agreed with the study of Fadia which found that 100% of nurses gave their opinions about no format in clinical setting to writing nursing process.7

The success of the implementation of nursing process is related to the importance of time utilization and its suitability with the workload, 87% of the participants agreed that there is not enough time for the nurse to apply nursing process. This finding is in line with the Ndayi and Fadia studies, which found that the majority of nurses (62.6% and 100%) attributed one of the reasons for non-application of nursing process is lack of time.7,8 While this result is not corresponding to Zeray, Dennis and Shahnaz studies found that (49% and 7.3%) of nurses attributed a lack of time as one reason to implement nursing process.10,13,14

Nursing process should be placed within the policies of health agencies so that the nurse can implement it into the clinical setting. In the current study, most nurses (100%) have not responded to apply nursing process because the policy of health institutions does not allow this, different opinion by studies of Ndayi and Fadia both found that (17% and 53%) of nurses agree that there are no rules in hospital to implement nursing process, respectively.7,8

In addition to insufficient time, lack of equipment can lead to non-implementation of nursing process, therefore, the majority of nurses (70%) instructed that non-applying of nursing process to insufficiency of equipment, this result is consistent with the studies of Zewdu, Fisseha and Mbithi who represented that (61.2%, 75.4, 71.5 and 63) of nurses said the lack of equipment can be barrier to implement nursing process.5,9,11,13

While different results by Shahnaz and Yihun studies which found that the nurses were asked a question, lack of equipment for the implementation of nursing process were (25.8% and 48%).12,15

The nurse to patient ratio and workload are among the criteria that increase the level of health care for the patient. Therefore, the current study proved that the majority of nurses (55%) gave their opinions about low nurses to patient ratio and (47.3%) of nurses agree that workloads can be one of the obstacles to implementing nursing process. This result is accepted with Shahnanz study which represented that (43.5%) of samples gave their opinions that The lack of full implementation of nursing process is that the ratio of nurses to patients is disproportionate to the workload, while this result is not accepted by Zeray and Ndayi studies which they found (63.7%, 75.6%) of nurses have listed a shortage of nursing staff as a barrier to the implementation of nursing process.10,15

The study showed that 36.7% of nurses had an average knowledge of the nursing process while 48.9% of them had poor knowledge’ level, this result may be explained by Mbithi which found that only 3.7% of study samples had poor level of knowledge in compares with average level which was 35.1%.9

Conclusion

Females are more than males in the study, quarter of the samples had graduated from college of nursing. The majority of nurses have never applied the nursing process in a clinical case at all.

The majority of nurses agreed that the lack of motivation for the implementation of nursing process is an obstacle to either nursing process and a lack of scientific background for nurses. Most nurses reported that nursing process were not applied for lack of time and workload, and also they have been reported that the policy of health agency does not allow for the implementation of nursing process and the absence of a format to applying it.

Nearly half of the nurses involved in this research had low level of knowledge of nursing process

Recommendation: The researchers recommend that continuous nursing education units intensify workshops and nursing training workshops involving nurses working in the field of health.
The researchers also recommends that the department of health Nineveh/department of nursing to follow the program mainstream the nursing process as an input to expand its application in clinical situation.

There is a need for similar future studies to follow up the application of nursing process in the clinical situation.

**Ethical Considerations:** The official approvals were obtained from the provincial health department, county health administration committee and the hospital administration and the approval of the concerned parties who will participate in the research in writing after the purpose of the research has been explained in addition to its objectives

**Source of Funding:** Self

**Conflict of Interest:** The authors has no conflict with interests in the study declaration.

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The Effect of Life Skill Education on Cigarette Control in Adolescents

Umar Daeng Palallo¹, Muhammad Syafar², Ridwan Amiruddin², Indar², Ahmad Yani³
¹Postgraduate Doctoral Program Student, ²Public Health Faculty, Hasanuddin University, Makassar, Indonesia; ³Faculty of Public Health, Universitas Muhammadiyah Palu, Indonesia

ABSTRACT

The World Health Organization (WHO) has warned that in the decade 2020-2030 tobacco will kill 10 million people per year, 70% of which occur in developing countries. The purpose of this study was to determine the smoking behavior of adolescents in the coastal area of Sinjai Regency and the factors related to smoking behavior in adolescents in the coastal area of Sinjai Regency. The method used in this research is cross-sectional study. The study population was adolescents aged between 13-16 years as many as 231 people. The research sample of 50 people. The study was conducted in Pattongko Village, Tellulimpoe District, Sinjai Regency. The study was conducted October 1 - 28 2018, by monitoring smoking behavior in adolescents in coastal areas in Sinjai district. The results of the study explained that the smoking behavior of adolescents based on frequent/high categories was 41 respondents (82%) and rarely/low was 9 respondents (18%); and health risks experienced by adolescents in the risk categories of 39 respondents (78%) and 11 respondents (22%). Adolescent smoking behavior in the frequent/high category that experiences a risk of 32 respondents (78.0) and no risk for 9 respondents (22.0%); while in the category of rare/low who experienced a risk of 7 respondents (77.8%) and no risk of 2 respondents (22.2%). Where the chi square test results of 0.000. That is, there is a relationship between smoking behavior with health risks experienced by adolescents.

Keywords: Life Skill Education, Cigarette Control

Introduction

Cigarettes are one of the leading causes of death in the world and are the only legal product that kills up to half of its use. Smoking habit causes at least 30 types of diseases in humans, in fact smoking is difficult to eliminate and rarely recognized by people as a bad habit(1).

Smoking is a habit that is carried out by the general public, the dangers of smoking will also lurk its future. The future of smokers will be bleak, see when they are addicted to consuming a cigarette. If it is fatal, then they will do everything they can to enjoy a cigarette. Diseases that arise will depend on the levels of harmful substances contained, the period of smoking habit, and how to smoke a cigarette (2). The younger a person starts smoking, the greater the risk that the person gets the disease when he is old. The smoking habit is very alarming, every time we encounter people in various ages, especially teenagers. Adolescence is a period where an individual experiences a transition from one stage to the next and experiences changes in both emotions, body, interest in behavior patterns, and also full of problems. Teenagers now often underestimate their health. They only think of what will make them happy, like cigarettes. Teenagers are more likely to use cigarettes at a young age without paying attention to the consequences that will be caused and lack of awareness of themselves so that they do not pay attention to the dangers of using these cigarettes (3).

The results of the study of teenage reasons for smoking include: trial and error, curiosity, just wanting to feel, being lonely, to look stylish, imitating parents, fun, relieving tension, so as not to be said sissy, a symbol of maturity, looking for inspiration. Other reasons are also as a stress reliever, saturation reliever, prestige, environmental influences, anti-acid mouths,
mouthwashes, pleasure. Moreover, excessive smoking can cause the death of 10% of the world’s population. This means that one in ten planet earth will die from smoking. Even in 2030 this figure will go faster, which is about half of smokers will die from smoking. Half of those who died are a group of young or productive age\(^4\).

The World Health Organization reports that smoking is the number one killer in the world. In its annual report, WHO states that in the 20th century around 100 million people died from smoking. If there is no attempt to control tobacco/cigarettes then during the 21st century at least one billion people of the world will die in vain, an increase of 10 times compared to deaths from cigarettes in the 20th century \(^5\).

Lots of evidence shows that smoking triggers various diseases and adversely affects health and the environment. Resistance to smoking occurs in almost all countries with different levels. Awareness of the dangers of smoking to health in developed countries causes the level of community opposition in developed countries is relatively strong compared to developing countries or underdeveloped countries. In the United States, one of the goals of The Healthy People 2010 is to reduce the prevalence of teenagers who smoke to reach 12% in 2010. By using simSmokemodel it is found that this is impossible to achieve, but can at least approach the expected results. For this reason, it is necessary to strengthen the cigarette tax, clean air, the prohibition of advertising in the media and global campaigns \(^6\).

Indonesia is the 4th most populous country in the world, with a population of 255.5 million people and an annual population growth rate of 1.38%. This large population, makes the country of Indonesia, a very promising market for various industries, including the cigarette industry. Cigarette consumption in Indonesia reaches 215 billion sticks per year. In Indonesia there are 60% smokers, 59% of them are men and 37% are women. Two out of three adult Indonesian men are smokers with an average cigarette consumption of 13 cigarettes per day\(^1\). This fact puts Indonesia in third place in the world with the highest number of adult male smokers below China and India. Even though the average age of starting smoking is 17.6 years, around 75% of Indonesian smokers start smoking before they are 20 years old. As many as 78.4% of those aged 15 years and over are exposed to cigarette smoke at home, 63.4% in government offices, 17.9% in health facilities, 85.4% in restaurants, and 70% in public transportation facilities \(^5\).

### Research Methodology

The method used in this research is cross-sectional study. The study population was adolescents aged between 13-16 years as many as 231 people. The research sample of 50 people. The study was conducted in Pattongko Village, Tellulimpoe District, Sinjai Regency. The study was conducted October 1 - 28 2018, by monitoring smoking behavior in adolescents in coastal areas in Sinjai district.

### Results & Discussion

The results of this study can be seen in table 1, that the smoking behavior of adolescents in the frequent/high category is at risk of 32 respondents (78.0) and not at risk of 9 respondents (22.0%); while in the category of rare/low who experienced a risk of 7 respondents (77.8%) and no risk of 2 respondents (22.2%). Where the chi square test results of 0.000. That is, there is a relationship between smoking behavior with health risks experienced by adolescents.

**Table 1: Smoking Behavior and the Risk Adolescents Experience in Smoking**

<table>
<thead>
<tr>
<th>Smoking Behavior</th>
<th>Risks Experienced</th>
<th>Total</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Risk</td>
<td>No risk</td>
<td>n</td>
</tr>
<tr>
<td>Frequent/High</td>
<td>32</td>
<td>9</td>
<td>41</td>
</tr>
<tr>
<td>Rarely/Low</td>
<td>7</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>11</td>
<td>50</td>
</tr>
</tbody>
</table>

The results of the study showed that teenagers tend to have a great curiosity. Because adolescence is a period where someone is still looking for their true identity and unstable, especially on environmental influences. Teenager is a period where an individual experiences a transition from one stage to the next and experiences
changes in both emotions, body, interests, behavior patterns, and also full of problems.

Many studies have shown that teenagers are more likely to smoke than adults. Even based on the results of the reset shows that teenagers smoke every year is increasing. In general they claim to have started smoking between the ages of 9 to 12 years. Currently, of the 1,100 million cigarette smokers in the world, 45% of them are students.

Every year an estimated 4 million people die due to tobacco-related cases. Based on a 1999 report from the World Health Organization (WHO), around 250 million children in the world will die if tobacco consumption is not stopped immediately. The smoking habit for students starts because of lack of information and misunderstanding of information, being consumed by advertisements or persuaded by friends (7).

According to the results of the Indonesian Heart Foundation questionnaire as many as 77% of students smoke because of being offered by friends, association outside the home is also a matter of great influence on the mining of a teenager. It has often been found that teenagers will join in smoking when there is a friend who offers dangerous goods to him. Even more sad, if many teenagers think they will look cooler or more cool if you consume cigarettes (8).

One of the dangers of smoking for students is health. Adolescent health will be very disturbed, because indirectly there are thousands of toxic substances that enter their bodies. Also increases the risk of lung cancer and heart disease at a young age.

In addition, skin health is three times more likely to have wrinkles around the eyes and mouth. The skin will age prematurely or often called premature aging. In terms of reproduction, early smoking can cause impotence, reduce sperm count in men and reduce fertility in women.

Reducing the dangers of smoking cannot be done by filtering cigarettes because filtering cigarettes might only filter a portion of tar and nicotine but does not block even a poison from cigarette sap, and also cannot be done with menthol. Because menthol only affects the taste of smoke. It does not reduce the danger of smoking (9).

Even though it only exhales cigarette smoke without smoking it, it still has a risk of damages because: Most of the chemicals in cigarette smoke (including nicotine) can be absorbed through the mouth and nose. Nicotine can also be absorbed through the skin. The exhaled smoke will stay in the air for a long time and if you breathe again, the smoke will enter the lungs again. Most smokers do not realize that they smoke cigarettes when they exhale.

Most poisons in cigarette smoke are absorbed into the bloodstream. When a pregnant woman smokes, these ingredients pass from the mother to the baby’s blood. Baby smokers may be born underweight, not months old or unable to live. Mother babies who smoke are more likely to die in the first year. If they continue to live, they have a worse risk of contracting the lungs and also poor physical and mental development.

Smoking is one of the biggest causes of death and causes of premature death in human history that can be prevented. The current pattern of smoking allows 500 million people who are now living will eventually die from consuming cigarettes. More than half are children and adolescents. It is estimated that in 2030, tobacco is the single biggest cause of death worldwide, which causes around 10 million deaths per year (5).

The number of smokers from year to year continues to grow. Data presented by the American Health Association (1997) shows that tobacco kills more than 400,000 people worldwide every year. Every day, 3,000 children start smoking. Every year there are 1 million teenagers who become regular smokers and it is estimated that 1 out of 3 teen smokers will die young due to smoking habits. The age of beginner smokers is getting younger and younger (5).

In Indonesia, based on the Household Health Survey the number of smokers is around 32.9% men and 3.6% women. Smoking is a future threat to humanity. Especially in students who are the age of the formation of the next generation. Of course we cannot allow this to continue. Efforts should be made to reduce the increase in the number of active smokers among adolescents. Because with this increase also increasingly adds to the number of passive smokers. And the population of passive smokers is far greater. Among them are pregnant women, babies and toddlers, as well as funny and smart children (10,11).

The increasing prevalence of smoking in developing countries including Indonesia, especially among women and adolescents, causes smoking to become increasingly
serious. Even the phenomenon shows that this habit can be seen in students, especially health students themselves about the knowledge and attitudes of smokers students on the influence of smoking on Unhas son’s ramsis, obtained about 10 health students or about 7.5% of 152 samples. Moreover, the impact of smoking also increases on passive smokers, ie people who don’t smoke but are badly affected by smoking. Cigarette consumption in Indonesia is growing the fastest in the world and the main cause is beginner smokers, 44% smokers aged 10-19 years and 37% aged between 20-29 years. The total active smokers in Indonesia has reached 70% of the total population of Indonesia, or as many as 141, 44 million people. While the tendency of smokers among women and adolescents at the age of 15-18 years also shows an increase (6,12–14).

Conclusions

This study concludes that teenage smoking behavior based on frequent/high categories is 41 respondents (82%) and rarely/low is 9 respondents (18%); and health risks experienced by adolescents in the risk categories of 39 respondents (78%) and 11 respondents (22%). Adolescent smoking behavior in the frequent/high category that experiences a risk of 32 respondents (78.0) and no risk for 9 respondents (22.0%); while in the category of rare/low who experienced a risk of 7 respondents (77.8%) and no risk of 2 respondents (22.2%). Where the chi square test results of 0.000. That is, there is a relationship between smoking behavior with health risks experienced by adolescents.

Ethical Clearance: Our study was not directly applied on human, hence ethical clearance was not required.

Source of Funding: Self funding.

Conflict of Interest: The author declare that he has no conflict of interest.

REFERENCE

Effectiveness of an Educational Program on Women’s Knowledge about Family Planning at Primary Health Care Centers in Al-Diwanyah Governorate

Sajida Khamees Abdullah¹, Wissam Jabbar Kasim², Fatima H. Abbas¹,², Eqbal GH. Ma’ala²
¹Teaching Assistant, College of Nursing, University of Al-Qadisiyah, Iraq; ²Assistant Professor, Community Health Nursing Department, College of Nursing, University of Baghdad, Iraq

ABSTRAcT

Objectives: To determine the effectiveness of the educational program on women’s knowledge about family planning.

Method: A quasi-experimental study was conducted between April 2nd, and November 10th, 2018. The study included a purposive sample of 50 women aged 15-29-years who were recruited from primary health care centers in Al-Diwanyah Governorate. This sample was randomly divided into two groups; study and control groups. Each group included 25 women. Data were analyzed using the descriptive statistical measures (frequency, percentage, arithmetic mean, mean scores, standard deviation) and the method of analysis of inferential analyses (t-test, Pearson correlation).

Results: The study results revealed that the educational program positively influenced women’s knowledge about family planning in the primary health care centers in the study group.

Conclusion: There were improvements in women’s knowledge about family planning that could reflect the positive influence of the educational program in the study group.

Recommendations: There is a need to continue applying the program to all governorates and to those who marry. A special men’s program on family planning should be implemented, because they represent the second part of responsibility. And to raise awareness of the whole community about family planning to determine reproduction through the media as collective awareness.

Keywords: Educational Program, Women’s Knowledge, Family Planning

Introduction

The widespread adoption of family planning represents one of the most dramatic changes of the 20th century. The growing use of contraception worldwide enable couples to choose the number and spacing of their children and has had tremendous lifesaving benefits. Yet despite these impressive gains, contraceptive use is still low and the need for contraception high in some of the world’s poorest and most populous places. There is a safe and effective family planning method for every woman that can enable her to protect her health and that of her children. More than half of all couples in the developing world are using family planning to delay, space, or limit future pregnancies, yet the need for family planning keeps increasing as the number of women of reproductive age continues to grow. An estimated (137) million women worldwide have an unmet need for family planning they are not using any method and report that they want to avoid a pregnancy.¹

In 1900, the world population was estimated to be about 1.7 billion. By 1999, it had risen to 6 billion (WHO estimate). Currently, 80% of the world population resides in less-developed countries and this figure will rise to 90% by 2050. So, family planning helps people have the desired number of children, which in turn improves the health of mothers and contributes to the nation’s social and economic development. In most developing countries, including Ethiopia, it is common practice for women to have too many children, too close to one another. As a consequence, the population size of the country has grown dramatically but economic growth has not kept in parallel with it. Such an unbalanced
population size will inevitably have a negative impact on the wellbeing of the nation. Family planning is one of the strategies which is proving to be effective in tackling these problems. (2)

United Nations Population Fund (UNFPA) is committed to closing the gap between the number of individuals who use contraceptives and those who would like to delay space or limit their families. UNFPA supports family planning services in countries around the world, usually within a broader context of reproductive health services. UNFPA supports family planning services in offering a wide selection of methods

1. reflect high standards of medical practice
2. are sensitive to cultural conditions
3. provide sufficient information about proper use or possible side-effects
4. address women’s other reproductive health needs

...imparts training for the use of various family planning devices. (3)

The development of modern contraceptive methods through scientific discovery, coupled with significant progress in the women’s health and rights movements, has paved the way to greater individual freedom and enhanced ability to decide on the number and spacing of children.

- These freedoms are enshrined in international human rights law, under the rights to health,
- to decide on the number and timing of children,
- to information,
- to privacy,
- to non-discrimination and
- to be free from inhumane and degrading treatment, as well as several international consensus statements. (4)

Study Design: A quasi-experimental design was used to guide this study.

Sample and Setting: A purposive sample of (50) women is selected throughout the use of non-probability sampling approach. The sample of the study includes women who visits the Family Planning Centers in Primary Heath Care Centers at Al-Diwanah. The sample is divided into study and control groups; each group includes (25) women.

Data Collection: Data were collected from April 8th, 2018 to September 13th, 2018 through the following techniques:

1. Each woman in the study is interviewed for the explanation of the study objectives (both the study and control groups).
2. All women in the study and control groups were exposed to pre-test.
3. All women in the study group were exposed to the Educational Program about Family Planning, at the same time in lectures-hall at Al-Taleea General Dispensary, in in Al-Diwanah Governorate.
4. All women in the study and control groups are exposed to post-test I immediately after implementation of the Educational Program about Family Planning.
5. All women in the study and control groups were exposed to post-test II four weeks after the post-test I.
6. Data were collected using self-reported study instruments, observation, and interview techniques.

Data Analyses

Data were analyzed using the statistical package (SPSS) ver. (22.0) for windows. The descriptive statistical measures Frequencies, Percent, observed Frequencies, Percent, Mean of score (MS), Standard Deviation (SD), repeated measures ANOVA, as well as scoring scales of 3 categories, are used, and such that (Don’t know, Not sure, and Know), and are responding with integer numbers (0, 1, and 2) respectively.

Results

Table 1: Distribution of the studied groups according to (SDCv.) with comparisons significant

<table>
<thead>
<tr>
<th>SDCv.</th>
<th>Groups</th>
<th>Study</th>
<th>Control</th>
<th>C.S.(*)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at marriage</td>
<td>Classes</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>&lt; 15</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>15 – 19</td>
<td>12</td>
<td>48</td>
<td>14</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>20 – 24</td>
<td>10</td>
<td>40</td>
<td>7</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>25 – 29</td>
<td>2</td>
<td>8</td>
<td>4</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

C.C.=0.212 P=0.503 (NS)
Relative to “Age at marriage” majority age (15–19) age-old (n = 12; 48%), and (n = 14; 56%) for the study and controlled groups respectively, while “Current Age” are seems to be distributed along age groups with focusing in middle of reproductive period. Most of occupational subjects are housewife (n = 17; 68%, n = 16; 64%) in the study and controlled groups respectively. Monthly income are focused at the first and second classes (n = 9; 36%; n = 14; 56%) in the study and controlled groups respectively. Regarding Educational Levels, most have primary, and secondary graduate levels (n = 17; 68%), as well as most have urban outskirts residency (n = 20; 80%) in each group. Finally, most of studied women has independent status (n = 20; 80%) in each group.

### Table 2: Distribution of the studied groups according to women’s knowledge

<table>
<thead>
<tr>
<th>Women’s knowledge about periods between pregnancy and another</th>
<th>Groups</th>
<th>Study</th>
<th>Control</th>
<th>C.S. (*)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Women’s knowledge about periods between pregnancy and another, should be: Less of months</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don’t know</td>
<td>16</td>
<td>64</td>
<td>18</td>
<td>72</td>
<td>C.C.=0.085</td>
</tr>
<tr>
<td>Not sure</td>
<td>9</td>
<td>36</td>
<td>7</td>
<td>28</td>
<td>P=0.544</td>
</tr>
<tr>
<td>Know</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Women’s knowledge about periods between pregnancy and another, should be: Less than a year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don’t know</td>
<td>13</td>
<td>52</td>
<td>18</td>
<td>72</td>
<td>C.C.=0.214</td>
</tr>
<tr>
<td>Not sure</td>
<td>9</td>
<td>36</td>
<td>6</td>
<td>24</td>
<td>P=0.300</td>
</tr>
<tr>
<td>Know</td>
<td>3</td>
<td>12</td>
<td>1</td>
<td>4</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Women’s knowledge about periods between pregnancy and another, should be: Less than two years</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don’t know</td>
<td>12</td>
<td>48</td>
<td>16</td>
<td>64</td>
<td>C.C.=0.207</td>
</tr>
<tr>
<td>Not sure</td>
<td>11</td>
<td>44</td>
<td>6</td>
<td>24</td>
<td>P=0.326</td>
</tr>
<tr>
<td>Know</td>
<td>2</td>
<td>8</td>
<td>3</td>
<td>12</td>
<td>NS</td>
</tr>
</tbody>
</table>
Women’s knowledge about periods between pregnancy and another, should be: Less than three years

| Don’t know | 13 | 52 | 15 | 60 | C.C.=0.196 |
| Not sure  | 8  | 32 | 9  | 36 | P=0.368 (NS) |
| Know      | 4  | 16 | 1  | 4  |

Women’s knowledge about periods between pregnancy and another, should be: Less than four years

| Don’t know | 13 | 52 | 18 | 72 | C.C.=0.298 |
| Not sure  | 8  | 32 | 7  | 28 | P=0.087 (NS) |
| Know      | 4  | 16 | 0  | 0  |

Relative to asking about women’s knowledge about periods between pregnancy and another shows that most of studied subjects are answered with don’t know level, and that were along all multiple and probable choices, as well as who has answered the correct choice, concerning should be not less than two years only 2(8%), and 3(12%) in the study and control groups respectively.

Table 3: Tests of Within-Subjects Effects for Women’s knowledge about benefit of family planning for mother, child, family, and community

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>4224.107</td>
<td>2</td>
<td>2112.053</td>
<td>827.175</td>
<td>.000</td>
<td>.972</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>4224.107</td>
<td>1.00</td>
<td>4224.107</td>
<td>827.175</td>
<td>.000</td>
<td>.972</td>
</tr>
<tr>
<td>Huynh-Feldt</td>
<td>4224.107</td>
<td>1.00</td>
<td>4224.107</td>
<td>827.175</td>
<td>.000</td>
<td>.972</td>
</tr>
<tr>
<td>Lower-bound</td>
<td>4224.107</td>
<td>1.00</td>
<td>4224.107</td>
<td>827.175</td>
<td>.000</td>
<td>.972</td>
</tr>
<tr>
<td>Error (Knowledge)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>122.560</td>
<td>48</td>
<td>2.553</td>
<td></td>
<td></td>
<td>.972</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>122.560</td>
<td>24.00</td>
<td>5.107</td>
<td></td>
<td></td>
<td>.972</td>
</tr>
<tr>
<td>Huynh-Feldt</td>
<td>122.560</td>
<td>24.00</td>
<td>5.107</td>
<td></td>
<td></td>
<td>.972</td>
</tr>
<tr>
<td>Lower-bound</td>
<td>122.560</td>
<td>24.00</td>
<td>5.107</td>
<td></td>
<td></td>
<td>.972</td>
</tr>
</tbody>
</table>

There was a (a priori p = 0.01) significant difference (F (1.000, 24.000) = 827.175, p = 0.01) in the women’s knowledge about benefit of family planning for mother, child, family, and community over time. The omnibus effect (measure of association) for this analysis is .972, which indicates that approximately 97% of the total variance in the women’s knowledge about benefit of family planning for mother, child, family, and community values is accounted for by the variance in the administered intervention.

Table 4: Tests of Within-Subjects Effects for Women’s knowledge about the risks of sexually-transmitted diseases items over time

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>STI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>3064.560</td>
<td>2</td>
<td>1532.280</td>
<td>140.333</td>
<td>.000</td>
<td>.854</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>3064.560</td>
<td>1.00</td>
<td>3064.560</td>
<td>140.333</td>
<td>.000</td>
<td>.854</td>
</tr>
<tr>
<td>Huynh-Feldt</td>
<td>3064.560</td>
<td>1.00</td>
<td>3064.560</td>
<td>140.333</td>
<td>.000</td>
<td>.854</td>
</tr>
<tr>
<td>Lower-bound</td>
<td>3064.560</td>
<td>1.00</td>
<td>3064.560</td>
<td>140.333</td>
<td>.000</td>
<td>.854</td>
</tr>
<tr>
<td>Error (STI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>524.107</td>
<td>48</td>
<td>10.919</td>
<td></td>
<td></td>
<td>.854</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>524.107</td>
<td>24.00</td>
<td>21.838</td>
<td></td>
<td></td>
<td>.854</td>
</tr>
<tr>
<td>Huynh-Feldt</td>
<td>524.107</td>
<td>24.00</td>
<td>21.838</td>
<td></td>
<td></td>
<td>.854</td>
</tr>
<tr>
<td>Lower-bound</td>
<td>524.107</td>
<td>24.00</td>
<td>21.838</td>
<td></td>
<td></td>
<td>.854</td>
</tr>
</tbody>
</table>
There was a (a priori $p = 0.01$) significant difference ($F(1.000, 24.000) = 140.333, p = 0.01$) in the women’s knowledge about the risks of sexually-transmitted diseases over time. The omnibus effect (measure of association) for this analysis is $0.854$, which indicates that approximately $85\%$ of the total variance in the women’s knowledge about the risks of sexually-transmitted diseases values is accounted for by the variance in the administered intervention.

**Discussion**

Analysis of evaluation of women’s general information presents dramatic change of the explains summary statistics of knowledge about family planning (contributes in spacing between pregnancies) in helping part of questionnaire’s items over time due to applying proposed of an educational program on women’s knowledge about family planning at primary health care centers in Al-Diwanyah Governorate with comparisons significant. Results of testing significant with reference of studied items, as well as scoring scales assessments concerning effectiveness of applying educational program were reported highly significant differences toward impact of program through raising knowledge grades of studied respondents at the post 1 period, and that could be able to confirms importance and successfulness of applying proposed program.

This result is consistent with that of the United Nations family planning allows individuals and couples to anticipate and attain their desired number of children and the spacing and timing of their births. It is achieved through the use of contraceptive methods and the treatment of involuntary infertility. A woman’s ability to space and limit her pregnancies has a direct impact on her health and well-being as well as to the outcome of each pregnancy. In this work which have succeeded in their methods of family planning, as well as the social, economic and political background of these family planning activities.

Explicated of this knowledge about benefit of family planning of mother, child, family, and community part of questionnaire’s items over time due to applying the educational program concerning women’s knowledge about family planning at primary health care centers in Al-Diwanyah Governorate including twenty items distributed for the study, and controlled groups with comparisons significant. Results of testing significant with reference of studied items, as well as scoring scales assessments concerning effectiveness of applying educational program were reported highly significant differences toward impact of program through raising knowledge grades of studied respondents at the post 1 period, and that could be able to confirms importance and successfulness of applying proposed program, and without loss of generality, item of “Provides a greater opportunity for the mother to nurse her baby and feed him long and sufficient breastfeed”, which reported no significant different along studied periods in the study group, since its initial has a highly responding in the pre period of time.

This study confirmed to family planning has several benefits including the health of mothers and their children. Others include socioeconomic benefits; i.e., women can advance their education and careers by delaying or limiting childbearing and this can bring better economic prospects to their household. family planning serves to reduce child and maternal morbidity and mortality by preventing unintended pregnancies and unsafe abortions. The number of maternal deaths that could be averted during childbirth as a result of a reduction in the number of pregnancies and induced abortions would be significant. family planning also enables birth spacing, ultimately reducing child mortality while enhancing the nutritional status of both mother and child. Consequently, this could contribute to significantly empowering women, achieving universal education for all, and achieving long-term environmental sustainability.

Women’s knowledge about family planning, the study results reported highly significant differences in women’s knowledge over time, and that could be able to confirms importance and successfulness of applying proposed program.

This study coincided with my studies, to support what regarding about women’s knowledge about the risks of sexually-transmitted diseases, displayed knowledge about prevention of STIs effects condom use. The level of knowledge about STIs is too low, and further education is needed. Reproductive health clinics and public campaigns/media may be suitable arenas for this. Further research on women’s status in relationships and its effect on sexual behavior is needed.
Conclusions

The researchers conclude that the education program positively affected on women’s knowledge about family planning. Unlike the control group where there was no improvement in their educational level, where has recorded results immovable responses over the periods of times with low or border low level of assessed.

Recommendations

The researchers recommend applying the program to all governorates. A special program needs to be done for men about family planning, because they represent the second part of responsibility. Raise awareness for the whole community about family planning to determine childbearing through the media (posters, advertising media) as a collective awareness.

Conflict of Interest: The researchers report no conflict of interest.

Source of Funding: This study did not receive any funding from any agency.

Ethical Clearance: A permission to conduct this study was obtained from the ethical committee in the College of Nursing, University of Baghdad.

REFERENCES


Effects of Supplementation of *Thymus Vulgaris* and *Zingiber Officinal* Powder on Reproductive Performance of Ageing Broiler Breeder Male

Sameerah Hussein Amen¹, Rashid Hassan Hamid Al-Dalawi¹, A. K. shanoon¹

¹Department of Animal Production, College of Agriculture, University of Kirkuk, Iraq

ABSTRACT

Ginger rhizome and thyme leaf are used medicinally and to examine the effect of them powder on male reproductive system there for the powder were add to drinking water for two groups of male broilers breeder ROSS308, supplementation start in 46wk and end in 64wks age at levels 0.5% and 0.1% for each plant powder in diet where the other group was a control (without supplementation). Ejaculate volume, sperm concentration, Counts, movements, motility and abnormality where the main parameters were study. There were a significant increase (P<0.05) in ejaculate volume (ml) and sperm concentration (109 Ml-1), movements (%) and a significant decrease (P<0.05) in motility and abnormality (%), for the treatment of ginger and thyme 0.1%. Therefore our results refer to that of ginger and thyme conceder as pro-fertility properties in ageing male broiler which might be a product of both its potent antioxidant properties and androgenic activities.

Keywords: broiler breeder, ginger, thymus, reproductive performance

Introduction

The most of the new research about use of antibiotic aimed to minimized or prevent the use of certain antibiotics and hormones as stimulant for growth in the animal feed in many European countries and America as a result of the harmful effect of them on human health, due to the accumulation of remnants Ginger and thyme was used in a variety in human drags¹ and used in animal feed and poultry as antioxidants and as stimulant for growth²,³. Also, it was found that ginger has the properties of sex hormones and in particular hormones androgenic properties³,⁴. Used thyme leave in reducing the age of puberty in female of domestic rabbits.⁵ Noted that the ginger oil’s has a role in the conservation & protection of the DNA from oxidation by hydrogen peroxide (H2O2) and the protection from the harmful effects of the reactive oxygen species⁶,⁷. In a recent study, it found by⁸ that the supplementation of 100 mg/kg body weight/day of ginger had increased the percentage of alive sperm vitality and massive motility and in addition to that increase the concentration of testosterone in rats.

Materials and Method

Birds and Experiment design: The experiment was conducted in poultry farm by using 45male (9 male/treat) of the broiler breeder Ross308 at the age of 24 weeks and the experiment period were to 48 wks. of old. The birds were numbered, use of cages of dimensions (150 × 50 × 55) cm for the purpose of breeding birds therein, and the distribution & classification of birds & distribution of treatments are shown below:

1. The first group (G1) is a control
2. The 2nd group (G2) supplementation powder of thyme leaves 0.5% of diet (5kg/1000kg diet)
3. The third group (G3) is treating with supplementation of powder of thyme leaves in drinking water 0.5 of drinking water (10kg/1000kg diet)

Corresponding Author:
Sameerah Hussein Amen
Department of Animal Production, College of Agriculture, University of Kirkuk, Iraq
Email: Samira.husin@yahoo.com
4. The fourth group (G4) is treating supplementation of powder of ginger in the drinking water 0.5 of drinking water (500mg/L of drinking water).

5. The 5th group (G5) is treating supplementation addition of powder of ginger tubers 0.5 of drinking water (1000mg/L of drinking water).

**Semen Collection:** Semen samples were collected from birds five times per week and for two consecutive weeks to ensure daily production estimate of the actual sperm\(^{11,12}\) at the same time (8 am). The semen samples were by procedure described by\(^{13}\). Semen parameters (ejaculate volume, sperm count, massive movements, alive & dead sperm %) were done according to standard procedure\(^{12}\), described by\(^{14,15}\).

**Statistical Analysis:** Data from experiment were analyzed as a randomized complete block design with the three replicates (3 male each). Means were separated using Fisher’s protected least significant difference (P< 0.05). The results were expressed as mean ± S.E.M (standard error of means).

**Results**

**Ejaculate volume (ml):** The effect of powder of ginger and thyme on ejaculate volume of broiler breeder males Ross308 as shown in table 1, there is a significant

<table>
<thead>
<tr>
<th>Age</th>
<th>Control</th>
<th>Thyme</th>
<th>Ginger</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G1</td>
<td>G2</td>
<td>G3</td>
</tr>
<tr>
<td>28</td>
<td>0.354 ± 0.015 c</td>
<td>0.421 ± 0.058 b</td>
<td>0.466 ± 0.056 b</td>
</tr>
<tr>
<td>32</td>
<td>0.366 ± 0.032 c</td>
<td>0.457 ± 0.022 b</td>
<td>0.490 ± 0.044 b</td>
</tr>
<tr>
<td>36</td>
<td>0.365 ± 0.053 c</td>
<td>0.460 ± 0.053 b</td>
<td>0.510 ± 0.036 b</td>
</tr>
<tr>
<td>40</td>
<td>0.370 ± 0.023 c</td>
<td>0.470 ± 0.032 b</td>
<td>0.515 ± 0.043 b</td>
</tr>
<tr>
<td>44</td>
<td>0.375 ± 0.022 d</td>
<td>0.476 ± 0.033 c</td>
<td>0.520 ± 0.033 b</td>
</tr>
</tbody>
</table>

Data are presented as mean ± SE.

Letter a, b, c and d refer to different between treatments at significant level P< 0.05

(P< 0.05) increase in the rate of ejaculate volume compared with control group, especially the group of powder of ginger G5 compared to other treatment groups (G4 ginger, G2,G3 thyme groups and control group G1) in all experiment periods While there was no significant difference.

**Sperm concentration (10^9 ml^-1):** Table (2) indicate the (P <0.05) in the concentration of sperm in the semen parameters between the powder of ginger, thyme and the control group. Ginger treatment G5 results a significant increase of sperm concentration in all periods compared to other G3 of thyme G4 and G3 and control. There was no significant difference between treatment of G3, G4, G3, but there were a significant differences with the treatment of control (P <0.05).

<table>
<thead>
<tr>
<th>Age</th>
<th>Control</th>
<th>Thyme</th>
<th>Ginger</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G2</td>
<td>G3</td>
<td>G4</td>
</tr>
<tr>
<td>28</td>
<td>3.33 ± 0.03 c</td>
<td>3.68 ± 0.05 b</td>
<td>3.77 ± 0.05 ab</td>
</tr>
<tr>
<td>32</td>
<td>3.40 ± 0.06 c</td>
<td>3.74 ± 0.04 b</td>
<td>3.88 ± 0.07 b</td>
</tr>
<tr>
<td>36</td>
<td>3.56 ± 0.04 c</td>
<td>3.83 ± 0.06 bc</td>
<td>3.95 ± 0.04 b</td>
</tr>
<tr>
<td>40</td>
<td>3.65 ± 0.05 c</td>
<td>3.97 ± 0.03 bc</td>
<td>4.22 ± 0.08 b</td>
</tr>
<tr>
<td>44</td>
<td>3.67 ± 0.05 c</td>
<td>4.33 ± 0.07 b</td>
<td>4.45 ± 0.05 b</td>
</tr>
</tbody>
</table>

Data are presented as mean ± SE.

Letter a, b, c and d refer to different between treatments at significant level P< 0.05
Massive movement of sperm (%): From the results of table (3) the existence of significant differences (P <0.05) in the percentage rate of the movement’s collective sperm between the totals of powder ginger, thyme, compared with the treatment of control.

Table 3: Effect of powder of thyme & ginger on sperm massive motility (%) of broiler breeder male

<table>
<thead>
<tr>
<th>Age</th>
<th>Control</th>
<th>Ginger</th>
<th>Thyme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wk</td>
<td>G1</td>
<td>G2</td>
<td>G3</td>
</tr>
<tr>
<td>28</td>
<td>70.33 ± 3.22 b</td>
<td>71.54 ± 4.66 b</td>
<td>75.43 ± 5.34 ab</td>
</tr>
<tr>
<td>32</td>
<td>73.54 ± 4.55 c</td>
<td>76.43 ± 6.37 bc</td>
<td>77.65 ± 6.87 b</td>
</tr>
<tr>
<td>36</td>
<td>74.76 ± 3.76 c</td>
<td>78.46 ± 5.65 b</td>
<td>79.51 ± 4.33 b</td>
</tr>
<tr>
<td>40</td>
<td>75.45 ± 3.32 c</td>
<td>79.54 ± 5.43 b</td>
<td>81.55 ± 3.44 b</td>
</tr>
<tr>
<td>44</td>
<td>76.22 ± 6.82 c</td>
<td>80.43 ± 7.43 b</td>
<td>82.55 ± 4.66 b</td>
</tr>
</tbody>
</table>

Data are presented as mean ± SE.
Letter a, b, c and d refer to different between treatments at significant level P< 0.05

Dead sperm (%): Table (4) shows the existence of significant differences (P <0.05) in the proportion of sperm dead between transactions powders of ginger and another treatments of ginger G4, thyme G2, G3 and the control group, as recorded treatment Ginger G5 showed the lowest reached in all periods compared to all treatments

Table 4: Effect of powder of thyme & ginger on dead sperm (%) of broiler breeder male

<table>
<thead>
<tr>
<th>Age</th>
<th>Control</th>
<th>Thyme</th>
<th>Ginger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wk</td>
<td>G1</td>
<td>G2</td>
<td>G3</td>
</tr>
<tr>
<td>28</td>
<td>19.33 ± 1.32 a</td>
<td>18.33 ± 2.85 a</td>
<td>16.33 ± 2.54 a</td>
</tr>
<tr>
<td>32</td>
<td>17.65 ± 2.65 a</td>
<td>14.44 ± 1.77 a</td>
<td>14.86 ± 1.33 a</td>
</tr>
<tr>
<td>36</td>
<td>16.32 ± 2.21 a</td>
<td>12.43 ± 1.65 a</td>
<td>12.15 ± 0.47 a</td>
</tr>
<tr>
<td>40</td>
<td>14.64 ± 1.76 a</td>
<td>11.33 ± 1.65 a</td>
<td>11.21 ± 1.33 a</td>
</tr>
<tr>
<td>44</td>
<td>15.43 ± 2.43 a</td>
<td>11.12 ± 0.55 b</td>
<td>10.33 ± 1.38 b</td>
</tr>
</tbody>
</table>

Data are presented as mean ± SE.
Letter a, b, c and d refer to different between treatments at significant level P< 0.05

Abnormal sperms (%): The results shown in Table (5) a significant differences (P <0.05) in the proportion of abnormal sperms in the semen between transactions powders of ginger, thyme and the control group being of recorded treatment Ginger G5 show lower rate of sperm abnormal, while the control treatment recorded the highest percentage of abnormal sperm. As indicated in table (5) a significant differences (P <0.05) between the periods in all the transactions had registered the highest percentage of deformed sperm during the periods of age (28wk) compared to another for the treatment of control and treatment of ginger, thyme.

Table 5: Effect of powder of thyme & ginger on abnormal sperm (%) of broiler breeder male

<table>
<thead>
<tr>
<th>Age</th>
<th>Control</th>
<th>Thyme</th>
<th>Ginger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wk</td>
<td>G1</td>
<td>G2</td>
<td>G3</td>
</tr>
<tr>
<td>28</td>
<td>14.24 ± 0.45 A</td>
<td>14.74 ± 1.43 a</td>
<td>11.22 ± 1.48 ab</td>
</tr>
<tr>
<td>32</td>
<td>13.43 ± 0.47 a</td>
<td>11.13 ± 1.23 ab</td>
<td>10.44 ± 1.33 b</td>
</tr>
<tr>
<td>36</td>
<td>13.12 ± 1.34 a</td>
<td>11.65 ± 1.32 a</td>
<td>9.88 ± 1.58 bc</td>
</tr>
<tr>
<td>40</td>
<td>12.23 ± 1.54 a</td>
<td>10.23 ± 1.83 ab</td>
<td>8.78 ± 1.45 b</td>
</tr>
<tr>
<td>44</td>
<td>11.28 ± 1.56 a</td>
<td>9.43 ± 1.28 ab</td>
<td>8.12 ± 1.87 b</td>
</tr>
</tbody>
</table>

Data are presented as mean ± SE.
Letter a, b, c and d refer to different between treatments at significant level P< 0.05
Discussion

In this study, the result of adding water of each of ginger and thyme produce a significant increase (P<0.05) in semen ejaculate volume, number of sperm in the ejaculate and massive sperm movement, a significant decrease (P<0.05) in dead sperm % and abnormal sperm %. The main pharmacological actions of ginger and compounds isolated there from include immuno-modulatory, anti-tumorogenic, anti-inflammatory, anti-apoptotic, anti-hyperglycemic, anti-lipidemic and anti-emetic actions. Ginger is a strong anti-oxidant substance and may either mitigate or prevent generation of free radicals. It is considered a safe herbal medicine with only few and insignificant adverse/side effects. All these effects may be attributed to the reason that ginger & thyme contain a broad spectrum of nutrients and chemical compounds that have a positive effect on the vital functions of a bird. It was found that ginger contains Capsaicin, Zingerone, Shagaols, gingerol, phenolic, curcumin, proteolysis, vitamin C and E. Also, thyme contains flavonoids, terponoids, thymol, carvacol and eugenol, and vitamin E. It has been observed in many laboratory studies the ability of these compounds to break the chain reaction of oxidation such as superoxide and hydroxyl and peroxyl radical. As well as the polyphenols prevent the oxidation of enzymes, that inhibit the oxidation free radicals. Because the sperm is more vulnerable & sensitive to free radicals, because of the high concentration of unsaturated fatty acids in sperm membrane.

This explains the low percentage of dead sperm and abnormal sperm morphology and increase the rate of massive movement of sperm in all groups treated with ginger. The present finding is similar to the result of. Also increase in testosterone concentration. These findings are consistent with previous studies, each of, who emphasized the act of antioxidants in protecting the DNA from oxidative damage. Also, an increase in the resistance of glutathione. In a recent study, done by who noted that the addition of led to significant improvement in semen particularly significant decrease in the proportion of dead sperm. Seen through the results of analysis of seminal plasma by the decline in cholesterol, protein, glucose of semen in the all treated groups as compared with control.

Conclusion

The present findings indicates that decrease the oxidation of fat and lower the level of glucose in seminal fluid. Which is depleted by the living sperm (30, 31, 32 and 33). Also it was observed in this study, this findings refers to the ability of ginger & thyme to influence the mechanisms of anti-lipid peroxidation. In previous study, it was observed that there is a positive correlation between the concentration of ginger & thyme & characteristics of semen.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: Not required.

REFERENCES


Effects of Personality Type on Burnout in Korean Clinical Nurses: Focus on Personality Type D

Song, Hye-Suk¹, Lim, So-Hee²

¹Assistant Professor, Department of Emergency Medical Technology, 21, Chungjeong St., Dong-Gu, Daejeon, Korea; ²Assistant Professor, Department of Nursing, KyungMin University, 545, Seobu-ro, Uijeongbu-si, Gyeonggi-do,

ABSTRACT

This study is a descriptive investigative study conducted to identify the influential factors for burnout in relation to somatization symptoms, emotional labor, job satisfaction and turnover intention for personality type D nurses. Participants were 285 nurses working in general hospitals in a metropolitan area. A hierarchical multiple regression analysis was conducted in order to identify influential factors on burnout of study participants in relation to personality type D. As for type D, the explanatory power was 67 % (F=78.56, p<.001). Somatization symptoms (β=.45) was the greater the effect on burnout. In addition, a higher level of emotional labor (β=.27) and turnover intention (β=.17) increased burnout, whereas high job satisfaction (β=-.19) decreased burnout. In order to reduce burnout of nurses, personality type D nurses need to be examined from a human resource management prospective and this approach must be followed by continuous attention and adequate management.

Keywords: Nurse, Personality, Intention, Job satisfaction, Burnout

Introduction

Burnout is a phenomenon that frequently occurs to workers in personal service sectors, such as medicine, education and social services, which are continuously exposed to various types of unsatisfactory situations and have to suppress their emotions¹. As nurses interact with patients firsthand and provide medical services to patients in their practice, they are easily exposed to the risk of burnout². Nursing burnout has very strong ripple effects in that it affects not only the individual, but also his or her fellow nurses within the organization, resulting in group burnout³. The longer the burnout, the more negative the tendencies, such as a sense of failure, guilt, and regret, will undermine their nursing ability and job satisfaction. This, in turn, increases their level of stress and causes a vicious cycle.

A personality type is a temperament characteristic of individuals that does not easily change and can cause psychological stress and undermine physical health. It is therefore an important determinant for psychological and mental health⁴. In personality type D, the letter “D” stands for “Distressed” and refers to a personality type based on two concepts of negative emotions and social inhibition⁴. Type D can be characterized by depression, anxiety and socially inappropriate concerns and worries. It is known that type D subjects are more easily exposed to chronic stress compared to subjects of other personality types⁵. The type D nurses with a highly negative emotional state and a high susceptibility to stress can easily experience burnout, but there have not been sufficient studies conducted on this issue.

Burnout is a significant health issue experienced by nurses in clinical practice and the efforts to intervene and reduce burnout must be continued. Burnout undermines not only physical and psychological health of individual nurses, but also their ability to perform their duties, which accordingly diminishes the quality of their nursing service. Therefore, efforts are required to prevent and reduce the occurrence of burnout, and there is a need to identify influential factors associated with burnout for prevention and intervention. Therefore, it is

Corresponding Author:
Lim, So-Hee
Department of Nursing, KyungMin University, 545, Seobu-ro, Uijeongbu-si, Gyeonggi-do, 11618, Korea
Phone: 82-31-828-7472; Fax: 82-31-828-7469
Email: sweetnurseme@naver.com

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important to identify personality types of clinical nurses in relation to somatization symptoms, emotional labor, job satisfaction and turnover intention. The identified data will be used as important indicators for identifying influential factors for burnout by personality type. In this context, this study aims to identify the influential factors for burnout of personality type D nurses.

Methodology

Measurements

Personality type D: The Korean type D scale-14 (Korean DS14) developed by Denollet and translated by Lim, Lee, Ko. The tool consisted of a total of 14 items with a 5-point Likert scale. The reliability of the tool was Cronbach’s α=.94 in the study Lim et al. and Cronbach’s α=.86 in this study.

Somatization Symptoms: Somatization symptoms were measured using a physical measurement tool developed by Han, Jeong, Tag and modified and complemented by Lee. This tool consists of a total of 15 items with a 5-point Likert scale, the higher the severity of the physical symptom. The reliability of the tool was Cronbach’s α=.91 in the study by Lee and Cronbach’s α=.93 in this study.

Emotional Labor: Emotional labor was measured using an emotional labor measurement tool developed by Morris & Feldman and translated by Kim. This tool consists of a total of 9 items with a 5-point Likert scale, the higher the severity of emotional labor. The reliability of the tool was Cronbach’s α=.86 in the study by Kim and Cronbach’s α=.89 in this study.

Job Satisfaction: Job satisfaction of nurses was measured using a Minnesota Satisfaction Questionnaire tool developed by Weiss, Dawis, England and translated by Lee. This tool consists of a total of 20 items with a 5-point Likert scale, the higher the severity of job satisfaction. The reliability of the tool was Cronbach’s α=.88 in the study by Lee and Cronbach’s α=.83 in this study.

Turnover Intention: Turnover intention was measured using a tool developed by Lawler and translated by Park. This tool consists of a total of 4 items with a 5-point Likert scale, the higher the turnover rate. The reliability of the tool was Cronbach’s α=.88 in the study by Park and Cronbach’s α=.89 in this study.

Burnout: Burnout was measured using a tool developed by Pines, Aronson, Kafry and translated by Choi. This tool consists of a total of 13 items with a 5-point Likert scale, the higher the severity of the burnout. The reliability of the tool was Cronbach’s α=.94 in the study by Choi and Cronbach’s α=.90 in this study.

Data Sources: The study subjects were nurses at three general hospitals with 300 beds or more located in S city. The data was collected in the form of a structured questionnaire that were provided to nurses who were informed of the study’s purpose and agreed to participate in the study. The collection of data for the study was conducted after obtaining approval from the Institute Review Board (WKIRB-201801-SB-008).

Data Analysis

The collected data was analyzed using the SPSS 23.0 program. χ²-test of the general characteristics were obtained. A t-test was conducted to analyze the difference among variables in relation to personality type D. A hierarchical multiple regression analysis was conducted in order to identify influential factors on burnout of study participants in relation to personality type D.

Results

General characteristics of personality type D and the difference in relation to key variables: The general characteristics with differences observed in relation to personality type D were as follows: gender (χ²=9.95, p<.001), religion (χ²=13.22, p=.004), education level (χ²=18.66, p<.001) and working place (χ²=9.65, p=.008).

Table 1: Mean of Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type D (n = 175)</th>
<th>Non-type D (n = 110)</th>
<th>t</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somatization symptoms</td>
<td>2.75 ± .77</td>
<td>2.00 ± .74</td>
<td>-8.12</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Emotional Labor</td>
<td>3.40 ± .67</td>
<td>3.23 ± .76</td>
<td>-1.91</td>
<td>.058</td>
</tr>
<tr>
<td>Job Satisfaction</td>
<td>3.12 ± .40</td>
<td>3.33 ± .40</td>
<td>4.46</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Burnout</td>
<td>3.07 ± .72</td>
<td>2.55 ± .48</td>
<td>-6.70</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

SD= Standard Deviation
The difference in key variables in relation to personality type D of subjects is shown in Table 1. The level of somatization symptoms was higher in type D subjects (M=2.75) than non-type D subjects (M=2.00) showing a statistically significant difference (t=-8.12, p<.001). The level of job satisfaction was lower in type D subjects (M=3.12) than non-type D subjects (M=3.33) showing a statistically significant difference (t=-4.46, p<.001). The level of turnover intention was higher in type D subjects (M=3.38) than non-type D subjects (M=3.16) showing a statistically significant difference (t=-2.14, p=.034). The level of burnout was lower in type D subjects (M=3.07) than non-type D subjects (M=2.55) showing a statistically significant difference (t=-6.70, p<.001).

**Analysis of influential factors on burnout of subjects in relation to personality type D:** To identify influential factors on burnout of subjects in relation to their personality types, the variables that showed a significant difference in general characteristics of the subjects were used as control variables.

As for type D subjects, two regression models were proposed through the hierarchical regression analysis. In Model 1 (constructed model), a control variable, the variable with a significant impact was working place and the explanatory power of general characteristics for burnout was 6%. The explanatory power of Model 2 (full model), which included independent variables, was 67%. With the general characteristics of the subjects under control, somatization symptoms had the greatest effect on burnout and the higher the somatization symptoms (β=.45) the greater the effect on burnout. In addition, a higher level of emotional labor (β=.27) and turnover intention (β=.17) increased burnout, whereas high job satisfaction (β=-.19) decreased burnout.

As for non-type D subjects, in Model 1, the variables with a significant impact were educational level and working place and the explanatory power of general characteristics for burnout was 8%. The explanatory power of Model 2 was 68%. With the general characteristics of the subjects under control, somatization symptoms had the greatest effect on burnout and the higher the somatization symptoms (β=.51) the greater the effect on burnout. In addition, a higher level of emotional labor (β=.33) and turnover intention (β=.31) increased burnout, whereas high job satisfaction (β=-.42) decreased burnout.

**Discussion**

In this study shows a higher level of somatization symptoms in type D subjects. A study conducted in Korea reported that 35.8% of patients with cardiovascular diseases, and 33% of patients with asthma had personality type D. Other study reported that Type D subjects showed increased fatigue. Based on the findings of the previous studies which reported that personality type D had negative effects on a physical aspect, there is a need to identify the relationship and analyze an in-depth causal relationship between personality type D and somatization symptoms for nurses. The study is indicating a lower job satisfaction in type D subjects. The existence of different personality types explains why individuals have different levels of job satisfaction. Therefore, it is recommended that various personality analysis methods, such as MBTI or Ennegram, be used for analyzing job satisfaction. In this study is indicating a higher turnover intention for type D subjects. Type D subjects have a more negative emotional state compared to non-type D subjects and repeatedly suppress their emotions rather than explicitly expressing them, subjecting them to psychological stress that leads to turnover intention. In this study, the scores for burnout for type D subjects was 3.07 and the score for non-type D subjects was 2.55. There needs to be a systematic approach to establish a strategy that will effectively reduce burnout for type D subjects.

The influential factors for burnout for type D subjects were analyzed and the results showed that the most influential factor was somatization symptoms. The study by Oh and Choi conducted on nurses supported the result of this study with the same result. In this context, there needs to be measures to prevent somatization symptoms and manage the symptoms at an early stage to address burnout of nurses. It is recommended for hospitals and nursing departments to provide administrative and institutional support to nurses as soon as they start working at hospitals in order to minimize burnout experienced by nurses.

The second most influential factor for burnout for type D subjects was emotional labor. The influential factor that affected the burnout of non-type D subjects was job satisfaction. Regardless of situations, type D subjects maintain a negative emotional state, such as anxiety, stress, tense or unstable in relationships with other individuals, and suppress the expression of their emotions or behaviors. In other words, type D nurses
experience greater displeasure with greater emotional labor and consciously suppress emotional expression, which results in a chronic negative emotional state that eventually causes burnout. In this context, nursing departments need to make efforts to identify type D nurses, implement emotional support programs to reduce burnout of nurses and foster a pleasant working environment, develop programs to mitigate nurses’ negative emotional state and help them express their emotions, thereby helping them develop a positive perception of themselves and establishing a new organizational culture.

**Conclusion**

This study identified the levels of somatization symptoms, emotional labor, job satisfaction, turnover intention and burnout in relation to personality type D and relevant characteristics as well as empirically defined the effects of personality type D on burnout. This study is significant in that it provides basic data for management of nurses and will be effect as basic data for development of concrete action plans and strategies for mitigating somatization symptoms, emotional labor, job satisfaction, turnover intention and burnout. In order to reduce burnout of nurses, personality type D nurses need to be examined from a human resource management prospective and this approach must be followed by continuous attention and adequate management. This study can contribute to advancement in nursing practice, systematic management of nurses, and productivity improvement.

**Source of Funding:** There is no financial disclosure

**Conflict of Interest:** None to declare.

**Ethical Clearance:** All experimental protocols were approved under Wonkwang University and all experiments were carried out in accordance with approved guidelines.

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Correlation of Maternal Education with Parenting and Child Nutritional Status

Sukmawati¹, Sirajuddin¹

¹Departement of Nutrition, Makassar of Health Polytechnic, Indonesia

ABSTRACT

Education levels is the key to childcare. Good education has an impact on the quality of the parenting style and nutritional status for under five years old. The objective of this study were to analyze the correlation of maternal education by care and nutritional status of children under five in Maros District in Indonesia.

Settings and Design: The sample were under five years old and selected by simple random sampling. Sample size were 156 children. The design of this study is a cross sectional study. Data analysis by spearman correlation test at 95% confidence level.

Method and Material: Child weight was measured by electronic SECA scale. Anthropometric data collected in Infants (0–11 mo of age) were weighed with their mothers and then the mother’s weight was subtracted to obtain infant weights. Recumbent length of children <24 mo of age was measured with the use of a measuring board. Nutritional status was assessed based on the WHO Multicenter Growth Reference Study Standards. Three indexes were derived from anthropometric measures, including weight-for-age z score (WHA), length-for-age z score (HAZ), and weight-for-length z score (WHA). This research was registered with the ethics commission of the Makassar Health Polytechnic.

Statistical Analysis Used: The data analyze were used to SPSS 16. Correlations between parenting style and z scores anthropometric were tested by Spearmen correlation at 95% confidence intervals.

Results: Distribution of nutritional status of children in the basic education group were normal as much as 67.1% while in the normal education group were 75.7%. Based on the HAZ index that basic education is 53.2% normal status compared in the education group 61.4%. Based on the WAZ index in the basic education group it was good status at 74.7% compared in continue education group were 77.1%. The results of the Spearman correlation analysis that education levels were correlated with parenting in the basic education group (p = 0.043) and in the continue education group it were not significant correlated (p = 0.417).

If respondents were grouped according to nutritional status (HAZ) and then conducted a correlation test the parenting pattern correlated with the value of the HAZ score in the continue education group (p = 0.026) but did not correlate with the basic education group (p = 0.057).

Conclusions: In the group of basic educated mothers, it is known that there is a correlation between the nutritional status of children according to the WAZ index while in the group of advanced educated mothers there is no correlation with the child’s WAZ status. In the group of continue educated mothers there was a correlation of HAZ nutritional status with parenting style.

Keywords: Education, Parenting and Nutritional Status of Toddlers

Introduction

The increase in the percentage of Stunting in South Sulawesi is that it continued between 2007, 2010 and 2013 which were 29.2%, 39.8% and 40.9% respectively. This percentage is a combination of children under five
who are short and short status based on indicators of height for age (HAZ) from the WHO Anthropometric reference. Various factors that affect of stunting. The both the intake and infectious diseases are direct factors. Prevention of stunting is important by overcoming indirect factors, namely parenting. Parenting is intended to care for feeding, child care, seeking treatment and child hygiene care. 1,2,3

Maternal education tends to have quality care for child feeding, because the reasoning is to work outside in the home. The habit of mothers working outside in the home is entrusting children to caregivers who are also from close families or helpers who are specifically employed. 4,5,6

The burden of the mother working outside the home seems to be a factor that correlates with the quality of child feeding care. The length of the mother’s work outside the home, especially during the critical period of growth is an aspect that deserves to be studied. Various underlying reasons include, for ethnic Bugis, whatever type of work the mother still has, she has a total role in responding to childcare. 7,8 Mother’s work should not neglect the care of child feeding, but at the same time sufficient skills and knowledge are needed to carry out parenting roles appropriately and efficiently. If this role is able to be carried out then the suspicion while children will not risk being short. This is what will be tested in this study.

The purpose of this study was to analyze the correlation correlation of maternal education by care and nutritional status of children.

Subjects and Method

The cross sectional study was conducted in Maros Regency, South Sulawesi, Indonesia, with a sample of 156 people using the random sampling method. Sample size is calculated based on proportional sample formulas.

Data were collected by trained enumerators on interview techniques and anthropometric measurements in April 2018. Questionnaires in this study had gone through trials with good validity and reliability. Question list consists of three parts. Child care patterns were divided into three parts, namely feeding, care, hygiene and medical care and were assessed based on parenting scores. Nutritional status is measured based on anthropometric data of the child’s height and weight. The indicators studied were, weight for age Z scores (WAZ), height for age Z scores (HAZ), weight for height Z scores (WHZ) The measurement uses 0.01 kg accuracy and 0.01 cm. Nutritional status for children for : Underweight: weight for age z scores < –2 standard deviations (SD) of the WHO Child Growth Standards median. Stunting: height for age (HAZ) < –2 SD of the WHO Child Growth Standards median. Wasting: weight for height Z scores (WHZ) < –2 SD of the WHO Child Growth Standards median. Overweight: weight for height Z scores > +2 SD of the WHO Child Growth Standards median. Processing data using SPSS version 16.0 from SPSS Inc. Descriptive data analysis with frequency, proportion, and median distribution. Test statistics with the spearman correlation test at 95% confidence. This study was approved by the Makassar Health Polytechnic Ethics Commission.

Results

The results of this study were presented in the following tables

<table>
<thead>
<tr>
<th>Educational Level</th>
<th>Overweight</th>
<th>Normal</th>
<th>Underweight</th>
<th>Severely underweight</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Basic (N = 79)</td>
<td>2</td>
<td>2.5</td>
<td>53</td>
<td>67.1</td>
<td>18</td>
</tr>
<tr>
<td>Continue (N = 70)</td>
<td>0</td>
<td>0.0</td>
<td>53</td>
<td>75.7</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Index (HAZ)</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Index (WAZ)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
The focus of the spotlight in this table is the percentage of malnutrition and malnutrition in both education, basic education and advanced education groups. The percentage of malnutrition + malnutrition in primary education is 30.4% while in advanced education it is 24.5%.

Table 2: Distribution of toddler protein energy intake based on parental education level

<table>
<thead>
<tr>
<th>Intake Energy</th>
<th>Energy</th>
<th>Severely deficit</th>
<th>Heavy Deficit</th>
<th>Light Deficit</th>
<th>Normal</th>
<th>Over</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>Basic (N = 79)</td>
<td>47 59.5</td>
<td>7 8.9</td>
<td>2 2.5</td>
<td>13 16.5</td>
<td>10 12.7</td>
<td>79 100</td>
<td></td>
</tr>
<tr>
<td>Continue (N = 70)</td>
<td>25 35.7</td>
<td>4 5.7</td>
<td>8 11.4</td>
<td>15 21.4</td>
<td>18 25.7</td>
<td>70 100</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 presents data on energy and protein intake at both levels of basic education and advanced education. Energy very deficit in basic education reached 59.5% while in advanced education it reached 35.7%.

Table 3: An overview of parenting, knowledge and practice of breastfeeding, in infants under the age of parents

<table>
<thead>
<tr>
<th>Parenting</th>
<th>Excellent</th>
<th>Good</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic (N = 79)</td>
<td>34 43.0</td>
<td>45 57.0</td>
<td>79 100</td>
</tr>
<tr>
<td>Continue (N = 70)</td>
<td>24 34.3</td>
<td>46 65.7</td>
<td>70 100</td>
</tr>
</tbody>
</table>

Table 3 presents data on parenting, knowledge and practice of breastfeeding for children for both the basic education and further education groups. Good parenting in basic education is 43% while in advanced education it is 34.3%.
Table 4: Relationship between parenting, knowledge and practice of breastfeeding, with index Body Weight for Age (WAZ) toddlers based on the level of education of parents

<table>
<thead>
<tr>
<th>Educational Levels</th>
<th>Parenting Value Median</th>
<th>Parenting Median WAZ</th>
<th>p-value</th>
<th>Knowledge Value Median</th>
<th>Knowledge p-value</th>
<th>Practice Value Median</th>
<th>Practice p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>Parenting 66.7</td>
<td>-1.7</td>
<td>0.043</td>
<td>Knowledge 54.5</td>
<td>0.475</td>
<td>Practice 50.0</td>
<td>0.908</td>
</tr>
<tr>
<td></td>
<td>Knowledge 54.5</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Practice 50.0</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Continue</td>
<td>Parenting 66.7</td>
<td>-1.465</td>
<td>0.026</td>
<td>Knowledge 54.5</td>
<td>0.483</td>
<td>Practice 40.0</td>
<td>0.693</td>
</tr>
<tr>
<td></td>
<td>Knowledge 54.5</td>
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<td></td>
<td>Practice 40.0</td>
<td></td>
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</tbody>
</table>

The results of statistical analysis of the correlation of basic education with parenting, knowledge, and practice of breastfeeding, based on the nutritional status (WAZ) in the basic education group found a negative correlation for parenting (p = 0.043) but no correlation with knowledge and practice (p > 0.05).

Table 5: Relationship between parenting, knowledge and practice of breastfeeding, by Height for Age (HAZ) index of toddlers based on the level of education of parents

<table>
<thead>
<tr>
<th>Educational Levels</th>
<th>Parenting Value Median</th>
<th>Parenting Median HAZ</th>
<th>p-value</th>
<th>Knowledge Value Median</th>
<th>Knowledge p-value</th>
<th>Practice Value Median</th>
<th>Practice p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>Parenting 66.7</td>
<td>-1.7</td>
<td>0.3</td>
<td>Knowledge 54.5</td>
<td>0.057</td>
<td>Practice 50.0</td>
<td>0.306</td>
</tr>
<tr>
<td></td>
<td>Knowledge 54.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Practice 50.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continue</td>
<td>Parenting 66.7</td>
<td>-1.6</td>
<td>0.026</td>
<td>Knowledge 54.5</td>
<td>0.483</td>
<td>Practice 40.0</td>
<td>0.277</td>
</tr>
<tr>
<td></td>
<td>Knowledge 54.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Practice 40.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of statistical analysis of the correlation of basic education with parenting, knowledge, and practice of breastfeeding, based on the nutritional status (HAZ) in basic education, found no positive correlation to parenting (p = 0.091), knowledge (p = 0.120) and breastfeeding practice (p = 0.293).

**Discussion**

Maternal education is directly related to parenting style feeding, care, treatment and personal hygiene. Mothers were known as the main caregivers of children for the composition of roles in Indonesian society in general. Indonesian people, especially urban areas, have applied the concept of gender equality in households. Based on this view, this time the discussion highlighted the point of view of basic education and continue education as the main domain. The main domain to find the point of difference in effects based on nutritional status in all three indexes WAZ, HAZ and WHZ.

This study were found the percentage of malnourished children and combined malnutrition were both basic education group than in continue education group. These results provide shown that children’s opportunities for malnutrition were greater in children whose parents (mothers) have basic education. The parental education is an investment in improving sustainable nutrition in rural communities based on nutritional status at WAZ.

Correlation analysis between parenting and nutritional status of children according to WAZ indicators were significant (p = 0.043). This fact that for mothers who have basic education, namely education up to a maximum of 9 years, the actual body weight of a child is influenced by the mother’s education. Especially for basic education in Indonesia, it is divided into
two groups, namely the age group of 6-12 years, and the age group 13-16 years, with a duration of 9 years of education. If the mother is only able to complete education in a group of 6-12 years, then she has the opportunity to work outside the house is limited. If the mother has an education group of 13-16 years, then the opportunity to work outside the home is greater, even if only as a operator worker at small industries. This social phenomenon has an impact on the pattern of mother’s care for their children. The value of parenting patterns will be better at a lower level than the higher ones, which is why in this study negative correlation values were found. Whereas specifically parenting knowledge and practice remains a positive and insignificant correlation.

The phenomenon of parenting in the basic education group is different from continue education group in this study. In the continue education group has a positive correlation was found in parenting with BBU nutritional status. The higher the mother’s education, the better the parenting style for her child. The upbringing pattern for the mother is further educated, even though she works outside the home but is good, because her education causes her to be able to provide better child care costs, so that the quality and quantity of nutrition is better.

The results found in the above data are consistent with the HAZ indicator. It was found that the percentage of children who were short was higher in the group of children from mothers who had basic education compared to advanced education. Various research reports report that educational factors are strong variables that influence the child’s height status. Height is even a good predictor for children’s social future. The reported academic potential and economic potential are positively correlated with the education status of both parents. In various countries with low literacy in nutrition science theoretically they will also have low nutritional status. The concept of education as an investment in improving nutrition is found to be positively correlated.

Before discussing that, it was also found that the energy and protein intake (Table 2) in the two groups also tended to be different. This difference can be seen from the percentage of energy deficit children in the group of children from basic educated mothers compared to advanced education. This proves that there are direct factors that cause children different nutritional status in both groups, namely energy and protein intake which is also lower in basic education than education.

**Acknowledgement**

Thank you to the Maros District Health Office, and Director of the Makassar Health Polytechnic.

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**Conflicts of Interest:** There are no conflicts of interest

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Effectiveness of an Educational Program on Emergency Nurse’s Knowledge and Practice about Advance Cardiac Life Support at Emergency Medicine Department in Baghdad City

Talib Kalifa Hassan Al-Temimi1, Hussain Hadi Atiya2
1Clinical Nurse Specialist, Ministry of Health; 2Assistant Prof., Adult Nursing Department, College of Nursing, University of Baghdad

ABSTRACT

Objective: To evaluate effectiveness of an educational program on emergency nurse’s knowledge and practice concerning advance cardiac life support at emergency medicine department in Baghdad City.

Methodology: A Quasi-experimental design study was initiated. A quasi-experimental design is carried out to evaluate the effectiveness of an educational program on emergency nurse’s knowledge and practice concerning advance cardiac life support at the emergency medicine department in Baghdad City. The study was initiated 4th December 2018 to 3rd April 2019, and divided into (26) emergency nurses for the study group, which were exposed to the education program about Advance Cardiac Life Support (ACLS), and (26) emergency nurses have been assigned to the control group who share the same criteria of selection for the study group and are not exposed to the educational program. The questionnaire is composed of 3 parts: First part, the demographic data, the second part Knowledge test: it is composed of (30) multiple choice questions which covered relevant points from the major content area of the advance cardiac life support. The third part: Observational checklist. It is composed of (25) items and sub item which covered five domains of practices concerning Advance Cardiac Life Support. And presented Advance Cardiac Life Support (ACLS), according to priority, Airway and Breathing care, cardiovascular system care, disability, intra venues fluid and DC shock uses. The validity of the questionnaire, observational checklist, and educational program were being identified by a panel of 12 experts; the study Reliability of instrument was determined through pilot study was carried out on 3rd to 24 November 2018. Data were analyzed through the application of descriptive statistics analysis and the inferential data

Results: The study findings indicated that the education program has a positive effect on case group at post test

Conclusion: The knowledge and practice of emergency nurses were improved after educational program

Recommendation: Promote advanced training about advance cardiac life support and Employment of college or institution graduate nurses in emergency Medicine should be planned by the ministry of health.

Keywords: Emergency nurse’s, Advance Cardiac Life Support

Introduction

Advanced cardiac life support or Advanced Cardiovascular Life Support (ACLS) refers to a set of clinical interventions for the urgent management of cardiac arrest, stroke and other life-threatening cardiovascular emergencies, as well as the knowledge and skills to deploy those interventions. Advance Cardiac Life Support refers to as an emergency medical procedure in which the basic life support efforts of CPR are augmented by the establishment of an intra-venous line, drug administration, possible defibrillation, endotracheal intubation, and the control of cardiac arrhythmias that are performed in the two referral hospitals in Botswana. Advanced Cardiac Life Support (also known as ACLS) focuses on educating doctors, nurses and other health care specialists on how to properly treat patients who are in

Corresponding Author:
Talib Kalifa Hassan Al-Temimi
Ministry of Health,
Email: talib_khalifah@yahoo.com
need of immediate cardiac treatment for strokes, cardiac arrest and other life threatening emergencies related to the heart and cardiovascular system. (4) ACLS is the training health professionals may receive in addition to cardiopulmonary resuscitation (CPR) training. ACLS is a set of established protocols for using CPR integrated with medications, defibrillation, and advanced airway for a cardiac emergency in the adult patient. The current ACLS class is a 2-day process taught using established guidelines written by the American Heart Association (AHA). (5,6) Cardiopulmonary resuscitation is a lifesaving technique that is performed when a person’s breathing or heart has stopped. The purpose of CPR is to move blood and therefore oxygen (which your body needs to survive) to the brain and heart. CPR involves three steps (C = Compressing the person’s chest to keep the blood circulating, A= Opening the person’s airway (the passageway between the nose/mouth and the lungs), B = Giving rescue breaths that fill the lungs with air). (7) Advanced cardiac life support (ACLS) affects multiple links in the Chain of Survival, including interventions to prevent cardiac arrest, treat cardiac arrest, and improve outcomes of patients who achieve ROSC after cardiac arrest. The 2010 AHA Guidelines for CPR and ECC continue to emphasize that the foundation of successful ACLS is good BLS beginning with prompt high-quality CPR with minimal interruptions, and for VF/pulseless VT, attempted defibrillation within minutes of collapse.

Methodology

A Quasi-experimental design study was carried out to evaluate the effectiveness of an educational program on emergency nurse’s knowledge and practice concerning advance cardiac life support. The study was initiated 4th December 2018 to 3rd April 2019, and divided into (26) emergency nurses for the study group, which were exposed to the education program about ACLS, and (26) emergency nurses have been assigned to the control group who share the same criteria of selection for the study group and are not exposed to the educational program., the instruments was constructed; the questionnaire is composed of 3 parts First part, the demographic data, the second part Knowledge test that is composed of (30) multiple choice questions which covered relevant points from the major content area of the (ACLS) (5) questions, Circulation (cardiovascular system) (5) questions, respiratory system and airway care (5) questions, Electrical and ECG of heart (5) questions, Conditions requiring advanced cardiac support (5) questions, Monitors, devices and tools used to support advanced cardiac life (5) questions, Electric Therapy, which includes DC Shock & AED Defibrillator. The questions were scored as correct question (2) points and the incorrect question (1) point. For the purpose of this study, the number of correct responses on the knowledge test questionnaire was used as the measure of the level of emergency nurses’ knowledge. The total scores of the test were 60 points. The cut of point was \( H = \text{High (R.S = 87.6\% - 100\%)} \), \( L = \text{Low (R.S = less than 75\%)} \), \( M = \text{Moderate (R.S = 75\% - 87.5\%)} \)

Part III: Observational checklist: This tool was developed to evaluate effectiveness of education program on emergency nurses practice concerning advance cardiac life support. This checklist was designed by the investigators based on extensive review of literature and relevant studies. The observational checklist was composed of (25) items and sub-items covered five domains of practices concerning ACLS. They are presented as follows (Advance cardiac life support, according to priority: consist of (5) items and sub items, Airway and Breathing care: consist of (6) items and sub items, Cardiovascular system care: consist of (8) items and sub items, Identify manage of dysrhythmia: consist of (4) items and sub-items, Illuminations and events among team members: consist of (2) items and sub items).

The researcher observed and checked for correct or incorrect performance and then the practices as mean
(3) or (2) corrections episodes were rated as always, (one) correct practice was rated as sometime and non-correct practice rated as never.

Observational checklist practices were observed emergency nurses prior to performing on mannequin and simulation scenarios during Implementation of an educational program on emergency nurses. The educational program consisted of six sessions and was carried over a four-months period in the Emergency Medicine Department.

Content validity for the early developed instrument is determined through the experts’ panel to investigate clarity, relevancy, and adequacy of the questionnaire to measure the concept of interest.

The educational program consisted of six sessions and was carried over a four-months period in the Emergency Medicine Department. The researcher observed and checked correct or incorrect performance. A practice checklist for emergency nurses was given to them prior to performing a manikin and simulation scenarios during either the morning or the afternoon times. The plan of the education program was discussed; the implementation of the program was introduced to the study group and has included the following:

1. Demographic data are filled by each emergency nurses in study and control groups at the emergency medicine Department in Baghdad City

2. Emergency Nurses Knowledge test (Questionnaire)

3. Emergency Nurses practice by observational (check list)

4. Implementation of an educational program is designed and presented in six sessions. Every session takes approximately three hours from (9-12) a.m. (Per day), and 5 days per week for two weeks (including pre-test and post-test both Knowledge and practice (study group).

The data were analyzed through the use of statistical procedures and using the SPSS (Statistical Process for Social Sciences) version 24 application Statistical analysis system.

Results

Table 1: Difference in participants’ overall knowledge about ACLS

<table>
<thead>
<tr>
<th>Advance cardiac life support</th>
<th>Paired Differences</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Posttest</td>
<td>5.06891</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Pretest</td>
<td>-2.53846</td>
<td>-2.08910 -1.01217</td>
<td>-2.221</td>
<td>25</td>
<td>.036</td>
</tr>
<tr>
<td>Control Posttest</td>
<td>3.83907</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Difference in participants’ practice related to ACLS

<table>
<thead>
<tr>
<th>Practice</th>
<th>Paired Differences</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Posttest</td>
<td>2.88870</td>
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<tr>
<td>Control Pretest</td>
<td>-.53846</td>
<td>-.208910 -1.01217</td>
<td>-.715</td>
<td>25</td>
<td>.481</td>
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<tr>
<td>Control Posttest</td>
<td>3.83907</td>
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</tr>
</tbody>
</table>
Discussion of the Results

Part II: Discussion of the Difference in participants’ overall knowledge about ACLS: It is clear that six items of Emergency nurses’ knowledge (two for knowledge about CVS physiology, two for respiratory system physiology, one for ACLS indications, and one for electrical therapy) are of medium mean scores with low Relative Sufficiency (R.S) and their assessment is low and all other items in all subdomains are of low mean scores with low R.S. and their assessment is low in the pretest time.

In the posttest time, one item was of medium mean scores with low R.S. and their assessment is low. Furthermore, nine items (one for knowledge about CVS physiology, two for respiratory system physiology, one for cardiac electricity, one for ACLS indications, one for electrical therapy) were of medium score high-mean scores, and all other items were with high R.S. and their assessment is high with statistically significant differences in 19 items.

Roth, Parfitt, and Brewer (8) Nurses rotated through an ACLS OB course when their ACLS recertification was due. Two studies were done. Prior to the class, nurses participated in a maternal mock code drill during annual skills review, and performances were scored. One year later, nurses participated in maternal mock code drills. Results were compared with the previous year’s scores. In the second study, pre- and post-class surveys were completed reflecting nurses’ satisfaction and self-confidence with successfully completing elements of American Heart Association (AHA) algorithms following attendance at traditional advance cardiac life support classes versus ACLS OB.

Part III: Discussion of the Difference in participants’ practice related to ACLS: One item of Emergency nurses’ practices related to ACLS is of medium mean scores with low R.S. and its assessment is low, and all other items are of low mean scores with low R.S. and their assessment is low in the pretest time. In the posttest time, three items were of medium mean scores with medium R.S. and its assessment is moderate. Furthermore, all other items were with high R.S. and their assessment is high with statistically significant differences.

There is a statistically significant difference in nurses’ practice related to ACLS in the study group (p-value = .000). For the control group, there is no statistically significant difference in nurses’ practice related to Advance cardiac life support.

There was a noticeable increase in the mean score of nurses’ overall knowledge about ACLS in the study group from 41.11 in the pretest to 52.69 in the posttest. For the control group, there was a trivial decrease in the mean score of nurses’ overall knowledge about ACLS from 44.46 in the pretest to 41.80 in the posttest.

Nambiar, M., Nedungalaparambil, N. M., & Aslesh, O. P. (2016). (9) The emphasis for over a decade, a low level of knowledge on BLS and ACLS among healthcare workers, particularly the Keralite physicians in this study, is a matter of concern. A strict accreditation/licensing program and periodic revision of life saving practices is the need of the hour. Inadequate improvement in knowledge levels even after BLS/ACLS training also points to an urgent need for innovative educational programs with an impetus for novel life support skills training in healthcare curriculum. This would help improve.

Clinical practices motivate better emergency care and foster research among future health professionals in this field in addition to bettering resuscitation skills training.

Conclusions

1. Male nurses employment more than female employment.
2. The educational program in enhancing nurses’ knowledge about cardiovascular system physiology, respiratory system physiology, cardiac electricity, ACLS indications, devices and tools used in Advance Cardiac Life Support and defibrillations the positive out come.
3. Improvement in the practice of Emergency Nurses’ was clearly observed in the study group through comparing pre and post education program, a highly significant association between the study and the control group in the post observational checklist all domains (cardiovascular system physiology, respiratory system physiology, cardiac electricity, ACLS indications, devices and tools used in ACLS, defibrillations.
4. Concerning the demographics as determinants of ACLS knowledge and practices, nurses’ age, level of education, years of experience in emergency
room years of experience in nursing have no statistically significant influence on nurses’ knowledge domains and practices both in the pretest and posttest times.

**Recommendations**

1. There is a need to implement a similar study on larger sample size.

2. Applying the educational program in all sections of the emergency and the training of emergency nurses and continue education in all emergency department in ministry of health There is a need to incorporate the Advance Cardiac Life Support materials into the curricula of various nursing programs

3. It is necessary to dedicate a space in the continuing medical education (CME) activities for the Advance Cardiac Life Support.

4. There is a need to keep updated with the American Heart Association Guideline for ACLS and apply it in the health care organizations in Iraq.

5. Establishing a new department in the institutes, studying emergency and dealing with cardiac arrhythmia.

6. presentation of an educational program specialist can be designed to nurses toward emergency and critical care units. Nurses’ knowledge and practices were improved significantly concerning one of the most important areas of nursing care to provide for the cardiac arrest patients at the critical care areas. improvement obtained a previous training courses Knowledge and practice was improved nursing education among

7. Continuous In–service training programs for the purpose of updating the knowledge and skills of nurses working with cardiac arrest patients.

8. A periodic evaluation of the critical care nurses’ knowledge and practice as regards different nursing procedures at the intensive care unit must be carried out in order to obtain data which determine the level of knowledge and practice in advanced cardiac life support.

**Conflict of Interest:** The researchers report no conflict of interest.

**Source of Funding:** This study did not receive any funding from any agency.

**Ethical Clearance:** A permission to conduct this study was obtained from the ethical committee in the College of Nursing, University of Baghdad.

**References**


The Impact of Chess Games towards Comfortableness of Cognitive Mind on Elderly

Wildan Agung Wahyu Laksono1, Joni Haryanto1, Khoridatul Bahiyah1
1Faculty of Nursing, Universitas Airlangga, Mulyorejo street Campus C, Surabaya (60115), Indonesia

ABSTRACT

Background: Dementia is a part of neurodegenerative process that occurs in the elderly caused by a decline in the cognitive function. Playing a board games, for instance chess, can promote the elderly’s mood as well as provide more intense time to interact with each other. It is a means to reduce the dementia effect. Based on that notion, further research is required on the impact of playing chess to elders.

Objective: This study aims to analyze the impact of chess game towards a sound mind (cognitive) on the elderly with dementia.

Method: This study employed quasi-experimental study. The population in this study was elderly with dementia in Lamongan, Indonesia. The selected method to choose the research location and population was multistage sampling method, by randomly selecting a location to be the location sample in this research, as well as in deciding the sample population. The respondents in this study were 20 people, consisting of 10 people in intervention group, and 10 people in control group who were grouped by using the formula based on Judy Bean’s formula in her research. The independent variable was chess game, and the dependent variable was a sound mind (cognitive). The data were collected using MoCA-Ina questionnaires and then analyzed using Paired T-Test and Independent T-Test with a significance level of α ≤ 0.05.

Results: The results suggested that chess game could provide a sound mind (cognitive) on elderly with dementia in the intervention group (p=0.000), and there was no influence in the control group (p=0.758). There was a different level of sound mind (cognitive) between the intervention group and the control group (p=0.008).

Conclusion: It can be concluded that chess game could generate a sound cognitive mind for elders, that may lead to a declining effect of disease. Elders became more active in thinking than before and their long term memory span increased.

Keywords: chess game, sound mind (cognitive), dementia, elderly

Introduction

Dementia is a neurodegenerative process with cognitive decline symptoms, including memory, language, attention, executive function, and visuospatial function decrease. The symptoms of dementia include decreased memory, difficulty in communicating, and alterations in mood and habits (1). There are various ways that may be applied to maintain cognitive functions to keep the dementia level from being worse. Chess game is one of cognitive activities. Nevertheless, the impact of chess games towards a sound mind (cognitive) on elderly with dementia still requires a further research (2).

A cognitive function decrease is one of the dementia symptoms. Dementia is a neurodegenerative process with symptoms of cognitive impairments, including both short and long-term memories, as well as intellectual decline. The cognitive decline can cause a decrease in the comfort level, making it difficult for the elderly to receive information (3).
Comfortableness in mind of human brain can be achieved if the cognitive function is in a good condition. Cognitive function is the ability to recognize conditions associated with experience and intelligence. Cognitive abilities include memory, attention, executive functions, language skills and visuospatial functions (4). Fitzpatrick (2013) and Sitzman (2011) developed Kolcaba’s Theory of Comfort with the main concept referred to as the Health Care Needs defined as the need to obtain comfort and to rise from a stressful situation. The needs include physical, psychospiritual, social, and environmental needs obtained through monitoring, verbal and non-verbal reports, pathophysiological parameter-related needs, education and support, as well as the need for financial counseling and intervention (5).

Chess game is a game played by moving pieces from one cell to another, with the aim of capturing the opponent’s pieces. This game has two aspects, namely psychological and social aspects. In the psychological aspect, this game can stimulate the minds of the elderly who play it into a comfort state. On the social aspect, this game allows the elderly who play it to interact with each other, resulting in a social comfort increase (3). Chess games performed as interventions for 14 sessions in 2 weeks with the duration of 30 minutes can enhance the cognitive function. In this study, the duration lasted 60 minutes. The objective of this study was to analyze the impacts of chess game towards comfortableness of mind (cognitive) on elderly with dementia in Karanggeneng Village, Lamongan Regency, Indonesia.

Material and Method

The research design was a quasi-experiment, which is a research method that aims to reveal cause and effect by involving control groups in addition to the experimental group (6). In this research, a pre-test was performed before giving treatment, followed by a posttest after giving treatment.

Population, Sampling and Samples: The covered population in this study was 36 people with dementia aging 60 to 74 years-old. The inclusion criteria of this research were the elderly who were able to communicate, had the experience or could play chess, and were cooperative. The method used for the location selection was multistage sampling method, which was to randomly choose a location to represent sample locations in the study. This study selected one of the sub-districts in Lamongan from 27 sub-districts, followed by choosing one village from 474 villages randomly. The sample selection applied a simple random sampling approach to represent the population, determined by the researchers. This study employed two variables, i.e. chess game as the independent variable and comfortableness of mind (cognitive) as the dependent variable (7).

Data Collection and Processing: The instrument used to regulate the dependent variable in this study was the Montreal Cognitive Assessment that had been modified into Indonesian, abbreviated into MoCA-INA, both in the pre-test and the post-test. The complete MoCA-INA consisted of 13 test items covering 8 domains of visuospatial/executive (3 items), naming (1 item), memory (1 item), attention (3 items), language (2 items), abstract (1 item), repetition (1 item), and orientation (1 item). The highest score was 30 points. The score of 26-30 was translated as a normal condition while the score of less than 26 was labelled as below normal. Data is processed by Software Product & Service Solution (SPSS).

Result

Table 1: Results of pretest and posttest of comfortableness of mind (cognitive) in both the control group and intervention group

<table>
<thead>
<tr>
<th>Intervention group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No.</strong></td>
<td><strong>Pre Classification</strong></td>
</tr>
<tr>
<td>1</td>
<td>Below Normal</td>
</tr>
<tr>
<td>2</td>
<td>Below Normal</td>
</tr>
<tr>
<td>3</td>
<td>Below Normal</td>
</tr>
<tr>
<td>4</td>
<td>Below Normal</td>
</tr>
<tr>
<td>5</td>
<td>Below Normal</td>
</tr>
<tr>
<td>6</td>
<td>Below Normal</td>
</tr>
</tbody>
</table>
Based on Table 2, there was a difference between comfortableness of mind (cognitive) scores in the intervention group and the control group, where the highest deviation for the intervention group is +4 and the lowest score is 15. In the control group, the highest deviation is -2 and the lowest score is 15.

Table 2: Respondent distribution based on pretest and post test of mind comfortableness (cognitive) in both the control group and the intervention group

<table>
<thead>
<tr>
<th>No.</th>
<th>Comfortableness of mind (cognitive)</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Below Normal</td>
<td>10</td>
<td>100</td>
<td>8</td>
<td>80</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>10</td>
<td>100</td>
<td>10</td>
<td>100</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

α ≤ 0.05

Paired T-test | p = 0.000
Independent T-test | p = 0.008

Table 2 demonstrates the results of the Paired T-Test statistical test in the intervention group where the p value obtained is less than α (α ≤ 0.05) namely p = 0.000. The different results were indicated in the control group where the p value were greater than α (α ≤ 0.05), namely p = 0.758. The results of the Independent T-Test statistical test in both intervention group and control group obtained p value of less than α (α ≤ 0.05), namely p = 0.008.

Discussion

Based on the research results, the average score of the pre-test of the comfortableness of mind (cognitive) in the control group was 20.10 and the average score of the post test amounted to 20.0 with an average score decrease of -0.1. The results of the Paired T-Test statistical test demonstrated a p value of 0.758. This means that there was no significant change in the value of comfortableness of mind (cognitive) in the control group. Eighty percent of the respondents in the control group had a smoking habit, and 40% of them had a hereditary history of dementia which was more than the percentage in the intervention group. In the control group, there was also no stimulation to retain comfortableness of mind (cognitive). The results of the Independent T-Test, as a comparison between the intervention group and the control group, proved that on the post-test, the chess game intervention generated a p value of 0.008.

In the visual function, the visual process begins with a series of cells and synapses that carry visual information from the environment into the brain to be processed. This process involves the retina, the optical nerves, the optical tract, the lateral geniculate nucleus (LGN), the optical radiation, and the striate cortex. Then, it proceeds further to the thalamus which is a part of the limbic system (9). Likewise, in the kinesthetic functions, stimulus is received by the skin which is the outermost part of the body. It is then passed on by afferent nerves to the spinal cord, then to the parabrachial complex, periaqueductal grey, and ends in the limbic system (10).

All stimuli and information that has arrived in the limbic system are processed by the hippocampus and amygdala. The hippocampus is a part of the limbic system that regulates memory formation, while the amygdala is a part that regulates emotions and feelings. The stimuli and information are then processed to the pre-frontal cortex (11). If conducted repeatedly, this process will...
affect the comfortableness of mind (cognitive) on the elderly with dementia.

Other factors that support an increase in the level of mind comfortableness (cognitive) are the level of the respondents’ education, employment, coffee consumption (lifestyle), and heredity factor (12). The higher the level of one’s education, the easier for them to receive cognitive stimulation in the brain. If the brain is often used to think actively, both in daily activities and in working situation, its performance can be affected and makes it capable of slowing down the cognitive function degeneration (13). In this study, comfort was obtained from the intervention of chess games, making the mind (psychology) and social state of the respondents comfortable (4). Mind comfortableness was also influenced by the intervening variables include internal factors such as genetics, age, and gender as well as external factors such as education, employment, and lifestyle (13).

In this study, the elderly who tried to minimize the impact of dementia would also be influenced by related institutions, including the elderly’s groups and communities, the community clinics, and also the hospitals (15). The elderly will also consider where they can seek treatment, by looking for institutions that have good policies and services to reduce the impact of dementia, as well as affordable prices in every health service (11). The limitations of this study is that the proportion of respondents were entirely male so that the results obtained cannot represent female clients.

**Conclusion**

Based on the objective of this study, which is to determine the impact of chess game towards the elderly with dementia, this study indicated significant results for the improvement of convenience of mind in elderly with dementia by providing chess game intervention. The elderly got easier to remember things and had sharper long-term memory towards everyday problems.

**Ethical Clearance:** The research process involves participants in the survey using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, nonmaleficence, and justice.

**Conflict of Interest:** There are no conflict about interest of this paper and paper guaranteed 100% safe from conflict

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Lighting and Noise Levels in the Neonatal Intensive Care Unit (NICU)

F. Sri Susilaningsih¹, Siti Yuyun Rahayu Fitri¹, Ai Mardhiyah¹, Ermiati¹, Yanti Hermayanti¹
¹Faculty of Nursing Universitas Padjadjaran, Jl. Raya Bandung Sumedang KM 21 Jatinangor, Kab. Sumedang, Jawa Barat Province, Indonesia

ABSTRACT

Environmental aspect including noise produced by medical devices as well as lighting levels in Neonatal Intensive Care Unit (NICU) are pain and stress stimuli for neonates in Neonatal Intensive Care Unit (NICU). Pain response and stress reaction of neonates can affect their neurologic development, negatively affecting many aspects of their future life. In Indonesia, there is no data on noise level (sound intensity) and lighting level in NICU in Indonesia. This study aimed to identify lighting and noise levels in NICU using descriptive observational study design. This study was done in the NICU of a referral hospital in Indonesia. The mean lighting level in the incubator, NICU, and phototherapy box were 6 – 20 lux; 108 – 148 lux (mean 120.33; median 116.95); and 2000 – 3500 lux respectively. Moreover, the noise level in incubator and NICU were 45.73 – 62.84 dB (mean 53.63, median 53.4) and 59.03 – 76.07 dB (mean 64.15, median 62.18) respectively. NICU lighting levels was optimal for patient safety, however phototherapy produced high lighting level. Noise level was above the recommended 45dB standard. In conclusion, the stress potential of neonates in NICU was high.

Keywords: lighting, noise level, neonates, NICU

Introduction

Neonatal Intensive Care Unit (NICU) is an intensive care unit specializing in the care of ill or premature newborn infants. NICU is equipped with advanced devices to support premature babies, therefore it is not an ideal environment for the growth and development of the neonates.(1,2). NICU’s physical environment is very different compared to intrauterine environment, hence demanding the neonates to adapt physiologically to the environment. (3)

During treatment in NICU, premature infants receive medical and non-medical care due to their physiological limitations, resulting in stimulation or even overstimulation on their body. Stimulations such as lighting, noise and pain from repeated medical action will induce stress. Stress in premature infants can affect hypothalamic function which in turn adversely affect growth and neurological mechanism. (4)

Noise is of the stress inducer for premature neonates cared in NICU. The American Academy of Pediatric suggest that noise level for NICU is below 45 dBA. To support hearing development, NICU’s sound level should be similar to intrauterine environment. However, in reality, there were many unpredictable sound such as alarm, ventilator, radiant warmer, infusion pump, incubator, noise from nurse’s and family’s mobility, emergency trolley circulation, opening and closing of cabinets, garbage cans and doors, as well as sounds produced by air conditioners. (5,6). Another study showed that the most dominant sound is produced from incubator and health worker conversation. (7)

Previous study showed that noise level in NICU and incubator ranged between 52.6-80.4 dBA and 45.5-79.1

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dBA respectively. (8) Another study identified that noise level in NICU was approximately 71.2 – 83 dBA. (6) This is above the noise level recommended by American Academy of Pediatrics. (9)

Excessive noise exposure may induce stress in premature infants. (10) Stress in preterm infants could generate disturbance and increase mortality rate. Moreover, noise in NICU was main cause of stress in preterm infants. (11) Stress caused by excessive noise exposure will affect their physiology such as increased blood pressure, heart rate, respiratory rate and decreased oxygen saturation, leading to increased oxygen demand and caloric consumption. (12) Long-term impact of noise exposure are disturbance of language development, growth, and hearing system. (7) High risk-neonates in NICU are 20 times more likely than infants in general room to experience hearing loss. (13)

NICU’s lighting play an important role in newborn development. Excessive lighting generates negative impact including weight gain disturbance, sleep disorder, and stress in infants. Moreover, it disturbs retinal development in preterm infants. (1,2)

Sudden changes of lighting also affect the visual function of preterm newborn due to their thin eyelids. An investigating showed that slowly increasing procedural lamp intensity allowed infant to adapt more easily and prevent decreased oxygen saturation. (14) Those, infants’ eyes should be protected from bright procedural lamps. (15)

The American Academy of Pediatric recommends that lighting level in NICU ranges between 10-600 lux. Light restriction in the NICU stabilize the physiological state of the newborn, including stable breathing, decreased heart rate, blood pressure and motoric activity, as well as shorter duration of mechanical ventilation and oxygen support. (3)

In addition to inappropriate exposure to noise and lighting, pain caused by invasive procedure also affect the growth and development of premature infants treated in NICU. 79% procedures conducted in NICU were painful. (4) Premature infants receive on average 5-15 painful procedures daily in NICU. (16) The number of painful procedures is directly correlated to delay in growth and brain function development. In addition, repeated painful sensations can activate stress signal and affect their growth and development in the future. (4)

There is no data on the lighting and noise level specific to NICU in Indonesia. Therefore, this study aimed to identify lighting and noise level (sound intensity) in the NICU.

**Material and Method**

This was a descriptive observational study. Data was collected using 2 instruments including sound-meter and lux-meter (Lutron series SL-4112P), checklist and documentation study. The study was conducted at the NICU of a provincial referral hospital in Indonesia. Lighting and noise levels were measured hourly (in 24 hours) for 11 consecutive days and performed on 8 incubators, 2 non-incubator beds and NICU space environment. We calculated the average value per day for 11 days and the average of each bed (incubator and non-incubator) and the NICU. The results is listed in graphs 1-3.

Microphone of the sound-meter and light sensor of lux-meter were placed 10 cm from the infant’s head to measure the noise and lighting level. The measurement equipment were all new and calibrated every day according to their respective manual.

Ethical clearance was obtained from the hospital prior to data collection.

**Finding**

The average lighting level in incubator (graph 1) ranged between 6 – 20 lux, in NICU 108 – 148 lux (mean 120.33; median 116.95), and in phototherapy box (graph 2) were 2000 – 3500 lux. Noise level in incubator (graph 3) was 45.73 – 62.84 dB (mean 53.63; median 53.4) whereas in NICU was 59.03 – 76.07 dB (mean 64.15, median 62.18).
Graphic 1: The lighting level in incubator and NICU area

Graphic 2: The lighting level of phototherapy box in NICU

Graphic 3: Noise level in the incubator and NICU area
Discussion and Conclusion

The result of the study regarding the description of lighting level and noise level consisted of two components, namely lighting level in incubator and outside incubator or NICU area. The lighting level of incubator with and without phototherapy were extremely different. Therefore the data were described differently between incubator with and without phototherapy.

Lighting level in incubator without phototherapy ranged between 6 – 20 lux; in non-incubator bed was 108 – 148 lux; while in phototherapy incubator was 2000 – 3500.

The recommended standard of lighting level for daily care in NICU is 10 – 600 lux (Figueiro, 2006), although 2000 is required special procedures that require adequate lighting (3,17)cost, energy and aesthetics, there appear different biological needs of patients, health care providers and family members. Communicational aspects of light, its role as a facilitator of the visual function of doctors and nurses, and its effects on the newborn infant physiology and development were addressed in order to review the effects of light (natural and artificial. Based on this recommendation, this study found that lighting level in this study was within normal limit. However, infants who received phototherapy received high intensity light, hence requiring monitoring and more effort to minimize the negative impact.

Environmental lighting play an important role in visual development (vision and visual) and visual cortex maturation. Excessive light exposure lead to immature eyes and is associated with poor clinical outcomes such as low weight, behavioral and sleep disorder, and increased stress level in preterm and seriously ill neonates. Sufficient lighting will stabilize neonates’ condition related to respiratory rate, blood pressure, motoric activity, and faster independence from ventilator and oxygen. (3,18)

This research found that noise level inside and outside of incubator or NICU area were 45.73 dB – 62.84 dB and 59.03 dB -76.07 dB consecutively. It showed that noise level inside an incubator was lower than outside of incubator or NICU area. Thus, infants placed outside of incubator were exposed to higher noise intensity compared to those inside the incubators.

The latest standard for noise level in NICU by American Academy of Paediatrics (AAP) was 45 dB for daily care and can be tolerated up to 50 dB for no more than 10% of the day, with a maximum level of 65 dB for no more than 1/20 seconds during measurement period. (19) According to this standard, noise level both inside and outside of incubators in NICU was higher than normal standard.

Excessive exposure to high noise level cause deafness due to damages in organ of Corti. In addition, noise also caused other disorders including increased adrenocorticotropic hormone (ACTH), poor cardiovascular response, effects on language development and sleep disturbance (19). A cohort study of 273 infants weighing less than 1500 grams and exposed to 65 dB of sound intensity showed that 10 infants developed sensorineural hearing loss. Moreover, from the study, 4 from 8 infants experienced bilateral hearing loss that require special education. Another finding suggest that mechanical ventilation and length of stay within the incubator significantly contribute to the hearing disorder. (19)

The lighting and noise level in NICU is originated from the devices in NICU itself such as ventilator, incubator, incubator transportation, apneustic monitor, phototherapy, central monitor and bedside monitor.

In conclusion, noise is an environmental aspect of NICU that could potentially cause stress and pain in neonates. Noise came from medical devices such as incubator’s motor, alarm of various devices, and voice of health workers. Lighting level for daily care was within normal limit, whereas lighting level of infants undergoing phototherapy showed very high values. Therefore, efforts should be made to anticipate unwanted effect of lighting and noise level on the infants. Pain assessment could indicate infant’s stress level and thus is very important and should be done routinely in order to cater appropriate interventions that meet the needs of infants.

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Psychological Treatment for Major Depressive Disorder: Effectiveness of Cognitive Behavioural Therapy

Jirushlan Dorasamy
Masters, University of Monash, Melbourne, Australia

ABSTRACT

Major depression, as a recurring and disabling disorder, can have a negative effect on the psychological and physical well-being of patients. Various psychological and medical interventions are generally used for patients with major depressive disorders. Patients suffering from major depressive disorders (MDD) may be subjected to medication only or medication may be used concurrently with psychological interventions. Psychological interventions like cognitive behavioural therapy (CBT) uses behavioural and cognitive principles to treat patients suffering from MDD, by helping them to identify, understand and analyse how the interaction of their thoughts, moods and behaviours triggers and aggravates depression. CBT has been beneficial in treating patients suffering from comorbidity of MDD with other disorders. While there is empirical and theoretical evidence supporting the use of CBT under various treatment settings and patient characteristics, research findings indicate varying rates of adequacy of the treatment. Further investigation of potential prescriptive risk factors associated with MDD in different contexts can help to predict more unbiased and consistent responses to different CBT techniques. This will make a valuable contribution to improving the use of CBT techniques for patients with different depressive characteristics and across different treatment settings and modes of delivery.

Keywords: Cognitive Behavioural Therapy, Major depressive disorder, psychological interventions.

Introduction

As a common chronic disorder, MDD is ranked as a major cause of disability. In treating MDD, research shows that only medication can be used to treat patients suffering from MDD, or alternatively psychological interventions can be used concurrently with medication as a treatment option. Studies by Parik et al., Cuijpers et al. and Renn and Areán, argue that CBT can be effectively used as a psychological intervention (1-3). However, studies by Berking, Ebert, Cuijpers and Hofmann(4) and Bet(5) also indicated that while there is evidence of the efficacy of CBT, about 50 % of patients do not show significant clinical changes, while between 40 and 60% of patients relapse after acute treatment. While there is limited evidence to show that CBT can totally eradicate MDD, empirical and theoretical findings reveal that CBT can help to reduce the severity of MDD. However, the treatment adequacy of CBT for patients with different depressive characteristics and under varying treatment settings have shown to yield variances in treatment adequacy rates. Deepening an understanding and knowledge of CBT will add value toward improving CBT techniques, strategies and modes of delivery for patients with MDD, in an attempt to enhance their physical and psychological well being.

A diagnosis of Major depressive disorder (MDD) is characterised by at least a one 2-week major depressive episode(6), with patients experiencing significant impairment in functioning and clinical distress (7). MDD can recur due to factors like scarring from previous depressive episodes and inherent patient characteristics inclined toward recurrence (8). Optimizing the efficacy of interventions in the MDD phases is crucial to avoid the risk of recurrence, since the risk of recurrence escalates with each episode of MDD(9).

Corresponding Author:
Jirushlan Dorasamy
Masters, University of Monash, Melbourne, Australia
Email: hellojirushlan@gmail.com; nirmala@dut.ac.za
Risk factors and modes of delivery associated with major depressive disorder: CBT is based on the theory that depression is underpinned by behaviours, thought and beliefs that may be negative and incorrect (2). There are several risk factors associated with MDD. For example, early negative events like inconsistent disciplining can lead to maladaptive emotions associated with loss and failure, ultimately leading to depression (10). Additionally, adaptive thoughts can be hampered by negative beliefs emerging from automatic negative thoughts and cognitive distortions (9), invariably impacting how individuals perceive events.

Further, findings by Knapen et al. (6) points to high levels of physical impairment caused by obesity, that is associated with depression (11). The authors also cited other influences like medical diseases; drug and alcohol abuse; chronic stress and pain; and social influences impacting maladaptive behaviour and thoughts associated with depression (6).

Physiological stressors associated with depression can also be influenced by physical inactivity (12). For example, Knapen et al. (6) reported that individuals with metabolic syndrome, caused through physical inactivity, have a relatively higher risk to develop depression than individuals without metabolic syndrome. As argued by Titov (15) that since MDD is a complex disorder, with risk factors remaining inconclusive, perhaps ongoing research can provide more evidence on the associated risk factors.

In comparing various modes of CBT delivery, the meta analyses by Richards and Richardson (14) reported that psychological treatments using specific computer programmes and the internet were just as effective as face to face CBT. Renn & Areán (3) supported the use of both modes for CBT, especially among older patients who do not have close access to treatment facilities, may experience physical difficulty travelling, and cannot afford travelling. The use of technology for CBT treatment, not only increases accessibility, but it also broadens opportunities to use multiple modes of delivery.

Further, the study by Linde et al. (16) indicated that guided self-help by remote based therapists like using the telephone and video conferencing yielded similar effects as personalised face to face CBT. Additionally, Simon et al. (18) reported CBT with a live therapist delivering treatment by telephone improved treatment satisfaction and efficacy compared to ADM alone. While these studies show the benefits of CBT as a treatment intervention for MDD, research findings do not conclusively point to the efficacy of any single mode of delivery of CBT. It can therefore be posited that various factors pertaining to the patients physical, environmental and mental condition must be considered.

Benefits of cognitive behavioural treatment for major depressive disorder: CBT interventions like self-control, role play, restructuring thoughts and stress management specifically teach patients adaptive ways to replace dysfunctional thoughts, moods and behaviours and develop skills to regulate emotions, decrease feelings of worthlessness, help in managing stressful and emotional events, increase the capacity to solve problems and strengthens cognitive control (13,16,19).

Various meta analyses since 2009 have not challenged the findings that CBT is as effective as ADM when the severity of the depressive disorder is not considered and that the combination of both is more effective (1-3, 11, 18). However, research findings still support the claim that psychological treatments like CBT is more effective for patients with MDD compared to patients with minor depression (19). Further, when the characteristics of patients are considered, ADM is less effective than CBT for treating MDD. Examples include patients with MDD who may be unable to take medication because of additional health reasons or may have a tendency to respond poorly to medication. Further, Renn and Areán (3) reported that especially for older patients, psychological treatments may be more viable in view of higher vulnerability to the side effects of drug sides and for those suffering from cognitive impairment.

Additionally, CBT is beneficial for pregnant women who cannot be prescribed ADM because of the side effects on the foetus. Unlike ADM, CBT is effective for all age groups, sexes and individuals from different ethnic and cultural backgrounds. This suggests that a wider scope of patients can benefit from CBT, compared to other psychological and ADM treatments.

Additionally, studies by Cuijpers et al. (1) and Simon et al. (19) revealed that patients treated with ADM showed higher recurrence/relapse rates than those patients treated with CBT treatment during the acute phase. Supporting findings by Richards and Richardson (14) showed that CBT treatment in the acute phase enhanced the efficacy
of preventive psychological intervention. However, Bockting et al.\(^{(9)}\) argued that while CBT in the acute phase may inhibit greater chances of a relapse compared to ADM after both interventions were discontinued, the overall rate of relapse is frequently high. A suggested prevention strategy for a second relapse by Jarrett et al.\(^{(19)}\) is to continue the same psychological treatment used in the acute phase.

Regarding long term strategies to minimise the recurrence or relapse of MDD, findings by Berking, Ebert, Cuijpers and Hofmann\(^{(10)}\) and Bet\(^{(5)}\) indicated that CBT reduced the relapse or recurrence of MDD compared to active controls like ADM. While the studies reported that relapse risks were reduced if preventive CBT was provided after remission, further large scale research is needed to validate the benefits of psychological treatments as an alternative to the use of ADMs in the long term. Bockting et al.\(^{(9)}\) supports the view that CBT is a valuable intervention for patients who are at a greater risk of relapse. Meta analyses by Cuijpers et al.\(^{(1)}\) indicated that CBT used in the continuation phase also appeared to reduce the risk of relapse. However, since there is limited research showing the preventive effects of other depression-specific continuation therapies, additional research is needed to deepen an understanding of different interventions to manage MDD.

Meta analyses by Parikh et al.\(^{(2)}\) showed evidence that CBT was not only the most recognised and established first line treatment for acute and maintenance depression, but also most effective for patients who did not respond to ADM. Despite findings from various studies, further research is specifically needed to investigate the efficacy of CBT compared to other psychological treatments for patients who did not respond to ADM.

The use of the internet and computer based CBT to treat disorders that have comorbidity with MDD is not only more cost effective, but also accessible to patients who cannot access contact treatments or do not prefer contact treatment. In this instance, patients and health care systems are relieved of unnecessary constraints or limitations associated with contact treatments. For treatment settings that are either contact or non contact, optimal benefits are dependent on relevant and ongoing staff training and guidance, to ensure patients receive the requisite support in real time.

While research has shown the benefits of CBT, the meta-analysis by by Linde et al.\(^{(16)}\) and Simon et al.\(^{(18)}\) reported that apart from CBT, other psychological interventions also shared the enduring treatment effects after the discontinuation of the acute phase treatment. While these findings suggest that other psychological interventions also have enduring effects, there is no conclusive evidence showing which of the treatments have the highest enduring effect. Therefore, further research is needed to address the gap in evidence.

However, maximising the beneficial effects of any one psychological intervention or combination of interventions requires an indepth understanding of the predictors of various responses to different kinds of treatment and the nature of treatment offered in the various phases of depression. While several studies\(^{(9,10,13)}\) posited that unstable remitters and higher rates of past episodes of depression benefitted more from preventive CBT, studies by Jarrett et al. \(^{(19)}\) on relapse prevention did not support this. This may possibly be due to studies that did not have different groups with different rates of depression episodes. Further research in this regard, will be valuable in deepening an understanding of relapse prevention using CBT or a combination of interventions.

**Factors determining rates of treatment adequacy:** Structured facilitation by experienced health professionals is fundamental in helping patients to release negative memories and feelings and help them to understand maladaptive thoughts and behaviour through the use of appropriate CBT techniques that respond to the needs of the patient.

The study by Parikh et al. \(^{(2)}\) suggested that empathy, genuine respect and interest in the well being and safety of patients with individual differences strengthens the therapy alliance between the two. Further, feedback from patients is important to monitor treatment adequacy, symptoms and experiences and to determine timeously the need for changes in approach \(^{(2)}\).

In terms of specific environments, studies showed adequacy of CBT being more pronounced in specialised care than in primary care \(^{(17-19)}\), since patients with MDD received direct treatment from more educated and experienced practitioners, focusing specifically on psychological symptoms \(^{(5)}\).

The training of clinicians in evidence based treatment, access to experts, mentors and peers who provide invaluable first hand knowledge, on-going support, access to facilities and incentives for clinicians...
in evidence based treatment is a critical determinant of adequacy of treatment, since it helps clinicians to adapt practices to individual needs (3).

It is also important to consider the preference of patients, since enhanced patient outcomes is dependent on the needs of patients be addressed. For example, there is growing evidence that patients are increasingly preferring psychological treatment compared to ADM (2). However, studies by Renn and Areán (3) found that especially in older patients, factors like treatment costs, transportation costs and travelling difficulties mitigated their choice of treatments.

Ultimately, adequately resourced and managed treatment settings, qualified health professionals, addressing patient needs comprehensively and ongoing support are some of the critical determining factors for adequacy of treatment. In the absence of this, the efficacy of treatments like CBT can be compromised.

**Conclusion**

Various considerations determine the efficacy and adequacy of CBT to help patients to identify and replace maladaptive thoughts and behaviour. Unlike antidepressants which have dosages that are standardized, CBT is influenced by multiple factors like the training and experience of the therapist; treatment settings, patient characteristics, ongoing support and the quality of content. It is increasingly challenging to ensure that diverse and sometimes competing complexities are managed to ensure optimal success.

CBT is an effective psychological intervention to treat the various phases of MDD, provided the treatment is properly managed to improve physical and psychological well-being. Since much research also shows that treatments such as CBT can only reduce one third of the disease for those affected by MDD even under optimal prevailing conditions, further research on prevention strategies rather than treatment of MDD can greatly help in decreasing incidences of MDD (17). Additionally, despite expansive research reporting CBT as an effective psychological treatment, meta-analysis by Amick et al. (13) and Cuijpers, van Straten, Bohlmeijer, Hollon and Andersson (1) indicated that previous studies overestimated positive treatment effects. Their meta analysis drew attention to many CBT studies often focusing only on certain techniques of psychological treatment, specific modes of delivery or particular target groups. Demographic factors like gender and age; and clinical factors like recognition of the mental problem, comorbidity and recurrence were often not considered, thereby neglecting to analyse the influence of such factors on the adequacy of CBT. Therefore, it can be suggested that more representative studies can possibly generate strategies to optimize the efficacy and adequacy of CBT as a psychological intervention in treating MDD.

Finally, future research based on longitudinal studies can analyse specifically reported data by patients, with the aim of identifying a typology of potential risk factors and to help predict responses to different kinds of cognitive behavioural therapy that yield more unbiased and consistent outcomes. Despite widely published evidence on the effectiveness of psychological interventions, further research is required to address the aforementioned unresolved focus areas.

**Ethical Clearance:** Not applicable as it is my own research. As both are review articles, ethical clearance not required.

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Value of Understanding Personality and Proactive Coping for University Students

Jirushlan Dorasamy
Masters, University of Monash, Melbourne, Australia

ABSTRACT
Coping in different situations involves the use of personal skills, attributes and various support mechanisms to manage challenging and stressful life experiences. There is a plethora of research focusing on coping as a response to a threat. However, there is currently increasing research focusing on coping as a proactive and future oriented strategy. Proactive coping draws on identifying resources that can be used to address challenges and pursue personal growth by overcoming negative outcomes associated with stressors. It is often argued that proactive coping is influenced by innate dispositions associated with personality traits. The Five-Factor Model is a trait based approach to understanding personality, which analyses emotion and cognition behavior. The model consists of Openness to experience, Conscientiousness, Extraversion, Agreeableness and Neuroticism. While experiences and situational factors can influence coping, personality traits can also affect coping ability. The Five-Factor personality model can be used to gain more indepth insight into how individuals with different personality traits cope with stressors. Further, it can be argued that there is a relationship between personality traits and proactive coping ability. The Five-Factor Model is used to argue that personality traits relate to proactive coping and that personality plays a critical role in coping styles and coping ability.

Since coping is multi dimensional in nature, individuals with different personality traits will cope differently during stressful situations, even in anticipation of stressful situations. Understanding the relationship between proactive coping and personality traits is important, especially for university students who often find themselves in stressful situations and cannot cope. Through the use of proactive coping strategies, students will be ready to manage stressors more effectively, ultimately enhancing their experiences through positive outcomes.

Keywords: Five-Factor Model, proactive coping strategies, personality traits,

Introduction
As an important adaptive strategy, proactive coping can help people to prepare for obstacles that are unavoidable. From the perspective of university students, proactive coping is necessary in helping them to adjust. The Five-Factor Model is used to show that proactive coping is associated with individuals who have personality traits that do not allow stressors to cause emotional distress. Rather their personality traits provide them with the capacity to consider stressors as challenges that encourages them to succeed. The paper identifies which of the five personality traits are predictive of proactive coping and the characteristics within the personality traits influencing proactive coping.

Initiating action in a problem-solving manner that reduces or removes the impact of stressors requires the use of coping strategies. Internal and external stressors can be managed through the use of behavioral and cognitive endeavours. The behavioral aspect includes strategies used to change a situation which is problem-focused coping or manage stressful emotions which is emotion-focused coping. The cognitive aspect includes the use of strategies that relate to how threatening or important the stressor is to the well-being of the person.
In anticipation of stressful events, individuals with proactive coping strategies actively seek new challenges that have not occurred. Proactive coping strategies are adopted to mitigate negative outcomes of potentially challenging situations\(^{(4)}\). Such coping which is challenge driven and future oriented, can enable people to prepare for stressors which are seen as challenging\(^{(1)}\).

It can be asserted that individuals with proactive coping strategies have personalities that make them think and behave in ways that support proactiveness in challenging situations. Since development of the personalities of individuals over time is largely influenced by personal memories, values, habits, attitudes, socialism and skills, their ways of thinking and behaving become distinctive. This is supported by Cervone and Pervin\(^{(5)}\) who argue that personality traits can be aligned to “psychological qualities that contribute to an individual’s enduring and distinctive patterns of feeling, thinking and behaving.” In this regard, the Five-Factor Model (FFM) provides a valuable multidimensional account of the structure of personality. The FFM consisting of Neuroticism, Extraversion, Conscientiousness, Openness to Experience and Agreeableness has more specific personality facets under each personality dimension. Neuroticism represents stress, depression and anxiety which is experienced differently by individuals. Extraversion is seen as a positive and warm trait. Conscientiousness is illustrated through the achievement of goals, morals and values. This personality factor is guided by the social aspects of life and oriented for future success. Openness to Experience is associated with being positive, creative, intelligent, and being amenable to try new things. Agreeableness is characterized of being supportive, trustworthy and nurturing\(^{(6,7)}\).

Coping is considered as constantly changing behavioral and cognitive efforts to effectively respond to particular internal and external demands on individuals. Research has linked coping strategies with different dimensions of personality\(^{(6)}\). Findings from past research have indicated that personality is one of the fundamental drivers associated with coping abilities, especially proactive coping\(^{(3,6)}\). Research has shown that personality traits can predict the coping strategies that individuals choose to use. Hambrick and McCord\(^{(3)}\) found that individuals who frequently used proactive coping strategies to manage their lifestyles, were most likely to espouse personality traits that were conducive to the successful use of proactive coping strategies. They concluded that proactive coping served as a buffer against negative outcomes. They claimed that this style of coping was effected by a proactive personality dimension that took initiatives, searched for opportunities and persevered until meaningful change occurred\(^{(3)}\). Instead of being constrained by situational impediments, proactive individuals seek opportunities to learn and are motivated to achieve higher levels of development. Such a personality trait is associated with positive outcomes.

Instead of giving up on stressful events, individuals with proactive personalities choose to rather identify the source of the stressor and find coping strategies to manage the stressor. The action oriented nature of such individuals is linked to their proactive personality of dealing with stressors. Hambrick and McCord\(^{(3)}\) found that the personality profile of individuals who demonstrate high counts of proactive coping ability is indicative of high levels of Conscientiousness, Extraversion and Agreeableness, while low levels of Neuroticism stems from depression and similar negative factors. This implies that proactive individuals experience lower levels of stress when addressing stress factors due to their proactive personality. Gan et al.\(^{(4)}\) supported this by arguing that proactive individuals who take purposeful and constructive actions based on appraisal of challenges and act ahead of time, experience lower levels of stress. Such purposeful and constructive actions is influenced by personality traits associated with Conscientiousness, Extraversion and Agreeableness. Therefore, it can be asserted that one of the ways to understand why certain individuals cope better by managing stressors in effective ways, an analysis of personality traits is integral. Personality traits impact positive coping outcomes. Evidence shows that proactive personality traits are negatively associated with avoidant, dysfunctional strategies that do not engage with the stressors in proactively. One such study by Major et al.\(^{(2)}\), revealed that individuals with proactive personality traits can mediate through challenges since they have the capacity to anticipate stressors. Such capacity enables them to use effective coping strategies to deal with stressful encounters.

It is valuable for university students to understand factors influencing their responses to stressors, as such
understanding can help them to mitigate the negative outcomes associated with stressful encounters. Entering an unfamiliar university environment can be accompanied by stressful situations for which most students may not be capacitated to deal with. Unanticipated, diverse, multiple and complex expectations within the university environment can lead to the inability to cope and maladjustment amongst students. University students endure stressful experiences emanating from academic, interpersonal, finance, living environment, health and self-imposed stressors. Gan et al.\(^4\) identified more specific stressors such as frustration, conflicts, pressures and changes in their study. Students who are disorganized and lack self-discipline may experience self-imposed stress. These negatively appraised stressors can be considered as consequences by students, rather than potential rewards.

Research points to coping styles and ways of coping that are influenced by the innate personality disposition of individuals. This points to the importance of recognizing the relationship between proactive coping abilities and the personality traits of individuals. Research shows that the personality of students within the university context impacts the ability to cope and influences adaptation through the use of proactive coping strategies\(^2, \ 8, \ 9\). In illustrating that proactive coping is commensurate with personality development, Douglas et al.\(^5\) argued that students with proactive coping personalities showed higher levels of time management which is associated with Industriousness and Orderliness. This was supported by evidence which showed that students who had study plans and completed their study requirements displayed personality traits linked to Orderliness, Industriousness, Intellect and Openness\(^8\). Such students transformed their mental capabilities into successful academic performance. They were able to do this through self-regulated learning that was founded on organizing themselves, setting goals and self-monitoring. These self management areas are associated with personality traits linked to enthusiasm, orderliness and industriousness. Further, Douglas et al.\(^6\) illustrated that university students who displayed traits associated with conscientious, showed time management behavior that produced positive outcomes and shared a positive relationship with industriousness. The implication is that individuals high on time management behavior, used their time productively and did not procrastinate making decisions. This helped them to cope with the completion of tasks, once they started. The authors further contended that if students have a state of mind that is work related and are motivated to invest time and effort into their work, then they will be inclined to show openness/intellect\(^8\). This was support in the findings by Akhtar, Boustani, Chamorro-Prenuzic and Tsivrikos\(^1\), which found a positive relationship between work engagement and openness/intellect. Therefore, it can be argued that since students with the openness/intellect trait have wide and insightful interests, the interest in working with new study material is reinforced. This type of proactive coping is positively associated with active planning, control, forward thinking and self-esteem. This claim is supported by Major et al.\(^2\) who stated that students who deal with the source of stressors, plan and take action, can be considered as forward thinking and active students. Such proactive action, is preceded by continuous engagement in active planning strategies. This is reflective of the personality trait known as openness to experience in the five factor model.

The study findings by Litman and Lunsford\(^9\) reported that students who coped with obstacles were generally students who showed higher levels of commitment and engagement with their work. Such an attitude toward their work helped them to experience positive outcomes. This supports the claim that there is relationship between a proactive personality and commitment. Additionally, the study by Hambrick and McCord\(^3\) reiterates the argument that students showed higher adaptive coping abilities, if they had a tendency towards social interaction, worked well in group settings and were able to get along with others. Evidence of strong correlations between coping and personality traits shows the dispositional influence of personality traits on the ability to cope. Based on the aforementioned findings, it is reasonable to assume that students can reduce stressors if they are willing to change, determined to succeed and not in depressive states. These high levels of positive emotions can be attached to traits of extraversion, conscientiousness, non-neuroticism and agreeableness. Such traits are conducive to students developing proactive coping strategies to manage stressful encounters.

However, a personality trait like neuroticism does not allow for successful proactive coping. It is can lead to higher levels of stress and maladaptive coping styles. The implication is that such students may use avoidance strategies when faced with new problems, as
they may be emotionally weak. Allen et al.⁶ argue that when students engage in avoidance coping behavior, they become disengaged. Such disengagement is generally associated with neuroticism. Based on the discussion, it can therefore be asserted that the higher order dimensions of the five factor model of personality such as openness to experience, conscientiousness, extraversion and agreeableness are associated with proactive coping strategies. Further, since openness to experience increases the ability to cope, some students will be better able to manage stressors than others.

**Conclusion**

Personality plays an influential role in determining how individuals cope in stressful situations. Understanding the influential role of personality in the context of coping is critical when analyzing how university students cope when faced with stressors. In the light of evidence pointing to students with exceptional coping abilities performing better when faced with stressors and experiencing less life stressors, this needs to be considered when university students are being guided to manage stressful obstacles. Further, in view of the relationship between proactive coping and the dispositional influence of personality pointing to high levels of extraversion, conscientiousness, and agreeableness amongst students who have high levels of coping ability, personality traits also require further analysis when assisting them to cope. Students can successfully manage to buffer stressors by using proactive coping styles.

The Five-Factor Model of Personality provides an important approach in understanding the key dispositions that influence the overall ability to cope. The innate relationship between personality traits and proactive coping is critical in understanding the coping abilities of university students. In view of extant literature on coping strategies linked to situational and dispositional factors, it can be concluded that personality is a fundamentally important consideration in trying to understand the ability to cope.

**Ethical Clearance:** Not applicable as it is my own research. As both are review articles, ethical clearance not required.

**Source of Funding:** Not applicable

**Conflict of Interest:** Nil

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**REFERENCE**


Effectiveness of an Education Program on Nurse-midwives’ Practices Related to Postpartum Hemorrhage at Delivery Room of Maternity Hospitals in Baghdad City

Azhar Hussein Ali¹, Ezedeen F. Bahaaldeen²

¹Nursing Teacher, Al-Yarmouk Secondary Nursing School, ²Assistant Professor, Maternal and Neonate Health Nursing Department, College of Nursing, University of Baghdad

ABSTRACT

Objective: To determine the effect of an education program on nurse-midwives’ practices related to prevention and management of PPH, and to identify the relationship between nurse-midwives’ practices related to PPH and their age, educational level, years of experience in nursing, years of experience in midwifery and training courses.

Methodology: A quasi-experimental design was conducted on a purposive sample of (97) nurses who are work in delivery rooms at six maternity hospital at Baghdad City for the period from May 27th, 2018 to December 10th, 2018. A questionnaire was used to data collection and consisted of two parts; part I socio-demographic characteristics, and part II nurses-midwives’ practices which consists of (54) items as an observational checklist distributed on (8) sub-domains related to management to prevent primary PPH.

Results: The results revealed that 87(89.69%) seem to be similarly distributed for whom age are less than 50-years-old, 56(57.7%) are secondary midwife graduates, 64(66.0%) are married, 51(52.6%) had (1-5) years in nursing and 56(57.7%) had (1-5) years of (experience) in the delivery room, number of training courses of PPH had (1-2) number. The overall assessment presents revealed that most were at a low and moderate levels of practice at the pretest period and became high level at posttest. Nurse-midwives’ practices not relationships within their age, education levels, and marital status. While, there is a relationship with the remaining variables (i.e. number of yrs. of total service, number of yrs. of service (experience) in the delivery room, and number of training courses related to pregnancy and childbirth).

Keywords: Nurse-midwives’ Practices; Postpartum Hemorrhage

Introduction

Postpartum hemorrhage (PPH) is one of the most common obstetric maternal complications and is among the three most common etiologies of maternal death globally. Its incidence is increasing and it affects 1% to 5% of all the deliveries (¹). Global advocacy groups describe maternal mortality as “avoidable” and “preventable”. This might be because over 70% of maternal deaths are due to five major complications (hemorrhage, sepsis, unsafe abortion, eclampsia and obstructed labor) and the clinical means to prevent either deaths arising from these complications (²).

The World Health Organization (WHO) currently recognizes the associated risk factor with PPH as increasing maternal age, fetal macrolecosmia, primiparity, multiple gestations, previous cesarean section, prolonged labor, fibroids, and episiotomy. However, many women present with these risk factors and do not develop a PPH. Therefore, the recommended practice is that women should benefit from active management of the third stage of labor, the only intervention known to prevent PPH (³). The causes of maternal mortality in 2017 from vital registration and bibliographic data were found to
be direct and indirect causes of obstetrics. PPH was the most common direct cause of maternal mortality in Iraq. Globally, 35% of maternal deaths are associated with PPH. The estimated mortality rate from bleeding in developed countries was below 13.4%. However, studies have shown the trend of increased incidence of PPH as a cause of severe maternal morbidity (near miss) in developed countries, such as Australia, Canada, United Kingdom and United States.

Methodology

A quasi-experimental “test-retest” design was conducted on non-probability (purposive sample) of (97) nurse-midwives who work in delivery rooms at six maternity hospital at Al-Karckh and Al-Russafa Health Directorates, Baghdad City. The educational program was program is constructed based on initial assessment data and implemented from May 27th, 2018 to December 10th, 2018. A questionnaire was used as a tool of data collection which consists of two parts; part I socio-demographic characteristics. Nurse-midwives’ practices include (54) items as an observational checklist which can be divided into (8) sub-domains related to prevention of primary PPH. These practices include the following:

1. Give the medicines expedited for delivery: composed of (1) items.
2. Feel the abdomen to make sure there is no second child: composed of (1) items.
3. The method of oxytocin giving: composed of (3) items.
4. The time given to oxytocin: composed of (6) items.
5. The position of the fetal before the umbilical cord clip: composed of (9) items.
6. Controlled traction of umbilical cord: composed of (7) items.
7. Uterine massage: composed of (9) items.
8. Direct care for postpartum hemorrhage: composed of (10) items. These sub-domains are related according to (3) level scale (always, sometimes, never) & scored with (3, 2, 1).

Results

Table 1: Distribution of the studied group according to (SDCv.) with comparisons significant

<table>
<thead>
<tr>
<th>SDCv.</th>
<th>Groups</th>
<th>No.</th>
<th>%</th>
<th>C.S</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Group (Years)</td>
<td></td>
<td></td>
<td></td>
<td>$\chi^2 =$</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15.124</td>
<td>P=0.002</td>
</tr>
<tr>
<td>Nursing School Graduate</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary Midwife Graduate</td>
<td>56</td>
<td>57.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary Nursing Graduate</td>
<td>15</td>
<td>15.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursing Institute</td>
<td>21</td>
<td>21.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College of Nursing</td>
<td>3</td>
<td>3.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master and more</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td>$\chi^2 =$</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>64</td>
<td>66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>28</td>
<td>28.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widow</td>
<td>4</td>
<td>4.1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; NS: Non Sig. at P>0.05; Testing based on One-Sample Chi-Square test, and the Binomial test

There is a statistically significant differences in all socio-demographical characteristics. Relative to nurse-midwives’ age group, they seem to be similarly distributed for whom age are less than 50 years old ($n = 87; 89.69\%$) compared to those who age 50–60-years ($n = 10; 10.31\%$). With respect to level of education, the majority are secondary midwife graduates ($n = 56; 57.7\%$). With respect to nurse-midwives’ marital status, the vast majority are married ($n = 64; 66.0\%$), followed by those who are single, widow, and divorced ($n = 28; 28.9\%, 4; 4.1\%, n = 1; 1.03\%) respectively.
There is a statistically significant difference in nurses-midwives’ knowledge about prevention & management of postpartum hemorrhage (p-value = .000).

Figure 1: Bar Chart for percentiles grand mean of score along pre-post periods practices sub and main domains for the studied sample

Figures (1) shows represented graphically the percentiles transformation outcomes for grand and global mean of score along pre-post periods of studied sub and main domains, as well as an overall evaluation of studying effectiveness of an education program on practices of sample toward PPH.

Table 3: Relationships (Analysis of Covariance) concerning Practices in light of SDCv., and service years and training variables

<table>
<thead>
<tr>
<th>Source of Variation (S.O.V)</th>
<th>Type III Sum of Squares</th>
<th>d.f.</th>
<th>Mean Square</th>
<th>F-value</th>
<th>Sig. Levels</th>
<th>C.S. (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>41334.0</td>
<td>1</td>
<td>41334.0</td>
<td>755.3</td>
<td>0.000</td>
<td>HS</td>
</tr>
<tr>
<td>Age Group</td>
<td>125.1</td>
<td>3</td>
<td>41.7</td>
<td>0.762</td>
<td>0.519</td>
<td>NS</td>
</tr>
<tr>
<td>Education Levels</td>
<td>348.4</td>
<td>5</td>
<td>69.7</td>
<td>1.273</td>
<td>0.285</td>
<td>NS</td>
</tr>
<tr>
<td>Marital Status</td>
<td>334.7</td>
<td>3</td>
<td>111.6</td>
<td>2.039</td>
<td>0.116</td>
<td>NS</td>
</tr>
<tr>
<td>No. of yrs. of total service</td>
<td>557.0</td>
<td>4</td>
<td>139.3</td>
<td>2.545</td>
<td>0.046</td>
<td>S</td>
</tr>
<tr>
<td>No. of yrs. of service (experience) in the delivery room</td>
<td>561.3</td>
<td>4</td>
<td>140.3</td>
<td>2.564</td>
<td>0.045</td>
<td>S</td>
</tr>
<tr>
<td>No. of training courses related to pregnancy and childbirth</td>
<td>1183.0</td>
<td>3</td>
<td>394.3</td>
<td>7.205</td>
<td>0.000</td>
<td>HS</td>
</tr>
<tr>
<td>Error</td>
<td>4049.8</td>
<td>74</td>
<td>54.7</td>
<td></td>
<td></td>
<td>R-Squared = 0.427</td>
</tr>
<tr>
<td>Total</td>
<td>713045.4</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(*) HS: Highly Sig. at P<0.01; Sig. at P<0.05; Non Sig. at P>0.05; Statistical hypothesis based on Analysis of Covariance (ANCOVA).

Nurses-midwives’ practices not relationships within their age, education levels, and marital status, while strong relationships are proved with number of years of experience, years of experience in the delivery room, and number of training courses related to pregnancy and childbirth.
Discussion of the Results

The study result show that study participants are equally distributed relative to age whom age are less than 50-years-old. Muzeya (2015) reported that participants' age ranged from 21-50-years and above. The majority age 21-30-years and only one (2.2%) was older than 50-years (8). This finding is in agreement with Medoh (2017) who stated that the ages varied from 31 years to 60 years. The average age and the standard deviation of the participants who completed the quality improvement training was 40.27 and 8.82, respectively (8). All this study agreed with present study. Concerning educational levels, the majority of the sample are secondary midwife graduate level (n = 66; 56.7%). Muzeya (2015) found that the majority (75.6%) of participants had a Diploma in Nursing and Midwifery and (22.2%) had a degree in Nursing and Midwifery (9). Mohammed (2015) shows the majority of the sample are secondary midwife graduate level (n = 27; 35.1%), while leftover of Basic, High Education, and Bachelor are reported 22 (28.6%), 11 (14.3%), 17 (22.1%) (11). All these studies agree with present study. Relative to marital status, the vast majority of the sample are married (n = 64; 66.0%). Kyei et al (2018) show the vast majority of the sample are married (n = 189; 69.5%) (9). These studies agree with present study. Regarding the “Number of years in nursing”, more than a half had 1-5-years (n = 51; 52.6%). Fungai Muzeya (2015) reported that most of the participants had 2-years of experience or below, whereas 17 (37.8%) had between 3-5-years working experience that mean the vast majority of studied sample had (1-5) yrs. and they are accounted 35 (77.8%) is in agreement with present study (8).

Regarding the number of years in the delivery room, more than a half had 1-5-years (n = 56; 57.7%). Medoh (2017) have stated that there were 25 participants’ years of experience in nursing varied from 6-30 years, of studied sample are distributed for whom years of experience as a labor/delivery or postpartum nurse and or obstetric nurse are less than 6-years (n = 6; 40%) (9). This study result agrees with present study. Relative to “Number of training courses related to pregnancy and childbirth” shows that vast majority had (1-2) number (n = 42; 68.9%). Finally, “Number of training courses of PPH” shows that vast majority of sample had (1-2) courses (n = 32; 89.2%). Hassan and others illustrate the attendance of the studied nurses of any educational training related to placental examination during their work years, this study agreement with present study in that most of participants in the program did not attend any training courses related to pregnancy and childbirth or training courses of PPH (12).

Table (4-2-2) shows summary statistics of practices (Pre, and Post) periods due to applying proposed of program. The study results reported highly significant differences toward impact of program through raising nurse-midwives’ practices extremely, except item of “The use of Tranexamic acid, which is known as Cyclocapron which showed no significant different at P>0.05, as well as perfect similarity responses was obtained in light of pre/post periods.

Egenberg et al., (2017) reported the most important step in preventing maternal morbidity and mortality due to PPH is skilled attendance at birth and access to emergency obstetric care. Skilled attendance includes active management of the third stage of labor, such as administration of oxytocin to the mother soon after childbirth, controlled cord traction, delayed clamping of the cord, and uterine massage (13).

All studies are agree with the present study, which showed that nurses midwives were low or moderate practices in the management of postpartum hemorrhage compared to their knowledge and may be due to several reasons, for example the lack of training courses for nurses to prevent and management of postpartum hemorrhage as well as a lack of educational programs and awareness and supervision and make them mandatory to identify all the update in terms of science and practice and knowledge for the purpose to control of PPH and reduce the proportion of morbidity and mortality, in addition to the importance of the development of recommendations and guidance of the WHO in the form of Flexes or posters in the delivery room, Wards birth and emergency women’s groups. Note that educational programs must be implemented for longer periods to ensure that all points are applied and utilized by everyone.

Conclusion

The present study has come out with the following conclusions:

1. The education program was effective an increasing the practices of nurses-midwives toward prevention and management of postpartum hemorrhage.

2. The results of the present study confirm unequivocal evidence of the benefits of implementing the educational program in the continuous and significant improvement in the practices of nurses-midwives through the post-
test results of the study group, one month after the implementation of the educational program on prevention of postpartum hemorrhage and management to stop it.

3. There was no statistically significant of an educational program for “nurse-midwife’s knowledge and practices toward postpartum hemorrhage at delivery room of maternity hospitals in light of (SDCv., service years, and training variables).

Conflict of Interest: The researchers report no conflict of interest.

Source of Funding: This study did not receive any funding from any agency.

Ethical Clearance: The researchers obtained a permission from the ethical committee in the College of Nursing–University of Baghdad to conduct this study.

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Effects of Pain, Disability, Social Support and Stress on Depression of Community-dwelling Elders

Hee Kyung Kim¹

¹Professor, Department of Nursing, Kongju National University, Gongju, South Korea

ABSTRACT

Purpose: The purpose of this study was to analyze the effect that pain, disability, social support, and stress have on depression in elders.

Method: The subjects of this study were 141 elders between 65 or above. The data were analyzed using descriptive statistics, t-test, ANOVA, Pearson’s correlation coefficient and stepwise multiple regression.

Results: With depression, pain had a positive correlation ($r=.26, p=.002$), disability had a positive correlation ($r=.25, p=.002$), stress had a positive correlation ($r=.47, p<.001$), but social support had a negative correlation ($r=-.42, p<.001$). Depression was set as a dependent variable for a multiple regression analysis. The analysis showed that stress ($β=.313, p<.001$), social support ($β=-.272, p<.001$), and economic status ($β=.201, p=.007$), and health condition ($β=-.178, p=.010$) had a significant effect on depression in elders. The regression analysis was statistically significant ($F=20.74, p<.001$).

Conclusion: Nurses that interact with the elderly in the local community must identify the source of stress to develop an intervention program and apply a social support program. By helping subjects check up on their own health condition and practicing health improvement practices, they should encourage the elderly to lead a healthy life. As economic status is a factor affecting depression, programs for depression management need to be developed.

Keywords: Elderly, Depression, Stress, Social support, Health condition

Introduction

The growth of the elderly population is a worldwide trend. Those aged 65 or older in Korea now account for 14.8% as of 2019, making the country an aged society.¹ Life expectancy in Korea as of 2015 is 82.06 years, which has seen the fastest increase rate among OECD countries in the past two decades. But the healthy life expectancy is 73 years, which indicate that longer life has led to increased physical and mental pain due to geriatric chronic diseases.² As such, policies are needed for aging and in particular measures to prevent aging and to maintain a healthy life. In terms of social relations, leisure activities including hobbies and volunteer activities must be widely adopted, while management of income and assets is needed.¹

Meanwhile, the elderly experience various stress factors and depression due to aging, including physical illness, death of a spouse, worsened financial situations, social isolation and undermined ability to carry out daily life. Depression in the elderly, compared to that in other age groups, has bad prognosis. Symptoms include sadness, memory loss, helplessness and frustration, which increases the risk of suicide² As such, nurses need to detect depression in the elderly early and address it.

The elderly living in local communities are likely to have at least one chronic disease and discomfort such as pain. As they age further, they experience further deterioration in the bodily functions, leading to more stress in everyday life and undermined physical and mental health.³ In such a situation, social support can help reduce depression and increase happiness.⁴ Preceding studies on the elderly show a correlation between stress...
and social support the elderly feel and their depression. Chronic pain and decreased bodily function experienced by the elderly lowers quality of life while social support is a major variable that reduces depression and quality of life.

As such, the objective of this study is to understand the degree of depression in the elderly living in local communities and apply the variables of pain, functional disorders, social support and stress to identify their correlation with depression to reduce depression and improve health in the elderly. In doing so, the study will provide basic data for the development of nursing intervention programs that can promote health in the elderly.

Method

Subjects: The elderly visiting 2 health centers in D city, 7 health centers in C province and 1 health center in S special city were used as subjects via a convenience sampling. Senior citizens who are active, who can communicate, who understand the content of the questionnaire and who gave their consent to participation in the study were used as study subjects. To verify the appropriateness of the size of the sample, G*Power 3.0 program was used to apply a significance level of 0.05, an effect size of 0.15, a power of test of 0.90 and six predictive factors that are needed for a regression analysis. This gave a sample size of 123 subjects. Considering the drop-out rate, a total of 150 copies of the questionnaire were distributed. 9 with insufficient responses were excluded and a total of 141 copies were used for the final analysis.

Instruments

Pain: The Visual Analog Scale [VAS] was used to measure for 4 weeks lower back pain, headache, joint pain or overall muscular pain on a scale of 0 to 100. ‘Not at all’ was given 0 point, ‘about medium’ was given 50 points and ‘very severe’ was given 100 points. Higher scores indicate greater pain.

Disability: The Oswestry Disability Index developed by Fairbank, Couper, Davis, & Brien and used by Lee was applied. For a total of 9 questions, higher scores indicate a more severe function disorders. In the study by Lee, Cronbach’s $\alpha=.89$ and in this study it was .88.

Social Support: The tool by Kim which is a revision of the MSPSS was used. This has a total of 12 questions. A higher score indicates greater social support. The confidence level in this study was .89.

Stress: BEPSI-K, the Korean version of a stress measurement tool revised by Lim et al. was used, which consists of 12 questions. A higher score indicates greater stress. The confidence level in this study was .89.

Depression: Short Form Geriatric Depression Scale consisting of 15 questions which was revised by Kee into a standardized Korean version was used. Responses were measured on a 2 point scale, with ‘yes’ being given 1 point and ‘no’ being given 0 point. A higher score indicates greater depression. At the time of the tool’s development, the confidence level was .84, and in this study it was .75.

Data Collection: Data were collected from April 11 to May 8, 2019. The researcher explained the objective and methodology of the study at a meeting of heads of local health centers. The heads of health centers who gave their consent to data collection were as follows: 2 centers in city D, 7 centers in C province and 1 center in S city. The researcher explained the objective and methodology of the study to the elderly who visited health centers and asked those who gave their consent to sign a consent form. It took about 20 minutes for subjects to fill out the questionnaire.

Ethical Consideration: To collect data for this study, approval from the ethics committee of K University was acquired (KNU-IRB-2019-20). During the study period the guidelines on ethical studies were observed.

Data Analysis: Using the SPSS/WIN 23.0 program, the general characteristics and variables were analyzed for frequency, percentage, mean and standard deviation. The difference in depression across different general characteristics was analyzed using a t-test, ANOVA and Scheffe test. The correlation between elders’ variables was analyzed using Pearson’s correlation coefficients. Multiple regression analysis was conducted to analyze the factors affecting elders’ depression.

Results

General Characteristics of Elders: The mean age of the elderly was 77.99 years, with those aged 80 or older accounting for the largest share at 45.5% (65 subjects). Most of them were women at 70.9% (100 subjects). In terms of their relationship with their spouse, cohabitation accounted for 50.0% (72 subjects). In terms of education, those who graduated from elementary school
or lower accounted for 82.5% (118 subjects). Those who responded that their health condition is average accounted for 58.3% (84 subjects). The number of diseases for which they take medication was 2 for 35.0% of subjects (49 subjects). Most common diseases were hypotension at 63.1% (91 subjects). The elderly who responded that they do not work out at all accounted for 37.4% (52 subjects) and those who responded that their exercise is not regular accounted for 37.4% (52 subjects). Those who walked as exercise accounted for 34.8% (50 subjects), and those who exercised 1-2 times on average per week accounted for 25% (36 subjects). The exercise duration was 30 minutes ~1 hour. The largest share of the elderly at 75.0% (108 subjects) responded that their economic status was average.

Pain, Disability, Social Support, and Stress on the Depression of Elders: The elders’ pain scored 55.21 points out of 100 points, and disability scored 2.45 points out of 6 points, social support scored 3.55 points out of 5 points. Stress scored 2.11 points out of 4 points and depression scored 0.25 points out of 1 point (Table 1).

<table>
<thead>
<tr>
<th>Item</th>
<th>M ± SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>55.21 ± 19.35</td>
<td>0–100</td>
</tr>
<tr>
<td>Disability</td>
<td>2.45 ± 0.88</td>
<td>1–6</td>
</tr>
<tr>
<td>Social support</td>
<td>3.55 ± 0.65</td>
<td>1–5</td>
</tr>
<tr>
<td>Stress</td>
<td>2.11 ± 0.52</td>
<td>1–4</td>
</tr>
<tr>
<td>Depression</td>
<td>0.25 ± 0.20</td>
<td>0–1</td>
</tr>
</tbody>
</table>

Difference in depression across general characteristics of elders: A review of the difference in depression across general characteristics showed that there is a difference in depression according to the subject’s health condition (F=11.51, p<.001). There was also a difference in depression according to economic status (F=13.10, p<.001) (Table 2).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>M ± SD</th>
<th>t or F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>65–69</td>
<td>0.20 ± 0.24</td>
<td>0.71</td>
<td>.493</td>
</tr>
<tr>
<td></td>
<td>70–79</td>
<td>0.25 ± 0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>80 or higher</td>
<td>0.26 ± 0.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>0.30 ± 0.24</td>
<td>1.76</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0.23 ± 0.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship with spouse</td>
<td>Cohabitation</td>
<td>0.23 ± 0.21</td>
<td>-1.37</td>
<td>.171</td>
</tr>
<tr>
<td></td>
<td>Death, divorce, living separately, single</td>
<td>0.27 ± 0.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Elementary school or lower</td>
<td>0.24 ± 0.19</td>
<td>2.61</td>
<td>.077</td>
</tr>
<tr>
<td></td>
<td>Middle school, High school</td>
<td>0.33 ± 0.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>University or above</td>
<td>0.10 ± 0.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health condition</td>
<td>Good a</td>
<td>0.16 ± 0.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate b</td>
<td>0.21 ± 0.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bad c</td>
<td>0.37 ± 0.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of diseases for which they are on medication</td>
<td>None</td>
<td>0.18 ± 0.18</td>
<td>-1.60</td>
<td>.112</td>
</tr>
<tr>
<td></td>
<td>One or above</td>
<td>0.26 ± 0.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise</td>
<td>Regular</td>
<td>0.19 ± 0.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>From time to time</td>
<td>0.27 ± 0.22</td>
<td>2.97</td>
<td>.055</td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
<td>0.29 ± 0.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic status</td>
<td>Wealthy a</td>
<td>0.16 ± 0.15</td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>Average b</td>
<td>0.22 ± 0.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Poor c</td>
<td>0.42 ± 0.22</td>
<td></td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
Correlation between pain, disability, social support, stress and depression of elders: With depression of elders, pain had a positive correlation ($r=.26$, $p=.002$), disability had a positive correlation ($r=.25$, $p=.002$), stress had a positive correlation ($r=.47$, $p<.001$), but social support had a negative correlation ($r=-.42$, $p<.001$) (Table 3).

Table 3: Correlation between Pain, Disability, Social support, Stress and Depression of elders

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pain $r(p)$</th>
<th>Disability $r(p)$</th>
<th>Stress $r(p)$</th>
<th>Social support $r(p)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>.26 (.002)</td>
<td>.25 (.002)</td>
<td>.47 (&lt;.001)</td>
<td>-.42 (&lt;.001)</td>
</tr>
</tbody>
</table>

Factors affecting depression of elders: Depression was set as a dependent variable for a multiple regression analysis. The self-correlation coefficient of Durbin-Watson was 1.677, and VIF value was 1.028~1.198 which is smaller than 10, indicating that there were no issues of multi-linearity. The analysis showed that stress ($\beta=.313$, $p<.001$), social support ($\beta=-.272$, $p<.001$), and economic status (poor) ($\beta=.201$, $p=.007$), and health condition (bad) ($\beta=-.178$, $p=.010$) had a significant effect on depression in elders. The regression analysis was statistically significant ($F=20.74$, $p<.001$), with the combined explanatory power of stress, social support, economic status, and health condition being 37.7% (Table 4).

Table 4: Factors affecting depression of elders

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>SE</th>
<th>$\beta$</th>
<th>t</th>
<th>$p$</th>
<th>$R^2$</th>
<th>Adj. $R^2$</th>
<th>F</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>.314</td>
<td>.112</td>
<td></td>
<td>2.820</td>
<td>.006</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress</td>
<td>.121</td>
<td>.029</td>
<td>.313</td>
<td>4.243</td>
<td>&lt;.001</td>
<td>.216</td>
<td>.211</td>
<td>20.74</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Social support</td>
<td>-.083</td>
<td>.022</td>
<td>-.272</td>
<td>-3.821</td>
<td>&lt;.001</td>
<td>.299</td>
<td>.289</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health condition (bad)</td>
<td>.107</td>
<td>.039</td>
<td>.201</td>
<td>2.763</td>
<td>.007</td>
<td>.346</td>
<td>.332</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic status (poor)</td>
<td>-.072</td>
<td>.028</td>
<td>-.178</td>
<td>-2.606</td>
<td>.010</td>
<td>.377</td>
<td>.359</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reference categories: Health condition=moderate, Economic status=average

Discussion

The elderly’s depression scored 0.25 points on a scale of 0 to 1, which was lower than preceding studies that looked at the elderly in local communities who scored 2.66 points out of 5 points, and 15.19 points out of 27. However, this seems to be due to the fact that the study was conducted on the elderly living in local communities as opposed to nursing homes and thus who were able to receive ongoing help from experts at local health centers. Pain, disability and stress in the elderly had a positive correlation whereas social support showed a negative correlation. This is similar to the findings of a study on those aged 60 or older with chronic lower back pain where it was found that more severe pain and disability were correlated with lower quality of life. In that study, the elderly with physical illness, compared to those without, had a higher degree of depression and the number of illnesses suffered was correlated with the severity of the depression. Physical health status, pain and disability cause inconvenience in daily life and cause stress, leading to depression and lower quality of life. As such, by reviewing the degree of pain and health condition of the elderly, help should be offered to them to reduce stress and depression.

In particular, factors affecting depression in the elderly were found to be stress, social support, disability and health condition. Such variables explained 37.7% of depression in the elderly. This is in line with the study conducted on the elderly aged 65 or older that found a positive correlation between daily stress and depression and a negative correlation between social support and depression, and how stress and social support were factors affecting depression. A study conducted on the elderly aged 60 or older and living in administrative areas of Gun saw that in the correlation between stress and depression, social support had a moderating effect, and as in general higher age meant higher stress and greater depression, psychological and social intervention such as social support is needed to improve health of the elderly. It was also noted that emotional support through the children of the elderly can help reduce depression. As such, by understanding the causes of stress and the social network of the elderly, social support programs can be operated such as counseling which can reduce depression.

The study found a negative correlation between perceived health condition and depression, with perceived health condition being the most important
factor affecting depression. Income sources also had an effect, which is in line with the findings of this study. An analysis of the causes and mitigating factors of depression in the elderly living at home found that the worse the health status and the more difficult the financial status, the more likely depression, and that social support and social activities had a major impact on depression. It was also in line with findings that reported how low physical and mental health and low financial status were correlated with greater depression. As such, the elderly need to take care of their own health with the help of experts to the point that they do not feel that their health is bad. To address financial difficulty, programs associated with volunteer work or job creation can be operated to offer more participation for the elderly.

Conclusions

Since the elderly, compared to other age groups, are more vulnerable in terms of their physical, mental and social situations, they are more prone to depression. The findings of this study suggest that stress, social support, health status and financial status must be considered as measures to mitigate depression in the elderly are developed. As such, health experts that focus on the elderly living in local communities must identify stress sources and develop a mediation program, as well as apply a program to boost social support so that depression can be mitigated. Help must also be offered to the elderly so that disease prevention and management can be done in daily life and the economic status of the elderly can be better understood. Measures to offer help through the local community network should also be considered.

Ethical Clearance: The data of this study was analyzed after review and approval of Institutional Review Board in K University (IRB No: KNU_IRB_2019-20)

Source of Funding: This work was supported by the research grant of the Kongju National University in 2019.

Conflict of Interest: Nil

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Psychological Analysis of Customary Law as the Spirit for Indigenous People of Bengkulu City Indonesia

Rangga Jayanuarto¹, Khudzaifah Dimyati², Absori Absori², Natangsa Surbakti², Fitriani Nur Damayanti³

¹Lecturer at University of Muhammadiyah Bengkulu, Indonesia; ²Lecturer at University of Muhammadiyah Surakarta, Indonesia; ³Lecturer at University of Muhammadiyah Semarang, Indonesia

ABSTRACT

Introduction: The only historical tradition of Indonesian law is customary law. For the indigenous people of Bengkulu City, customary law is the representation of the people spirit. Law is the representation of a nation’s spirit. Customary law is a living law as it represents the real feeling of the law believed by the people. Bengkulu customary law is one of the inherited cultural law as a tool to regulate the life of the indigenous people. One of the characters of customary law is that the ability to always consider the psychological state of the people so that the implementation of the law will be based on the feeling of justice and the need of law within the society. Every act done by indigenous people is mainly based on some factors, including psychological factor. It is in line with the fact that psychology as the science about psychic or human behavior. Therefore, it strongly relates to the study of law, where psychology view law as the representation of human behavior.

Material and Method: It was research which employed primary and secondary material, with descriptive qualitative as the research method.

Finding: Volkgeist is the spiritual manifestation or a spirit of a group of people. Society is empirical. It makes society is different from one another. Volkgeist is the terminology for something psychological and spiritual which were inherited and operated in some entities as language, folklore, custom, and behavior. The correlation between psychology and customary law is represented by the customary law of Bengkulu City. Law is formed from the given ratio and behavior in human. Behavior in human consist of motoric, perceptive, and cognitive aspects. The process also represents the customary law formation at Bengkulu City. It starts from human’s thinking, will, and behavior as the psychological manifestation of the indigenous people spirit of Bengkulu as customary law includes the implementation of psychology from each individual of which work, idea, and sense also included.

Conclusion: Volkgeist is a terminology with inherent psychological and spiritual meaning which is operated and manifested in the form of language, folklore, custom, and behavior. Related to that psychological aspect, the indigenous people of Bengkulu City are obedient to the customary law as the law contains ethical values and norms which well reflected the ethical wisdom. The ethical wisdom is a reference engraved on the spirit of the people. Values, norms, and cultural wisdom are the reflection of the way of thinking and psychological structure of indigenous people at Bengkulu City. It is because the customary law is the implementation of the society’s psychological aspects, which includes work, idea, and sense.

Keywords: Psychology, Customary Law, People Spirit, Indigenous People

Introduction

The only historical tradition of Indonesian law is customary law¹. In this modern era, Indonesian still have their respect for customary law. The existence of indigenous people in Indonesia is attached on the 1945 Constitution of the Republic of Indonesia the second
amendment in article 18 B section (2) and article 28 I section (3). Customary law is the law regulates relationship among the people as custom, habit, and morality in the indigenous community as it is obeyed and defended by the people, also the law with sanctions for violation determined by the authority holder and decision makers such as leader and judge. Particularly for indigenous people at Bengkulu city, the regulation is explained in the local government regulation of Bengkulu No. 29/2003 about the implementation of Bengkulu City Custom.

On the indigenous people of Bengkulu City, customary law is the reflection of people spirit. Law is the psychological reflection of a nation. Law is not the will of a state or something derived from God’s law. Instead, it is something we can seek from social life. There is no exact form and substance of the law. It fully depends on social development. Customary law is a living law as it represents the people feeling. However, custom with sanctions is the one defined as (customary) law. Customary law is a form of inherited culture of law which is used to manage the life within the indigenous community. As customary law commonly represented as a habit, the law tends to be unwritten law. The other character of the customary law is the ability of the law to pay attention and consider the psychological condition of society. It makes the function and application of the law are based on the feeling of justice and the need for law among society. Every behavior and action of people must be based on the psychological factor.

Based on the description above, the psychological analysis about customary law as the people spirit on indigenous people at the Bengkulu City of Indonesia.

**Material and Method**

The research employed primary and secondary material. Primary material gained through research about the empirical fact of human behavior documented in the form of behavior records. Meanwhile, the secondary material was gained through literary study. Descriptive qualitative was used as the research method.

**Finding**

A. Psychological analysis of customary law as the people spirit (volksgeist): People are not able to inherit the customary law from the people before them without looking back to the history of their ancestor. It emphasizes the importance of cultural tradition as revealed in some studies about law and social development. The importance of cultural tradition through historical approach in law was stated by Savigny that “Das Recht wird nicht gemacht est ist und wird mit dem volke” which means that law is not instantly made yet grow and develop in the national spirit.

The close historical view which became the icon of Savigny did not instantly change law into something stiff and out of date. In this case, the law is dynamic as the product of national spirit which always moves to the direction of the people interest. Law is formed through a long journey, from the bottom to the top. Law is a fundamental value of national spirit, not the randomly made value. Those concepts gave Savigny idea to deliver the concept of volkgeist (national spirit) when he learned about the law of a nation.

Volkgeist, volksseele, nationalgeist, geist der nation, or volkscharakter are known as national character. It can also be literally translated into the spirit of a nation. According to Herder, volkgeist is the manifestation of the people spirit. People or society is something empiric. It makes a society is different from one another. Every society has its character, especially for the indigenous people or society. Volkgeist is a psychological and spiritual terminology which inherent and operates in some entities such as language, folklore, custom, and behavior.
The importance of customary law might never be clearly formulated and firmly stated by the leader. Therefore, Savigny defines it as the law of people or volksrecht which exist comprehensively under the spiritual consciousness of the society. In this case, Margareth Gruter mentioned that the existence of people behavior in law is not limited as the customary law which is rooted in people idea. Instead, it has been programmed deep inside human idea, so that it is believed as the result of biological evolution of human.

B. Psychological analysis on the customary law of indigenous people at Bengkulu city: The correlation between psychology and customary law as the spirit of the people is represented on the customary law of Bengkulu city. The customary law is a kind of custom in people’s social life. It began when human come to the world, made family, and lived as a community, and then as a nation. By looking at the development, the law is formed since the process of God giving idea and behavior to human.

Behavior is stuck on people and represented by the motoric, perceptive, and the cognitive function as an individual. God creates human and gifted it with the mind or thought to well behave. The continuous behavior which forms individual habit can be spontaneously accepted by society as a form of custom. Besides, as a social being, a human cannot avoid the consequence of social interaction which may influence the other individual. Habit can be formed into custom by means of social interaction. Therefore, the habit can be slowly transformed into a custom which reflects people feeling (indigenous people of Bengkulu City). The society makes the custom as a valid regulation which should be obeyed by all of the society members and makes this into a customary law. The process shows the creation of customary law of Bengkulu city which begin from people idea, behavior, and will as the psychological manifestation on indigenous people spirit of Bengkulu City.

It is clear that customary law is one of the living and cultural aspects of Indonesia as a nation. It is because the spiritual structure and way of thinking which are well reflected in the customary law itself. According to Soepomo, by looking at the Indonesian (indigenous people of Bengkulu City) spiritual structure and way of thinking, the customary law is represented into some characters such as follow:

1. Communal: Based on customary law, a human is a creature within a social bond with a strong communal feeling. Indigenous people prioritize togetherness without ignoring individual deed.

2. Religious: The customary law has a religious value which is strongly related to Indonesian living aspects, of which the people believe in something magical and evaluate religious aspect as a real aspect in life.

3. Concrete: The system and management of Indonesian customary law is concrete. It means that people use a concrete symbol to represent their behavior and action as the representation of someone’s will.

4. Visual: The relationship over law can only be determined by a visual bond. The actualization of these values is integrated and true between saying and action.

The psychological aspects are also included in the customary law aspects, such as:

1. Reality aspect, which means that custom is always respected in any condition repeatedly and continuously to be obeyed and applied in everyday life.

2. Psychological aspect means that after believing that the custom is constant and continuous, people should also believe that the custom has its legal force and give the legal obligation to the people (opinion yuris necessitatis).

Related to those psychological aspects, the indigenous people of Bengkulu city are obedient to the customary law as the law contains the ethical value, and also the applied norms which are able to reflect the cultural wisdom value. It engraved as the reference for the society. Those ethical values are saved on the philosophical system of the indigenous people of Bengkulu City as Syara’ based custom. Syara’ is based on Kitabullah or the holy Quran. It proves that society has a religious way of thinking, or the belief of something sacred, also the assumption that every individual is an integral part of society. An individual deed is synchronized with the social deed.
Meanwhile, the prohibited norms in customary law society of Bengkulu City are *Cempalo mulut* (make someone else embarrassed), *Cempalo tangan* (damaging, ruining, vandalism), *Cempalo mato* (make a social call, adultery, social etiquette, land ownership, the duty to keep the environment, also etiquette in taking other’s goods). The customary penalty usually in a form of apologies, *setawar dingin*, and customary fines\(^21\).

The norms, values, and customary wisdom are the reflection of spiritual structure and way of thinking of indigenous people with the customary law of Bengkulu City. It is because customary law is also the implementation of psychology from the indigenous customary society which includes work, idea, and sense.

**Conclusion**

Psychological analysis on customary law as the spirit in indigenous people of Bengkulu City Indonesia showed that there is an integrated relation between volkgeist and customary law of Bengkulu citizen. Volkgeist is the terminology with psychological and spiritual meaning which inherent and operates as some entities such as language, folklore, custom, and behavior. The behavior has stuck on human which is represented through motoric, perceptive, and cognitive function and formed a single totality as a human. Related to those aspects of psychology, the indigenous people of Bengkulu City are obedient to the customary law, as the law contains ethical value and norms which reflects the cultural wisdom and strongly engraved on people spirit. The values, norms, and cultural wisdom are the reflection of spiritual structure and the way of thinking of indigenous people of Bengkulu City. It is because the customary law is the implementation of psychology on every individual of a group of customary society in a form of work, idea, and sense.

**Conflict of Interest:** Not Exist

**Ethical Clearance:** Not exist

**Source of Funding:** Indonesia’s Endowment Fund for Education (LPDP)

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Corn Silk Based Ethosomal Gel: A New Treatment for Periodontitis in Diabetic Albino Rats a Preliminary Study

Riewpassa I. E.1, Kim YR2, Tenrilili A. N. A.2, Untung J. S.3, Djamaludin N. S.4, Achmad MH5
1Oral Biology Department, 2Undergraduate Student, Faculty of Dentistry, 3Undergraduate Student, Faculty of Pharmacy, 4Departement of Public Health Dentistry, 5Department of Pediatric Dentistry, Hasanuddin University, Makassar, South Sulawesi, Indonesia

ABSTRACT

Objective: Periodontitis and diabetes are related and high blood glucose level plays an important part in this correlation. Corn silk has the property of anti-hyperglycemic and anti-inflammation. The aim of this study was to determine the capability of corn silk based Ethosomal gel to reduce blood glucose level and degree of inflammation in alloxan induced rats.

Material and Method: 15 wistar male rats with initial weight of 150 gram were included in this study. Alloxan was used to induce diabetes and 5-0 silk ligatures to induce periodontitis. Blood glucose level was analyzed before and after induction, 3 days after administration, and 7 days after. Degree of inflammation was examined with histopathology test.

Results: Blood glucose level in F1 is unstable (p=0.0583>p=0.05), whilst F2 and F3 both showed stable blood glucose decrease (F2: p=0.0086<p=0.05; F3: p=0.035<p=0.05). Anti-inflammation effects best shown in F3, which has mild inflammation (p=0.001<p=0.05). Whereas both F1 and F2 have moderate inflammation (F1: p=0.225>p=0.05; F2: p=0.423>p=0.05).

Conclusion: Corn silk based Ethosomal gel treatment manage to reduce blood glucose level and periodontitis in alloxan induced diabetic rats.

Keywords: Corn silk extract, Diabetes Mellitus, Ethosomal gel, Periodontitis.

Introduction

Periodontitis is a disease caused by specific microorganism that derived from dental plaque. These bacterian can cause progressive periodontal tissue and alveolar bone damage by inducing the formation of periodontal pocket, gingival ressesion, or both. Clinical signs of periodontitis are gingivitis, periodontal pocket, and loss of attachment. Diabetes itself is a risk factor for gingivitis and periodontitis, and the degree of glycemic control appears to play an important part in this correlation. Diabetes is a clinically and genetically heterogeneous group of metabolic disorders manifested by abnormally high levels of glucose in the blood. This hyperglycemia results from either a deficiency of insulin secretion caused pancreatic β-cell dysfunction or resistance to the action of insulin in liver and muscles, or both. Diabetes itself is a risk factor for gingivitis and periodontitis, and the degree of glycemic control appears to play an important part in this correlation. High glucose level in gingival crevicular fluid directly hinders fibroblast’s ability to heal itself by inhibiting the attachment and spreading of cells needed for wound-healing and normal tissue turnover. Abnormality in neutrophil’s adherence, chemotactic, and phagocytosis has been observed in some DM patients. Neutrophil’s impairment may inhibit bacterial killing in the periodontal pocket and significantly increase periodontal destruction. Apparently, this impairment can be subdued with better glycemic control. In conditions of sustained...
hyperglycemia, protein binds with glucose molecules and undergo glycation thus forms Advanced Glycation End Products (AGEs). AGEs formed on collagen increases collagen crosslinking. Due to this crosslinking activities collagens formed become highly susceptible to enzymatic degradation by collagenase, which is mostly present in active form in people with diabetes. Human gingival fibroblasts also produce decreased amounts of collagen and glycosaminoglycans in the hyperglycemic state.\(^7\) As a result of collagen crosslinking and collagen deficiency, collagen metabolism is disturbed, thus affecting wound-healing process.\(^7\) AGEs bind with RAGE (Receptor for AGEs) on the surface of monocyte; therefore monocytes are forced to stay in one place because it limits their migration. AGE-RAGE interaction induces phenotype changes in monocyte, which increase the production of cytokine TNF, Prostaglandin E (PGE), Interleukin (IL-1)\(^9\). Host immune response stimulates pro-inflammatory mediators such as IL-1, TNF- \(\alpha\), IL-6, IL-7 and a whole lot more PGE\(_2\), which promotes periodontal tissue damage.\(^9\) PGE\(_2\) is an important mediator in periodontitis process and bone destruction also plays important part in inflammatory response regulation. PGE\(_2\) surpresses lymphocyte production, collagen synthesis by fibroblasts, and bone osteoclast resorption.\(^10\)

Corn silk (\textit{Stigma maydis}) is made from stigmas, the yellowish thread like strands from the female flower of maize. It is a waste material from corn cultivation and available in abundance.\(^10\) Throughout the world corn silk has been used as a treatment of edema as well as for cystitis, gout, kidney stones nephritis and prostatitis.\(^10\) Corn silk contains numerous bioactive compounds such as volatile oils, steroids, alkaloids, sitosterol and stigmasterol and natural antioxidants such as flavonoids, saponins, tannins, and other phenolic compounds.\(^12,13\) Variation in secondary metabolite compound would affect its pharmacological activities. Phytochemical contents of plant are affected by various factors such as environmental conditions, season, plant age, growth factors, and leaf maturity.\(^14,15,16,17\) Flavonoids has the ability to inhibit \(\alpha\)-amylase and \(\alpha\)-glucosidase activities \textit{in vitro}, inhibit glucose transport, prevent cytokine induced \(\beta\)-cell damage, and ameliorate insulin resistance peripherally.\(^18\) Saponins can reduce blood glucose level by increasing insulin secretion, glucose uptake, and hamper glucose absorption in the small intestine. Alkaloid can decrease glucose absorption by inhibiting \(\alpha\)-glucosidase enzyme. Tannins and phenol can interact with protein and are capable of slowing down carbohydrate catabolism. Phenolic compound also has antioxidant properties therefore it can help repair damaged \(\beta\)-cell hence increasing insulin secretion.\(^19\) Aside from having anti-hyperglycemic activities, corn silk extract also has anti-inflammation, antioxidant, antidepressant activity, diuresis, and many more.\(^20\)

Ethosom gel is one of the Transdermal Drug Delivery System (TDDS) that can increase drug penetration despite being applied topically. The Ethosom itself is a lipid vesicle modified from liposomes. Ethosom is comprised from phospholipid, relatively high concentration alcohol (ethanol or isopropyl alcohol), and water. Ethosom vesicle sizes are varied from micrometer (\(\mu\)m) - 10 nanometer (nm). Ethosom needs lesser time to penetrate the skin and significantly increase transdermal drugs flux value. Ethosom also decrease the risk of GI Tract irritation due to orally administered medication.\(^21\)

### Materials and Method

**Animals:** Wistar strain rats weighing 150gram were purchased from local breeder in South Sulawesi. The rats were maintained at room temperature under alternating natural light/dark photoperiod and were fed twice a day with standard feed water was available \textit{ad libitum}.

**Chemicals:** Alloxan was used to induce diabetes and were purchased from Tokyo Chemical Industry. Metformin used for positive control was of generic brand.

**Corn Silk Extract Preparation:** Corn silk from 40 days old corns were obtained from local farmers in Jeneponto a region in South Sulawesi. The corn silk were washed and dried at room temperature (24.2 ± 1.0°C) till dried and an ethanol extraction was performed by adding 5L of ethanol 80% and 200gram dried corn silk. After 3 days of maceration process, the ethanol solvent was evaporated using rotatory evaporator.

**Corn Silk Extract Based Ethosomal Gel Formulation:** Three corn silk based Ethosom formulas were made (refer to Table 1). Lecithin and phosphatidylcholine were dispersed in heated distilled water (40°C). Corn silk extract entered lipid phase and stirred with magnetic stirrer for 5 minutes and 700rpm till it entered coloidal system. Propylene glycol and ethanol 96% were heated
till 30 °C and entered coloidal system. Lechitin or phosphatidicolin, corn silk extract, propylene glycol with ethanol 96% were mixed together and homogenized with magnetic stirrer for 5 minutes and 700rpm till Ethosom suspension was formed. The suspension were cooled in room temperature then stored in the refrigerator.

After the Ethosom formulas were made, they were put in gel system (refer to table 2) and corn silk ethosomal gel were made. Carbomer 940 was dispersed in distilled water that contain methylparaben for 24 hours. After that triethanolamine was added drop by drop whilst being stirred till a clear gel mass was formed. Ethosom (Formula A, B, C) mixed with a small amount of distilled water were added to the gel base and stirred till homogenized, after that glycerin and distilled water were added to the mixture.\textsuperscript{21}

**Experimental Design:** 15 rats were fasted for 8h and blood glucose level was measured with blood drawn from the vein in tail. Each rat’s weight was measured and then alloxan (150 mg/kg) dissolved in sterile saline were injected intraperitoneally. Three days after inducing diabetes, periodontitis was induced as well. 5-0 silk ligatures was tied around the mandibular first incisor and tied gently to prevent damage to the periodontal tissue. The ligature was thought to facilitate local accumulation of bacteria and thereby enhance bacteria mediated inflammation. One week after alloxan was administered blood sample were drawn again from the tail vein. One week after periodontitis was induced, 14 hyperglycemic rats (the blood glucose level greater than 126 mg/dL) were selected randomly and divided into 5 groups. Metformin dissolved in water were administered orally (positive control), each formula was administered topically once a day to each specified group, and the clear gel base without corn silk extract was administered once a day (negative control group). 3 days metformin, Ethosom gel, and clear gel base was administered blood sample were drawn again for analysis. 7 days after administration, blood sample were collected for final analysis and periodontal tissue were collected for histopathology test.

**The Periodontal Tissues were Embedded in Paraffin Blocks after Formalin Fixation:** After tissue fixation in formalin, tissue samples were processed in tissue processor machine. After being processed, the tissue samples then moved to embedding machine to make paraffin blocks. Paraffin blocks were then cooled down and trimmed with microtome after that moved to waterbath in 37 °C. The tissue sample were then taken out using slides that were numbered. Slide then heated on hot plate at 60 °C till the paraffin that surrounds the tissue melts. The section was examined after hematoxylin and eosin staining.

**Statistical Analysis:** All data were analyzed using students t-test. The data represents means and standard deviations. The significant level of 5% (P<0.05) was used as the minimum acceptable probability for the difference between the means.

**Results and Discussions**

The blood glucose level of hyperglycemic rats are presented in Fig. 1. The blood glucose level for negative control kept increasing because it hasn’t been given any treatment just a clear gel base as a placebo. The positive control, F2, and F3 level of blood glucose kept decreasing. In contrast with other experiments group, in F1 the blood glucose level decreased at first and starting to increase again. Eventhough, the final blood glucose level for F1 is still lower than it’s blood glucose level after being induced the p value shows no significance by landing a p value at 0.0583 which is slightly bigger than p value 0.05. This indicates that F1 can not stabilize blood glucose level and has no significance in lowering blood glucose level. Metformin administered orally to positive control group shows decreasing blood glucose level but apparently has no significance statistically with p value of 0.264. Experimental groups F2 (p=0.0086<p=0.05) and F3 (p=0.035<p=0.05) both shown decrease in blood glucose level and both have significance statistically.

Due to extremely large number of inflammatory cells such as leukocyte and PMN that are too many to count, the inflammation rate are shown with 3 different grades. 1 for mild, 2 for moderate and 3 for severe. As seen in fig. 2, negative control group has the highest inflammatory grade which is 3 and accompanied with cell necrosis (Fig. 3). Second highest inflammation grade is F2, in contrast to it’s blood glucose level and other experiment groups. Supposedly, the degree of inflammation decreases as the blood glucose level decrease. One other important factor to note when it comes to periodontitis is that stress also affects periodontitis by altering immune system response, delayed wound healing, hormonal changes, and changes in behaviour that supports periodontitis formation.\textsuperscript{22,23,24,25,26}
F2 control group has been observed to have high stress levels. In spite of having higher inflammation grade than negative control, F2 has new connective tissue formation. F1 falls into moderate category but has no statistic significance with p value of 0.225. Only F3 has low inflammation grade and statistic significance with p value of 0.001. This imply that corn silk extract based Ethosomal gel has the ability to reduce blood glucose level and inflammation response.

Table 1: Corn Silk Based Ethosom Formula

<table>
<thead>
<tr>
<th>Formula</th>
<th>Phosphatidocolin (F)/Lecithin (L) (g)</th>
<th>Ethanol (g)</th>
<th>Propylene Glycol (g)</th>
<th>Corn Silk Extract (g)</th>
<th>Distilled water</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1 (F)</td>
<td>10</td>
<td>1</td>
<td>0.1</td>
<td>Till 50gram</td>
</tr>
<tr>
<td>B</td>
<td>1 (F)</td>
<td>10</td>
<td>1</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>1 (L)</td>
<td>10</td>
<td>1</td>
<td>0.025</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Corn Silk Based Ethosomal Gel Formula

<table>
<thead>
<tr>
<th>Formula</th>
<th>Bahan</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Formul A 1 2 5 0.15</td>
<td>Till 100gram</td>
</tr>
<tr>
<td>F2</td>
<td>Formul B 1 2 5 0.15</td>
<td></td>
</tr>
<tr>
<td>F3</td>
<td>Formul C 1 2 5 0.15</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Blood glucose level. Values are mean

Figure 2: Degree of inflammation. Values are mean
Figure 3: Inflammatory response in periodontal tissue represented by HE
(A) Negative control group showed severe inflammation response accompanied with cell necrosis (B) Moderate inflammation shown in rats administered with F1 (C) F2 administered rats shown moderate inflammation accompanied with newly formed connective tissue (D) F3 administrated rats shown mild inflammation (E) Positive control group showed severe inflammation response

Conclusion

The results showed that corn silk extract based Ethosomal gel treatment markedly reduces blood glucose level and periodontitis in alloxan induced diabetic rats. With F3, lecithin and 0.025gram corn silk extract as the formula that manages to have both anti-hyperglycemic and anti-inflammatory effects.

Conflict of Interest: There is no conflict of interest in this study.

Source of Funding: Domestic government

Ethical Clearance: This study obtained a label of ethics escaped by the number: 0081PL09/KEPKFKG - RSGMUNHAS/2018 and register number UH 17120068 on Oktober 9, 2018.
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Immunological Effect of Capparisspinosa Extract and Iraqi Dates Vinegar in White Mice Infected with Pseudomonas Aeurugenosa

Asif Hasan Abulrazaq¹, Mayada Abdullah Shehan², Najeeb Mohammed Hussein², Mohammed. A. Hamad³

¹Department of Biotechnology, College of Applied Science, University of Fallujah, Iraq; ²Department of Biology, College of Science, University of Anbar, Ramadi, Anbar Iraq; ³Department of Medical Laboratory, College of Applied Science, University of Fallujah, Iraq

ABSTRACT

The effects of the caper ethanol extract showed no significant effect on Hb, PCV, platelets, RBCs, and showed a significant effect between the treatments for total white blood cell count and neutrophil cell were observed on ethanol extract for caper plant highly significantly than the treatments T2, T3 and control Tc, and significantly increase in the weight of the mice in the treatment T1 compared with T2, T3 and Tc, also showed a decrease in spleen and liver inflation particularly in T1 compared with the Tc, and The results showed T1 had a significant effect compared with other groups with respect to IgA and IgM, showed increased significantly in a concentration C3, C4 that is related to treatment T1 compared with T2, T3, and TC, and was observed that the ethanol caper plant extract that gave a speed in wound healing after contaminated with the P. aeruginosa than the control group, the aim of these study to treated with C.spinosa administration orally that important to the enhancement and useful to supported immune response and pro-inflammatory response against any pathogenic foreign body.

Keywords: immunology, Capparisspinosa extract, in vivo.

Introduction

Capparisspinosa one of the plants that utilized in treating a few maladies since thousand years prior and utilized as nourishment and helpful, and it is broadly spread of the world, it is brought in Iraq.(¹) Shefallah or kabbr, Spain (alcaparro), Italy (capero), Turkey (kapari) and Russia (kapersy and kappertjes).(²) Trick plants were utilized in old periods, for instance, Egyptians, Babylonians, Greeks and Romans and furthermore utilized as sustenance and restorative, escape(³) plant has a place under family called capparaceae, and which have a high capacity to adjust to natural conditions. (⁴) The connection among trick and people can become to until to archæological age, found in China in 2800, it was utilized for therapeutic purposes (⁵) The trick considers from fragrant plants with the hard spines, round leaves, green and delicate, white blossoms or pink, with extensive silvery natural products bearing a genuinely long stalk, containing dark seeds with an unforgiving taste and a red coagulated substance with a sweet taste(⁶) A synthetic trial was completed on the distinctive pieces of C.spinosa as a rich hotspot for some concoction exacerbates that considered different auxiliary metabolites, for example, glycocapperin, rutin, spermidine, quercetin, stigmasterol, carotenoids tocopherols, campesterol⁷ explicit insusceptible framework.

Materials and Method

Capparisspinosa: Plant collection from the Abu Ghraib gardens area of the faculty of the veterinary medicine of Baghdad University, where the plant was collected in the period between July and until November, this period flowering season, the samples were taken from aerial parts (fruits, flowers, leaves, stem), The plant was dried before the process of grinding. also, Used Al-Badawi vinegar dates get from the markets.

Preparation of ethanol extract of Capparisspinosa Plant: The best and most effective method to extracting the active organic material crude from compounds in the plant used the Soxhlet apparatus. We used the plant and grinding or crushing by a blender apparatus into powder,
taken 50 g of plant powder and placed inside Thumble, 250 mL of ethanol then placed 95% after extraction, the extraction process was carried out within 24 hours and then concentrated by a rotary evaporator, Then put in frozen under -20 ° until used.

**Laboratory Animals:** The Swiss white mice used (mice Balb/c strain) at the age of 6-7 weeks in this study and were obtained from the Cancer Research Iraqi Center

**Immunization of mice:** The mice were divided into four groups and each group consisted of 10 mice

- **Group A:** Negative control (Tc) with saline phosphate precipitate solution (PBS).
- **Group B:** Treated of mice with ethanol caper plant extract (T1).
- **Group C:** mice treated material Iraqi dates Vinegar (T2).
- **Group D:** mice treated with a mixture of ethanol extract of the plant and vinegar (T3).

The mice were given 0.1 ml oral administration from each treatment for 20 days, after 21 days each group was divided into three groups. the first group was analyzed blood and immune tests.

**Collect Blood Samples:** Blood samples were collected via the cut vein and put in heparinized capillary tubes and white tube for other blood tests and separated the serum by centrifugation at 3,500 rpm after left blood for clotted in the refrigerator at 4 ° C for 30 minutes and was then kept in a deep freeze at −70°C until doing immunological tests.[8]

**Experience Wounds:** The mice were divided into three groups and each group consisted of three mice treated:

- **Group 1:** Negative control treated with the solution of phosphate saline (PBS)
- **Group II:** Treated with the solution of ethanol extract of the caper plant.
- **Group III:** Treated with the solution of Iraqi date vinegar.

Standard wounds of 1 cm were performed in the dorsal side after shaving and the wounds were injected with the 0.1 ml active isolate of P. aeruginosa, and follow-up until healing within 12 days after the infection.

**The Statistical Analysis:** The results of the study were presented through the Using of the SPSS program. In analyzing the data, while the LSD test was used to determine the least significant difference between the mean of the coefficients at the probability level (0.05). The T-test was also used to determine the differences between totals.

**Results and Discussion**

The C. spinosa plant is one of the important nutritional plants, flowers, and buds widely used in nutrition, the caper is also rich in protein, fat, carbohydrates, vitamins and minerals. [9] Caper plant is a source of flavonoids, Rutin and Quercetin, a very rich source of quercetin. [10] The effectiveness of these compounds comes from antioxidant action and also has anti-inflammatory properties and it was Immunomodulation using medicinal plants (or their compounds) can provide alternatives to the conventional therapy for a variety of diseases. [11]

Experiments were conducted on mice and observed the effects of the caper ethanol extract. Table (1-1) differences between the treatments showed no significant effect on hemoglobin Hb, PCV, thrombocytopenia (platelets), RBCs. This effects may be explained by the fact, that the mice did not have any significant effect with extract, may be treated mice did not obtain these extract for a long period time in the experimental may be one of the reasons for the absence of any effect between the tests [12].

<table>
<thead>
<tr>
<th>Treatment</th>
<th>HB</th>
<th>PCV</th>
<th>platelets (100 ML/g)</th>
<th>RBC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tc</td>
<td>10.70 ± 0.3</td>
<td>36.50 ± 0.95</td>
<td>226250 ± 1650</td>
<td>237000 ± 24.12</td>
</tr>
<tr>
<td>T1</td>
<td>10.47 ± 0.2</td>
<td>34.50 ± 0.64</td>
<td>293750 ± 1675</td>
<td>243000 ± 18.38</td>
</tr>
<tr>
<td>T2</td>
<td>8.61 ± 0.5</td>
<td>27.75 ± 1.8</td>
<td>231250 ± 1940</td>
<td>210000 ± 22.44</td>
</tr>
<tr>
<td>T3</td>
<td>9.59 ± 1.8</td>
<td>31.75 ± 6.1</td>
<td>265000 ± 4173</td>
<td>249000 ± 59.45</td>
</tr>
</tbody>
</table>
The results table (2-1) of the statistical analysis showed a significant effect between the treatments (p <0.05), they were observed that the ethanol extract T1 of the caper plant highly significantly to the treatments T2, T3 and control Tc for the total white blood cell count (WBC), group T2 highly significant compared to the control group Tc, The treatments for neutrophil cells were also highly significant effect than control, lymphocytes cell reduction significant was observed in compared to control treatment. These differences are explained from by the possibility that this extract has stimulated and effected on the body from the effects of the chemical compounds found in the caper extract from substances such as Tannins, Alkaloids, Indoles, Polysaccharides, the results agree with. (13) When used caper extraction for treated administration rat, rabbit, and chicken.

### Table 2-1: Total count and percentages of the differential for WBCs

<table>
<thead>
<tr>
<th>Treatment</th>
<th>White blood cells count</th>
<th>Neutrophil cell</th>
<th>Lymphocyte cell</th>
<th>Monocyte cell</th>
<th>Acidophil cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tc</td>
<td>4750 ± 221 C</td>
<td>42.46 ± 0.82 B</td>
<td>34.62 ± 0.39 A</td>
<td>10.22 ± 0.44</td>
<td>6.80 ± 1.04</td>
</tr>
<tr>
<td>T1</td>
<td>7550 ± 997 A</td>
<td>49.53 ± 0.93 A</td>
<td>31.08 ± 2.4 AB</td>
<td>9.98 ± 0.76</td>
<td>7.30 ± 0.44</td>
</tr>
<tr>
<td>T2</td>
<td>6875 ± 980 B</td>
<td>48.92 ± 1.39 A</td>
<td>29.23 ± 1.07 B</td>
<td>9.23 ± 1.6</td>
<td>7.41 ± 1.73</td>
</tr>
<tr>
<td>T3</td>
<td>7300 ± 532 B</td>
<td>51.01 ± 1.30 A</td>
<td>25.46 ± 0.72 BC</td>
<td>11.67 ± 0.41</td>
<td>6.27 ± 0.90</td>
</tr>
</tbody>
</table>

Different letters indicate significant differences between the transactions at the level of (p <0.05)

### Table 3-1: Effect of the caper extract, vinegar and their mixture dosages on mice through the rate inflation liver and spleen

<table>
<thead>
<tr>
<th>Treatment</th>
<th>The weight of the mouse</th>
<th>Liver weight</th>
<th>Liver weight In terms of inflation</th>
<th>weight spleen</th>
<th>Spleen weight In terms of inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tc</td>
<td>17.92 ± 0.54 C</td>
<td>2.06 ± 0.15</td>
<td>11.49 ± 0.72 A</td>
<td>0.59 ± 0.04 B</td>
<td>3.29 ± 0.17 A</td>
</tr>
<tr>
<td>T1</td>
<td>30.91 ± 1.4 A</td>
<td>2.28 ± 0.14</td>
<td>7.37 ± 0.39 B</td>
<td>0.42 ± 0.03 C</td>
<td>1.42 ± 0.16 B</td>
</tr>
<tr>
<td>T2</td>
<td>24.82 ± 1.5 B</td>
<td>2.23 ± 0.07</td>
<td>8.89 ± 0.23 B</td>
<td>0.42 ± 0.04 C</td>
<td>1.69 ± 0.10 B</td>
</tr>
<tr>
<td>T3</td>
<td>27.27 ± 2.1 B</td>
<td>2.28 ± 0.20</td>
<td>8.36 ± 0.22 B</td>
<td>0.46 ± 0.02 A</td>
<td>1.68 ± 0.07 B</td>
</tr>
</tbody>
</table>

Different letters indicate significant differences between the transactions at the level of (p <0.05).

The results of treated mice of the table (3-1) were found a significant effect in some of the treatments. There was a significant increase in the weight of the mice in the treatment T1 compared with other treatments T2, T3 and Tc, and they are no significant effect on the weight of the liver, but a significant increase was observed in the treatment of the T3 with the Tc and other factors, and also a significant decrease in the mice of spleen weight in the second and third treatment compared to Tc, furthermore, the results showed a decrease in spleen and liver inflation that treatment with the ethanol caper extraction and the vinegar solution group and their mixtures group compared with the control group. This result is explained by the biological activity of spleen and immune stimulation, which plays an important role in defending the body against germs and against other antigenic from original chemical component in plant, and the results of Table (4-1) showed that T1, T2, and T3 factors had a significant effect compared with Tc group with respect to IgA. It was observed that T1 and T2 were significantly higher with T3 and Tc, and also higher significantly for T3 compared with to Tc. The IgG test showed that the treatments T2 and T3 were higher significantly than T1 and Tc, and IgM test was showed treatment T1 was higher significantly compared with T3 and Tc. T3 also significantly affect compared with Tc group. These indicators of an immune response and evolution in humoral immunity may be due to chemicals compound from the secondary metabolism in the caper plant, for example, Quercetin, Alkaloids, Rutin, Indol-3-ylmethyl (14) that is related to activation of the immune response and the development of humoral immunity. This response begins with the interaction between the innate and acquired immune response(15). Also, The results agree showed a significant affect for high concentration for IgA and IgM in test groups than the control group(16).And the results agreed with (17) when using some of the chemical components given orally to
local rabbits as they led to a rise concentration for IgA and IgM. Also, the results agree with (18) that reported C. spinosa used to pseudomonas aeruginosa attenuated after that injected in white mice.

Table 4-1: Concentration rate IgM, IgG, IgA in mice serum (mg)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>IgA</th>
<th>IgG</th>
<th>IgM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tc</td>
<td>256.73 ± 100.03 C</td>
<td>817.12 ± 65.77 C</td>
<td>291.80 ± 40.32 C</td>
</tr>
<tr>
<td>T1</td>
<td>808.23 ± 73.31 A</td>
<td>2370.56 ± 880.36 B</td>
<td>493.70 ± 9.1 A</td>
</tr>
<tr>
<td>T2</td>
<td>547.70 ± 107.19 A</td>
<td>3938.66 ± 415.49 A</td>
<td>413.23 ± 25.7</td>
</tr>
<tr>
<td>T3</td>
<td>477.86 ± 58.76 B</td>
<td>4208.66 ± 255.46 A</td>
<td>304.92 ± 100.6 B</td>
</tr>
</tbody>
</table>

Letters indicate significant differences between the transactions at the level of (p <0.05)

The effect of the dosages on laboratory mice for the complement protein concentration C3, C4 showed increased significantly in a concentration C3, C4 that is related to treatment T1 compared with T2, T3, and TC table (5-1), these results agree with (19) that found the immunization of laboratory mice produce a high level in C3, C4 of all treatments compared with the control group. caper plant compounds could eventually play an interesting role to control several pathologies by induces immune responses and enhances immunity host against pathogens, for example, IL-17 plays an important role, also strongly suggested in tumor development and in both inflammation and sporadic cancers of the liver, stomach, and colon. (20)

Table 5-1: Concentration rate complement protein (mg)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tc</td>
<td>156.10 ± 41.7 B</td>
<td>44.23 ± 4.34 B</td>
</tr>
<tr>
<td>T1</td>
<td>328.30 ± 4.08 A</td>
<td>79.86 ± 10.94 A</td>
</tr>
<tr>
<td>T2</td>
<td>186.30 ± 28.27 B</td>
<td>44.80 ± 11.03 B</td>
</tr>
<tr>
<td>T3</td>
<td>195.86 ± 57.03 B</td>
<td>57.06 ± 1.23</td>
</tr>
</tbody>
</table>

Different letters indicate significant differences between the transactions at the level of (p <0.05)

It was observed that the immunize white mice may be stimulated by ethanol caper plant extract and vinegar solution that gave a positive effect on the speed wound healing after contaminated with the P. aeruginosa compared than the control group, where it gained complete healing after the seventh day while the control group did not heal even after the tenth day, the results of the study were agreed with

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Not required

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The Correlation between Interleukin-1A and Bone Destruction on Chronic Suppurative Otitis Media with Cholesteatoma

Muhammad Reza Mahardika¹, Artono¹
¹Department of Otolaryngology-Head and Neck, Faculty of Medicine, Universitas Airlangga, Jl. Mayjen Prof. Dr. Moestopo 47, Surabaya (60131), Indonesia

ABSTRACT

**Background:** Cholesteatoma is a benign lesion in chronic suppurative otitis media having the ability to induce bone around it. Bone damage is caused by osteoclasts and interleukin-1α (IL-1α).

**Objectives:** To analyze the correlation of IL-1α with the degree of bone destruction in chronic suppurative otitis media (CSOM) patients with cholesteatoma treated mastoidectomy surgery

**Materials and Method:** Prospective colectomy tissue collexatoma was taken during mastoidectomy surgery from 20 CSO patients with cholesteatoma. All tissues were processed then IL-1α was quantitatively tested with ELISA using IL-1α specific antibodies. Bone damage rates were categorized into mild, moderate, and severe degrees. Correlation of both variables was analyzed using spearman rank test (p <0.05).

**Results:** The results of IL-1α in cholesteatoma tissue in 20 patients were in the range of 25.01 - 35.00 pg/ml (30.76 ± 2.99). The degree of bone destruction is mostly in the weight category (65%). The result of analysis of both variables use spearman correlation test (r = 0.625; p = 0.003).

**Conclusion:** There is a strong positive correlation between IL-1 and bone damage rate in CSOM with cholesteatoma.

**Keywords:** cholesteatoma, interleukin-1a, bone destruction, chronic suppurative otitis media

Introduction

Chronic suppurative otitis media (CSOM) can cause morbidity and mortality and thus it remains a major health problem in the world. One of the morbidity and mortality is caused by bone destruction in CSOM patients with choloriatoma causing complications (¹). Cholesteatoma is a cystic lesion coated with a gradual squamous epithelium and contains keratin debris. Keratinocytes in the matrix and macrophages of perestatiechsteatoma express Interleukin-1α (IL-1α). IL-1α plays a role in the growth and maintenance of cholesteatoma homeostasis. The imbalance between resorption process and bone formation occurs in CSOM patients with cholesteatoma (²).

Bone resorption is primarily played by osteoclasts derived from monocyte/macrophage hematopoietic cells. The differentiation and function of osteoclasts is governed by the activator of nuclear factor-κB ligand (RANKL/RANK) receptor bond which will initiate the cascade of osteoclastogenesis. IL-1α increases RANKL expression in osteoblasts and macrophages. IL-1α also affects fibroblasts and osteoclasts to produce prostagagin E2 (PGE2) and collagenase that degrade bone matrix (³).

CSOM complications with cholesteatoma are mainly due to temporal bone destruction processes that can cause hearing loss, balance disorders, facial paresis, periosteal abscess, and intracranial complications (⁴). Bone destruction is divided into three degrees based on
the number of structures involved, i.e. mild, moderate, and severe destruction. IL-1α increases the amount of osteoclasts causing bone density to decrease. The thickness of the bone cortex decreases significantly when constrained by IL-1α.\(^5\)

IL-1α as a therapeutic target has been developed in several diseases with bone destruction, such as rheumatoid arthritis. The important role of IL-1α in the process of bone destruction in CSOM with cholesteatoma allows blockage of IL-1α as a therapeutic target as an adjunctive surgery. Based on the above explanation of the research whether there is a relationship between IL-1α with degrees of bone destruction in CSOM patients with cholesteatoma treated with mastoidectomy surgery.

Materials and Method

The subjects of this study were CSOM patients with cholesteatoma treated with mastoidectomy surgery in Dr. Soetomo General Hospital Surabaya, Indonesia from November 2016 to June 2017. The inclusion criteria of the subjects consisted of CSOM patients with cholesteatoma who were about to undergo mastoidectomy surgery at Central Surgery Installation Dr. Soetomo General Hospital Surabaya, Indonesia and patients who had sufficient pathological tissue for IL-1α examination. Subjects who met the criteria filled the informed consent prior to their involvement in this study.

This is an observational study with cross-sectional design and consecutive sampling method of 20 subjects. In the first step, 4 subjects were identified for their mean of IL-1α with simple random sampling. The collection of pathological tissue of cholesteatoma and skin of MAE was performed at Central Surgical Installation Dr. Soetomo General Hospital Surabaya, Indonesia. The operator took the pathological tissue in the form of cholesteatoma tissue and MAE skin during surgery, then put them into the plate and stored them on a cooler temperature of 40˚C for less than 2 hours. The degree of bone destruction is determined by the operator during the surgery. To take a specimen (examination material), curette, forceps, and tissue scissors were used during mastoidectomy surgery.\(^6\)

IL-1α ELISA examination was performed at the Clinical Pathology Laboratory of Dr. Soetomo General Hospital Surabaya. The tissue in the cooler was sent to the Clinical Pathology Laboratory of Dr. Soetomo in less than 2 hours, then stored at -800C in the Esco Lexicon II ULT freezer. Measurement of IL-1α levels was done quantitatively using the ELISA method. The cholesteatoma and skin tissues of MAE were processed using human IL-1α ELISA kit for lysates (RayBio, location, manufacture state) in accordance with the procedures stated in the kit. The absorbance value reader tool was set at 450 nm wavelength with Humareader Single. The ELISA examination was performed after the entire sample was fulfilled and performed by a Clinical Pathology Specialist Consultant doctor.\(^7\)

The results of the above tests were analyzed using the Shapiro-Wilk normality test first. The mean comparison of IL-1α cholesteatoma and MAE skin were analyzed using Mann-Whitney U test. The relationship between IL-1α with bone destruction was analyzed using Rank Spearman test. Data analysis was conducted using SPSS (SPSS, Inc., Chicago, IL) with p <0.05.

Result

Table 1: Subjects’ Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>≤10</td>
<td>2 (10.00)</td>
</tr>
<tr>
<td>11-20</td>
<td>6 (30.00)</td>
</tr>
<tr>
<td>21-30</td>
<td>9 (45.00)</td>
</tr>
<tr>
<td>31-40</td>
<td>5 (10.00)</td>
</tr>
<tr>
<td>≥41</td>
<td>1 (5.00)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11 (55.00)</td>
</tr>
<tr>
<td>Female</td>
<td>9 (45.00)</td>
</tr>
<tr>
<td><strong>Tribe</strong></td>
<td></td>
</tr>
<tr>
<td>Java</td>
<td>14 (70.00)</td>
</tr>
<tr>
<td>Madura</td>
<td>4 (20.00)</td>
</tr>
<tr>
<td>Banjar</td>
<td>2 (10.00)</td>
</tr>
<tr>
<td><strong>Bone Destruction Degree</strong></td>
<td></td>
</tr>
<tr>
<td>Mild Destruction</td>
<td>5 (25.00)</td>
</tr>
<tr>
<td>Moderate Destruction</td>
<td>2 (10.00)</td>
</tr>
<tr>
<td>Severe Destruction</td>
<td>13 (65.00)</td>
</tr>
</tbody>
</table>

Table 1 above shows that CSOM patients with cholesteatoma in this study were mostly in the age group of 21-30 with 45%. Most of the subjects were male (55.00%) and Javanese (70.00%). The data also shows that severe destruction has the highest number in patient than other bone destruction case. Most of the patients with bone destruction are javanese tribe.
Table 2: Degree of IL-1α cholesteatoma

<table>
<thead>
<tr>
<th>Cholesteatoma IL-1α level (pg/ml)</th>
<th>Mean ± SD</th>
<th>N (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.00 – 15.00</td>
<td>12.71 ± 1.64</td>
<td>5 (25.00)</td>
<td>0.000</td>
</tr>
<tr>
<td>15.01 – 25.00</td>
<td>20.38 ± 2.79</td>
<td>5 (25.00)</td>
<td></td>
</tr>
<tr>
<td>25.01 – 35.00</td>
<td>30.76 ± 2.99</td>
<td>7 (35.00)</td>
<td></td>
</tr>
<tr>
<td>&gt; 35.00</td>
<td>51.72 ± 14.99</td>
<td>3 (15.00)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 shows that most subjects had severe bone destruction (65.00%). The highest levels of IL-1α cholesteatoma were in the range 25.01 - 35.00 pg/ml with mean value of 30.76 ± 2.99 (35.00%). Mann Whitney test analysis results obtained p value = 0.000.

Table 3: Correlation between cholesteatoma IL-1α and bone destruction

<table>
<thead>
<tr>
<th>Bone Destruction Degree</th>
<th>Cholesteatoma IL-1α level</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>14.93 ± 4.36</td>
<td>0.003</td>
</tr>
<tr>
<td>Medium</td>
<td>22.75 ± 12.18</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>31.98 ± 14.16</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 shows the destruction of mild bone had IL-1α score was obtained 14.93 ± 4.36, medium bone destruction had the level of IL-1α obtained value 22.75 ± 12.18, and severe bone destruction had the level of IL-1α obtained value 31.98 ± 14.16 (r = 0.625; p = 0.003). The severe bone destruction has the highest score number than other degree. of bone destruction. Light degree bone destruction has the smallest score than other degrees.

Discussion

The levels of IL-1α in cholesteatoma with normal MAE skin were measured using Western Blot method. The mean of IL-1α concentration in cholesteatoma tissue in the study was 0.39 pg/ml, whereas the levels of IL-1α in normal skin were undetectable. No detection of IL-1α in normal skin in the study is likely due to the limit of skin IL-1α levels to be below the minimum level of IL-1α levels that can be detected by the reagents used. Calculation of IL-1α levels on culture of cholesteatoma tissue quantitatively using ELISA method. Levels of IL-1α were found to increase in the culture of the first day until the third day to reach the highest levels of 270 pg/ml. The IL-1α levels of 23 CSOM patients with cholesteatoma and in control group were compared using ELISA.

Interleukin-1α keeps the homeostasis of cholesteatoma in an autocrine way. Cholesteatoma expresses IL-1α continually and IL-1α provides a positive feedback by inducing formation of cholesteatoma keratinocytes (8). The thing that differentiates this study from the one mentioned above is probably the clinical characteristic of different patients. Most sufferers come to treatment in severe bone destruction conditions (1). The longer the suffering of CSOM with cholesteatoma will cause more cholesteatoma to form, causing the bone destruction to be heavier as well.

Bone resorption in tissue culture of cholesteatoma where bone resorption increases is directly proportional to elevated levels of IL-1α (9). A research examined the relationship between IL-1α and bone destruction in patients with CSOM with cholesteatoma using Western Blot examination (8). Medium bone destruction was most prevalent and there was a positive correlation between IL-1α levels and bone destruction (r = 0.597).

Osteoclasts are the main cells in the process of bone destruction in cholesteatoma. Interleukin-1α affects osteoclast formation and differentiation. Interleukin-1α is the most potent osteoclastogenic cytokine that plays a role during the inflammatory process in cholesteatoma. Experiments on IL-1α-blocked mice showed a decrease in bone resorption rates (10). The number of osteoclasts decreased significantly (p <0.01) in the bones of experimental animals with IL-1α constraints compared with normal bones while bone density was increased in mice with suppression of IL-1α (11). Bone resorption in tissue culture of cholesteatoma. Human cholesteatoma tissue cultures given antibodies toward IL-1α incubated on the calf bone medium of the experimental animals showed no bone resorption. This suggests that IL-1α plays a role in direct bone resorption, and resistance to IL-1α works by decreasing the number of osteoclasts causing the increase of bone density (12).

Interleukin-1α is not the only cytokine that plays a role in bone resorption in OMSK with cholesteatoma. Cytokine Tumor Necrosis Factor alpha (TNF-α) also has an important role in the process. A study in Japan provides the fact that there is an increase in TNF-α and IL-1 detected in cholesteatoma acquisita as well as congenital cholesteatoma compared to in normal KAE skin (1). The RT-PCR technique showed that messenger ribonucleic acid (mRNA) for IL-1α and TNF-α was detected in 5/5 cholesteatoma, whereas in congenital
cholesteatoma there was a strong mRNA expression for TNF-α in 5/5 cases but only weak for IL-1α in 4/5 cases (13). ELISA techniques obtain higher IL-1α levels in cholesteatoma acquisita than in congenital cholesteatoma, whereas TNF-α levels do not differ significantly in both cholesteatomas (14).

Interleukin-1α is a cytokine that plays a role in inflammation and increases bone destruction directly or through increased osteoclastogenesis in CSOM with cholesteatoma. Various studies on IL-1α inhibition have been performed on various diseases associated with bone resorption, including rheumatoid arthritis, gout, ankylosing spondylitis, and erosive osteoarthritis. Some IL-1α inhibitors include anakinra, rilonacept, and MABp1 are used as a therapy for rheumatoid arthritis and ankylosing spondylitis (15).

There has been no research on IL-1α antagonists as a therapeutic target in CSOM with cholesteatoma conducted previously. The provision of recombinant IL-1RA may be a new target for adjuvant therapy in addition to surgery on CSOM with cholesteatoma (2). The goal is to reduce IL-1α activity which reduces the inflammatory process as well as inhibits the growth of cholesteatoma and the process of bone destruction (16).

**Conclusion**

Bone destruction in CSOM with cholesteatoma is not only due to IL-1α. The cytokine TNF-α, PGE2, and Lipopolysaccharide (LPS) produced by bacterial infection also have a role in bone destruction, but this study does not measure TNF-α, and PGE2. This study also did not conduct bacterial cultures to determine the bacterial infection that will produce LPS.

**Ethical Clearance:** This research process involves participants in the survey using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, no maleficence, and justice.

**Conflict of Interest:** There is no report of conflict of interest of the research, as well as the conflict between authors so far the research has been conducted and documented.

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**REFERENCES**


Effect of Alcoholic Extract of *Opuntia Ficus Indica* on Semen Quality of Awassi Rams after Different Cooling Periods

Abd AL-Kareem Abd AL-Reda Hobi¹, Ahmed Mahdi Abbas AL-Helal¹

¹Department of Animal Production, College of Agricultural Engineering Sciences, University of Baghdad, Iraq

ABSTRAcT

This study was conducted to undertake the effect of adding alcohols extract of *Opuntia ficus indica* fruits (AEOFI), and its effect on some characteristics of Awassi rams semen during liquid storage at 5 °C for up to 72 h in Tris egg yolk (TEY) extender. To select the better concentration of alcohols extract. This experiment was executed at the farm Animal, Department of Animal Production, College of Agriculture, University of Baghdad AL-Jadreya campus during the period from the first October, 2017 to 27 th of March, 2018. Semen samples from three local Awassi rams were pooled and extended with Tris-egg yolk extenders containing (AEOFI) (0%, 0.5%, 1%, 1.5% and 3%), at a final concentration of 0.8 × 10⁷ sperm/ml. The sperm characteristics (individual motility, plasma membrane integrity and dead sperm) were evaluated at different time periods (0, 24, 48, 72 h) at cooling 5°C. Results showed that the supplementation of Tris egg yolk extenders with 1 % (AEOFI) contributed to enhance sperm individual motility, membrane integrity and decreased the percentage of dead sperm, during storage compared with the control group. In conclusion, (TEY) supplemented with 1% of (AEOFI) can improve the quality of Awassi ram semen. In addition, our results suggest that (AEOFI) in these concentrations can help to enhance Awassi ram semen quality during chilled storage.

Keywords: Awassi ram, Alcohols extract, Semen, Sperm characteristics, Tris

Introduction

Sperm cells have a high content of unsaturated fatty acids in their membranes. Therefore, sperm cells very susceptible to lipid peroxidation by free radicals such as hydrogen peroxide, hydroxyl radical and superoxide anion which could later lead to the structural damage of sperm membranes during the cooling storage of sperm. Many studies indicate that the quality of semen deteriorates during liquid storage for a long periods. Cold shock of sperm cells during the cooling process is associated with oxidative stress induced by free radicals which could later lead to the damage of cells. Impaired sperm function is a general cause of male infertility. A balanced generation of reactive oxygen species (ROS) and antioxidant enzymes is associated with normal physiological functions. Seminal plasma has an antioxidant system that seems to be very relevant to the protection of sperm, include superoxide dismutase, catalase, glutathione peroxidase and glutathione reductase. Therefore, the defensive role of the seminal plasma is reduced after applying sundry dilutions for semen storage. To outdo with such problems, the uses of lactoferrin in the semen causing decrease in the total number of bacteria in the semen. Subsequently, we suppose that possibly the (AEOFI) has ability of to improve the liquid preservation of Awassi rams semen. Thus, this study was conducted to explain the protective effect of various concentrations (0, 0.5, 1, 1.5, and 3 %) of (AEOFI) from *Opuntia ficus indica* fruits added in Tris-egg yolk extenders on sperm quality during the liquid storage of ram sperm at 5 °C for various periods of storage.

Materials and Method

Animals and Semen Collection: Semen samples from three mature Awassi rams (2-3 years of age and 52-60 kg
of Wight) were utilized in this study. The rams were drink, fed, housed and lit, conventionally. The study was carried out from the first October, 2017 to 27th of March, 2018. Animals were housed at the farm Animal, Department of Animal Production, College of Agriculture, University of Baghdad, Iraq. All the rams were in a good health. They were safeguard in equal managerial and nutritional situation throughout the periods of the study. The animals were kept in open front barrens, were fed singly with concentrated mixture (Containing 46% barley, 36% bran, 16% soybean, 2% minerals and salt mixed in the farm) of one kg per ram per day and water was given ad libitum. Thirty ejaculates were collected by artificial vagina during ten weeks. For collecting ejaculates, ram were penned with ewes in estrus. Ejaculates were evaluated and included in this study if the following norm were met, volume of (0.9-1) mL, sperm Concentration of (2.5-10^9) sperm per mL, motility (>70%).

**Semen Analysis:** The volume of every ejaculate was listed, sperm concentration was specified by taken (0.1mL) semen and diluted with (19.9mL) diluents solution, formed from (0.9%) Nacl, 0.01 Hgcl, 2 gm/L eosin stainelope the diluted semen was placed on hemocytometer with the sperm enumerated in five squares of one chamber. Sperm motility was identified as those sperm cells that demonstrated individual motility according to. Semen was laid on a heated glass slid, and scoring was performed at microscopic magnification of 400 x. The mean value was used for data analysis. Assessment of the percentages of dead sperm was performed using an eosin–nigrosin staining method. Assessment of the percentage of Sperms plasma membrane integrity was performed according to method, a semen sample 30 μL was mixed with 300 μL distilled water (pH 7.2, mOsm 05) and incubated at 37 °C for 5 min, after incubation a drop 15 μL of the treated mixture was placed on a warmed slid and covered with a cover slip, a total of 200 sperm was counted in six different microscopic fields at 400 x, the percentage of spermatozoa with swollen and curved tails was recorded.

**Dilution of Semen and Addition of (AEOFI):** Semen samples were diluted by using the basic extenders were Tris 3.63%, fructose 0.5%, citric acid 1.9%, streptomycin 100 mg, penicillin 100000IU and egg yolk 19.2 mL. The diluted semen sample was divided into five group. The first group Tris egg yolk only without any addition considered as control group. The other four treatment group were adding the alcoholic extract of the Opuntia ficus indica fruits (AEOFI) with different percentage which were 0.5%, 1%, 1.5%, 3% for T1, T2, T3, T4 respectively.

**Statistical Analysis:** Data were analyzed by SAS (2012) computer program using completely randomized design (C.R.D) to study the effect of treatment for any time according to model:

\[ Y_{ij} = \mu + \text{Ti} + e_{ij} \]

Where, \( Y_{ij} \) is the value of observation \( j \) to treatment \( i \), \( \mu \) the general mean of the characteristic, Ti effect of treatment \( i \), eij : random error which is naturally distributed at an average of zero and a variation of e. Duncan test was used to compare the significant differences between means.

**Results**

In this study there was no significant differences \( p>0.05 \) were found between individual Awassi rams in the estimated parameters. The results of our study revealed that the addition of 0.5% and 1% (AEOFI) in TEY can significantly increase (\( p<0.05 \)) in the percentage of individual motility compared to the control groups after storage period at (0, 24, 48, 72 h) (Table 1). The percentage of individual motility declined gradually in all concentration of AEOFI (0, 0.5, 1, 1.5, 3%) with Tris egg yolk containing diluents when preserved at 5 °C from 0 to 72 h which was declined markedly (Table 1).

<table>
<thead>
<tr>
<th>Table 1: Effect of added different concentration of (AEOFI) to (TEY) on the individual motility (%) for spermatozoa of Awassi ram after 0, 24, 48, 72 h of storage at 5 °C.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment</strong></td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>T1</td>
</tr>
<tr>
<td>T2</td>
</tr>
<tr>
<td>T3</td>
</tr>
</tbody>
</table>
Conted…

<table>
<thead>
<tr>
<th>T4</th>
<th>73.37 ± 1.22 B a</th>
<th>62.25 ± 2.08 B b</th>
<th>52.00 ± 1.80 B c</th>
<th>39.75 ± 1.70 C d</th>
<th>**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of significant</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>---</td>
</tr>
</tbody>
</table>

(TEY): Tris egg yolk, AEOFI : alcohols extract of Opuntia ficus indica fruits, C: Control group TEY only, T1: TEY + 0.5% AEOFI, T2: TEY + 1% AEOFI, T3: TEY +1.5% AEOFI, T4: TEY + 3% AEOFI, Values are expressed as mean ± SEM, Means carrying different big superscript letters within the same column are significantly varied at \(^{\ast}\)p<0.05. Means carrying different small superscript letters within the same row are significantly varied at \(\ast\ast\)p<0.01.

The results also showed cooling extender supplemented with 0.5% and 1% led to higher percentages (p<0.05) of plasma membrane integrity during cooling storage at 5\(^{\circ}\)C for all preservation period (0, 24, 48, 72 h) compared to control group. The effect of the period of storage from 0 to 72 h on the percentages of plasma membrane integrity significantly (p<0.01) decreased and this decreased it was higher after 72 h from cooling storage (Table 2).

### Table 2: Effect of added different concentration of (AEOFI) to (TEY) on the plasma membrane integrity (%) for spermatozoa of Awasii ram after 0, 24, 48, 72 h of storage at 5 \(^{\circ}\)C.

<table>
<thead>
<tr>
<th>Time</th>
<th>Treatment</th>
<th>At 0 h of storage(%)</th>
<th>At 24 h of storage(%)</th>
<th>At 48 h of storage(%)</th>
<th>At 72 h of storage(%)</th>
<th>Level of significant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>65.25 ± 0.92BCa</td>
<td>55.75 ± 0.94 Bb</td>
<td>48.87 ± 1.68BCc</td>
<td>38.50 ± 1.33 Cd</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T1</td>
<td>71.25 ± 0.79 Ab</td>
<td>63.37 ± 0.96 Ab</td>
<td>55.00 ± 1.10 Ac</td>
<td>44.75 ± 1.03 Ad</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>72.87 ± 1.12 Ab</td>
<td>62.62 ± 1.19 Ab</td>
<td>51.62 ± 0.90 Abc</td>
<td>44.00 ± 1.33 Abd</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>67.87 ± 0.83 Ab</td>
<td>55.87 ± 1.04 Bb</td>
<td>46.37 ± 0.88 CAbc</td>
<td>40.37 ± 0.86 BAbd</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>63.62 ± 1.32 Ab</td>
<td>53.25 ± 1.51 Bb</td>
<td>44.12 ± 2.00 Dc</td>
<td>31.62 ± 1.82 DAb</td>
<td>**</td>
</tr>
<tr>
<td>Level of significant</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>**</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

(TEY): Tris egg yolk, AEOFI : alcohols extract of Opuntia ficus indica fruits, C: Control group TEY only, T1: TEY + 0.5% AEOFI, T2: TEY + 1% AEOFI, T3: TEY +1.5% AEOFI, T4: TEY + 3% AEOFI, Values are expressed as mean ± SEM, Means carrying different big superscript letters within the same column are significantly varied at \(^{\ast}\)p<0.05. Means carrying different small superscript letters within the same row are significantly varied at \(\ast\ast\)p<0.01.

Data for the dead sperm are in Table 3, the results provided evidence that AEOFI at 1% in Tris fructose egg yolk extenders decreases the dead sperm at (0, 24, 48 and 72 h) of storage at 5 \(^{\circ}\)C compared to the control group. Dead spermatozoa increases gradually when preserved at 5 \(^{\circ}\)C from 0 to 72 h, which was declined markedly Table 3.

### Table 3: Effect of added different concentration of (AEOFI) to (TEY) on the dead (%) for spermatozoa of Awasii ram after 0, 24, 48, 72 h of storage at 5 \(^{\circ}\)C.

<table>
<thead>
<tr>
<th>Time</th>
<th>Treatment</th>
<th>At 0 h of storage(%)</th>
<th>At 24 h of storage(%)</th>
<th>At 48 h of storage(%)</th>
<th>At 72 h of storage(%)</th>
<th>Level of significant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>24.37 ± 0.37 Aa</td>
<td>34.75 ± 0.61 Ab</td>
<td>40.62 ± 0.73 Abc</td>
<td>47.75 ± 0.79 Bd</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T1</td>
<td>18.78 ± 0.39 Da</td>
<td>24.00 ± 0.46 Db</td>
<td>34.37 ± 0.65 Cc</td>
<td>41.25 ± 0.64 Cd</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>14.50 ± 0.32 Ea</td>
<td>20.87 ± 0.39 Eb</td>
<td>32.37 ± 0.70 Cc</td>
<td>41.37 ± 1.01 Cd</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>20.50 ± 0.56 Ca</td>
<td>30.50 ± 0.37Cb</td>
<td>38.62 ± 0.65 Bc</td>
<td>46.37 ± 0.41 Bd</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>22.37 ± 0.59 Ha</td>
<td>32.50 ± 0.73 Bb</td>
<td>42.12 ± 0.98 Ac</td>
<td>51.00 ± 0.46 Ad</td>
<td>**</td>
</tr>
<tr>
<td>Level of significant</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>**</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

(TEY): Tris egg yolk, AEOFI : alcohols extract of Opuntia ficus indica fruits, C: Control group TEY only, T1: TEY + 0.5% AEOFI, T2: TEY + 1% AEOFI, T3: TEY +1.5% AEOFI, T4: TEY + 3% AEOFI, Values are expressed as mean ± SEM, Means carrying different big superscript letters within the same column are significantly varied at \(^{\ast}\)p<0.05. Means carrying different small superscript letters within the same row are significantly varied at \(\ast\ast\)p<0.01.
Discussion

This study was designed to determine the effect of alcohols extract of *Opuntia ficus indica* fruits (AEOFI) addition in cooling extender on the individual motility, plasma membrane integrity and dead of Awasii rams spermatozoa. Cooled extender is a better alternative to frozen semen if it is used in a short time of storage. The quality of sperm after liquid storage needs to estimate before practical implementation in the farm. The lowering in the percentage of individual motility of sperm during long period of liquid storage in the present study was agreed with 9. Oxidative stress due to undue production of ROS has been related with defective sperm profession. The ROS attack polyunsaturated fatty acids in the sperm plasma membrane that led to loss in a membrane fluidity and integrity16. Many studies have reported that membrane lipid peroxidation in sperm are associated with reactive oxygen species ROS production17,18. And addition methionine to semen19 and ascorbic acid3. And addition lycopene on ram semen to prevent oxidative stress in rams spermatozoa during liquid storage, and addition cactus seed oil during liquid storage to improvement of ram semen quality20. That led to the addition of other natural herbs on the ram spermatozoa can enhance ram sperm quality like colve bud21 and rosemary22,23.

Conclusion

This study implies that supplementation of TEY with an suitable concentration of alcohols extract of *Opuntia ficus indica* fruits (AEOFI) has a beneficial effect on ram sperm parameter during liquid storage at 5˚C. The (1%) concentration of AEOFI can enhance sperm quality variables such as individual motility, plasma membrane integrity and decreases dead sperm. Therefore, this AEOFI can be considered powerful natural antioxidants that can be added in extender for semen cooling.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: Not required

REFERENCES


Agricultural and Food chemistry, 2001. 49(11), 5165-5170.


Motivation in Health Behaviour: Role of Autonomous and Controlled Motivation

Adeline Y. L. Tam¹, Rohaizat Baharun², Zuraidah Sulaiman³
¹PhD Candidate, ²Professor, ³Senior Lecturer, Azman Hashim International Business School, Universiti Teknologi Malaysia, Johor Bahru, Johor, Malaysia

ABSTRACT

Introduction: Self-Determination Theory (SDT) emphasizes effect of motivation quality (autonomous and controlled motivation) in influencing behaviour. SDT explains the involvement of motivation in many areas, particularly health behaviour.

Purpose: This paper reviews the application of both autonomous and controlled motivation in predicting health behaviour in the literature.

Methodology: Published journals or articles containing quantitative studies that applied either autonomous and controlled motivation or both as independent variables that predicted health behaviour were included in this review. Articles from the past ten years (2009 to 2018) were reviewed. Health behaviours were further categorised into illness treatment and recovery, reduced health risks, and general health.

Findings: Review results indicated that autonomous motivation was consistently related to various health behaviours for short- and long-term. Controlled motivation was either insignificantly or negatively related to health behaviours.

Implication: This paper adds to our understanding of the influences of motivation on health from the perspective of SDT. This paper also contributes to the healthcare literature by providing insights into the extent to which both types of motivation influence health behaviour.

Keywords: autonomous motivation, controlled motivation, health behaviour, Self-Determination Theory, health maintenance

Introduction

Health-related habits are not changed by act of wills, but rather motivational and self-regulatory skills¹. Motivation factors are not only associated with engagement in health behaviour, but also long-term health behaviour change². Self-Determination Theory³ (SDT) has showed particular promise in explaining the nature and role of motivation for various health behaviours⁴. SDT is distinct from other motivation theories in that it conceptualises motivation by its quality rather than its quantity (level of motivation)². The SDT constructs, autonomous motivation (AM) and controlled motivation (CM), were applied to explain individual involvement in various health behaviours. Nevertheless, few studies⁷-⁸ have reviewed how AM and CM influence health behaviours.

This paper reviewed two main constructs of SDT, AM and CM, their roles in predicting health behaviour in the literature. The objectives of this study are twofold. First, this study examined the influence of AM and CM on health behaviours in the literature; Second, this study compared the influence of AM and CM in conducting health behaviour. This paper deepens our understanding of how motivation influences health from the SDT perspective.

Corresponding Author:
Adeline Y. L. Tam
PhD Candidate,
Azman Hashim International Business School
Universiti Teknologi Malaysia,
Johor Bahru, Johor, Malaysia
Phone: 006 016 846 1550
Email: adelinetamyl@gmail.com
**Literature Review**

SDT defines motivation as the psychological energy directed toward a goal. White pointed out that using motivation to capture need fulfilment could explain ‘why a behaviour occurs’ due to individual intentions, attitudes, and beliefs. AM is defined as engaging in a behaviour because it is perceived to be consistent with intrinsic goals or outcomes that emanate from the self. Autonomous motivated behaviours are initiated and regulated through choice as an expression of oneself. According to SDT, people are inherently inclined to engage in behaviours consistent with their interests, life values, and important goals and hence AM explains individual actions. AM was found to be reliable in predicting healthcare intentions, triggering initiations, and promoting behaviours persistence, as well as short-term and long-term behaviour.

CM reflects engagement in behaviours due to external pressures (for instance, to gain rewards, avoid punishment or meet expectations), and/or internal pressures (including obtaining perceived approval from others or avoiding feelings of shame, guilt, or anxiety). CM behaviours are characterised by heteronomous initiations that are pressured and coerced by intrapsychic and environmental forces, and thus do not represent true choice. SDT proposed that AM is more effective than CM in promoting behaviour persistence because behaviour guided by CM will cease when the external contingency no longer exists.

**Health Behaviour:** Health behaviour in this review refers to various individual behaviours to promote or maintain their own health. The health behaviours accepted in this review followed Hagger et al. Health behaviours were further categorised into illness treatment and recovery (ITR), reduced health risks (RHR), and general healthcare (GH). Health behaviours such as injury treatment adherence, reduced health risks, and exercise for patient with heart disease were grouped into ITR. Meanwhile, RHR included various behaviours to reduce threat to health. Other behaviours to maintain good health were categorised in GH.

**Methodology**

Published journals or articles consisting of quantitative studies that used AM and/or CM as antecedents to predict physical health behaviour were included. Journals that were published during the last ten years (2009 to June 2018) were collected from established online journal banks, such as Google Scholar, Ebscohost, Emerald and Science Direct. Conceptual paper, qualitative research, and quantitative research paper that only applied mean comparison (e.g. t-test and ANOVA) or correlation methods of analyses are excluded as these studies did not contain beta coefficient value that required for further comparison. A total 21 journals detected and included in this review.

Beta coefficient value (or standardised regression coefficient) are used for direct comparison of the relative effect of each AM and CM on the dependent variable. Beta coefficient eliminates the problem of dealing with different units of measurement and reflects the relative impact on the dependent variable of a change in one standard deviation in independent variable. The details of relationships between AM and CM with health behaviours (in beta coefficient) are tabulated in Table 1.

The articles included in this review covered various health-related behaviours which were grouped into three categories, ITR, RHR, and GH. There are five studies fall under the ITR, five studies under RHR and the remains in GH category. Although the samples of these studies were mostly healthy population, unhealthy population is also included. The samples in these studies were of different age groups, such as adolescents, young adults and adults. Meanwhile, two studies analysed the data in the population survey. Most articles were applying structural equation modelling (SEM) to analyse the influences of motivation on health behaviour.

**Findings**

Except for few cases, AM was consistently and positively related to various health behaviours in GH (beta=.08~.52; beta mean=.240) and ITR (beta=.13~.72; beta mean=.290) categories. AM negatively influenced unhealthy behaviours under RHR category (beta=-.31~-.57; beta mean=-.214). It was noticed that AM was more strongly related to long-term behaviour than with short-term behaviour in the context of weight-loss and exercise behaviour. Nevertheless, Shaikh et al found that the AM was associated with fruit and vegetable intake stronger in the base time than a year later.
CM was examined in 14 studies and revealed inconsistent results in relation to health behaviours. CM was found to influence health behaviour significantly in eight studies (57.14%). Four of these studies found that CM was negatively associated with health behaviours (beta=-.13~-.26; beta mean=-.185) but two studies found that CM was positively related to health behaviours (beta=.17~.21; beta mean=.193).

While for RHR, CM was also negatively related to unhealthy behaviours, but positively associated with unhealthy eating. Among the three studies compared CM influences in short-term with long-term, only Shaikh et al. social support (SS confirmed that CM was positively related to fruit and vegetable intake in the short-run but insignificant in the long-run.

### Table 1: Relationship between motivations and health behaviour in past studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>β value of</th>
<th>Health Behaviour</th>
<th>Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM</td>
<td>CM</td>
<td>ITR</td>
</tr>
<tr>
<td>Chan et al10</td>
<td>.62**</td>
<td>-.26*</td>
<td>Z</td>
</tr>
<tr>
<td>Halvari et al31</td>
<td>.18*</td>
<td>-</td>
<td>Z</td>
</tr>
<tr>
<td>Austin et al32</td>
<td>.38**</td>
<td>-</td>
<td>Z</td>
</tr>
<tr>
<td>Shaikh et al28</td>
<td>a.45*</td>
<td>b.21*</td>
<td>Z</td>
</tr>
<tr>
<td></td>
<td>a.18*</td>
<td>b.Y</td>
<td></td>
</tr>
<tr>
<td>Silva et al33</td>
<td>a.35**</td>
<td>b.31**</td>
<td>Z</td>
</tr>
<tr>
<td>Chan &amp; Hagger16</td>
<td>.72**</td>
<td>-</td>
<td>Z</td>
</tr>
<tr>
<td>Sloviniec D’Angelo et al18</td>
<td>a.13*</td>
<td>b.00</td>
<td>Z</td>
</tr>
<tr>
<td></td>
<td>a.16*</td>
<td>b.04</td>
<td></td>
</tr>
<tr>
<td>Fenton et al34</td>
<td>a.20*</td>
<td>b.15*</td>
<td>Z</td>
</tr>
<tr>
<td></td>
<td>a.15*</td>
<td>b.06</td>
<td></td>
</tr>
<tr>
<td>Gorin et al20</td>
<td>a.21*</td>
<td>b.02</td>
<td>Z</td>
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<td></td>
<td>a.01</td>
<td>b.06</td>
<td></td>
</tr>
<tr>
<td>Ng et al29</td>
<td>a.22**</td>
<td>b.33**</td>
<td>Z</td>
</tr>
<tr>
<td></td>
<td>a.22*</td>
<td>b.09</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c.10</td>
<td>c.14</td>
<td></td>
</tr>
<tr>
<td>Chan et al13</td>
<td>a.04</td>
<td>b.32**</td>
<td>Z</td>
</tr>
<tr>
<td></td>
<td>a.17**</td>
<td>b.16**</td>
<td></td>
</tr>
<tr>
<td>Hardy et al21</td>
<td>a.31**</td>
<td>b.57**</td>
<td>Z</td>
</tr>
<tr>
<td></td>
<td>a.15*</td>
<td>b.04</td>
<td></td>
</tr>
<tr>
<td>Katz et al19</td>
<td>.52**</td>
<td>-</td>
<td>Z</td>
</tr>
<tr>
<td>Marcinko16</td>
<td>.08*</td>
<td>-.13**</td>
<td>Z</td>
</tr>
<tr>
<td></td>
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<tr>
<td>Raaijmakers et al17</td>
<td>a.06</td>
<td>b.27</td>
<td>Z</td>
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<td></td>
<td>a.34</td>
<td>b.20</td>
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<td>a.15</td>
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<td></td>
<td>a.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>McSpadden et al4</td>
<td>.42**</td>
<td>-.19**</td>
<td>Z</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwyer et al25</td>
<td>a.31**</td>
<td>b.35**</td>
<td>Z</td>
</tr>
<tr>
<td></td>
<td>a.13</td>
<td>b.07</td>
<td></td>
</tr>
<tr>
<td>Guertin et al22</td>
<td>-.39*</td>
<td>.20*</td>
<td>Z</td>
</tr>
<tr>
<td>Keshtidar &amp; Behzadnia35</td>
<td>.36**</td>
<td>.07</td>
<td>Z</td>
</tr>
<tr>
<td>Richards et al33</td>
<td>.52*</td>
<td>-</td>
<td>Z</td>
</tr>
<tr>
<td>Sylvester et al34</td>
<td>.46**</td>
<td>-</td>
<td>Z</td>
</tr>
</tbody>
</table>

Note: *significant at p<.05; **significant at p<.01; Y- β value not available; Z- dependent variable in health behaviour category.
Discussion

Most studies confirmed that AM was significantly and positively related to the health behaviours, supporting the view that AM had the most pervasive effect on intentions and behaviour across the majority of the health-related behaviours in regardless of sample background, such as gender and age. In line with SDT, when an individual agreed with the values and benefits of health behaviour, he would be motivated to perform the behaviour, leading to positive relationship with health behaviour. In contrarily, CM was inconsistently related to health behaviours with only slightly more than half of the studies found CM significantly associated with the health behaviours tested. The finding was consonant with reviewed done by Teixeira et al which in turn is associated with important health outcomes. Accordingly, research on exercise motivation from the perspective of self-determination theory (SDT for exercise behaviour. CM reflects engaging in behaviours due to external pressures and/or internal pressures and thus required the existence of sure pressures to behave. In the events that these pressures unavailable, CM would not associate with the health behaviours.

AM had a higher beta results than the CM reflecting that the AM had stronger influences than CM on the health behaviour. AM results in ITR category reflected that patients with AM were aware of the benefits of health behaviours and were more determined to engage voluntarily with illness treatment and recovery behaviours. To enhance results of illness treatment and recovery process, medical professionals needed to boost the AM of patients but avoiding CM by reducing external pressures to the patient. The findings provided evidence to warrant used of AM to promote health behaviours in other contexts, supporting Hardy et al.

The analysis revealed that both AM and CM were good at discouraging unhealthy behaviours that could threaten the health of individuals. Promoting abstinence from health-risk behaviours could be more effective if the targeted groups were taught of the value to autonomously demotivate risky behaviour and at the same time, they were made aware of the potential external and internal pressure to refrain from the risky behaviour.

Furthermore, AM was found to associate with health behaviours in both the short-term and long-term, but CM was not able to predict any health behaviours in the long-run. The finding confirmed that AM is more likely to produce long-term, sustained behaviour change than CM. While CM might be suitable to pressurise an individual to start performing a health behaviour, AM would be necessary to sustain health behaviour until habitual health behaviour created.

Conclusion

This review provides a unique and important insight into the consequences of motivation towards health behaviour adoption and maintenance. Academically, this paper supported the inclusion of AM and CM in future research of health behaviours. This paper also presents evidence to health professionals to include motivation, particularly the AM in promoting and maintaining health behaviour. The findings may extend to apply in other health context or to resist unhealthy behaviours in both short-term and long-term. Nevertheless, the influences of social support and environment context on motivation were not examined. Future study could review the impacts of social support and environment context on the motivation quality and level. Future review could attempt to examine the influences of motivation on the emotional and psychological well-being. In conclusion, this research draws attention to the importance of motivation quality (AM) as proposed by SDT in promoting health behaviours and refraining from unhealthy behaviours.

Source of Support: Nil
Conflict of Interest: None
Ethical Clearance: This review made use of secondary datasets hence there is no need for ethical clearance.

REFERENCES


The Effectiveness of Aluminum Potassium Sulfate Micro-Particles Addition into Soft Denture Lining Material on Candida Albicans Adherence

Ali Mohad1, Abdalbseet A Fatalla2
1Master Student, 2Assistant Professor, Department of Prosthodontics, College of Dentistry, University of Baghdad

ABSTRACT

Naturally available products have been used widely for centuries in handling human disease. The present study aimed to determine the antifungal ability of aluminum potassium sulfate against *Candida Albicans* adherence to the soft liner material in scientific way. The antifungal ability of aluminum potassium sulfate evaluated against *Candida Albicans* adherence in two part, first part include incorporation of KAL(SO$_4$)$_2$ in too soft liner monomer in concentration (1%,2%,3% by wt.) while the second part include immersion of soft liner specimens in solution of KAL(SO$_4$)$_2$ in concentration(5%,10%,15% percent) during different time periods (0,10,30,60 minutes). In conclusions, the results of current study encourage use KAL (SO$_4$)$_2$ as antimicrobial material in different ways.

*Keywords*: Aluminum Potassium Sulfate, Micro-Particles, Denture Lining Material, Candida Albicans Adherence

Introduction

Soft denture lining material used in patient suffering from pain or soreness resulting from tissue contact with hard denture base. Addition of soft denture lining material ensuring optimal adaptation of the denture to the underling tissue. (1) Soft denture lining material characterized by high resiliency so acting as shock absorber reducing load transmission to the underling tissue. (2) Common problem associated with soft lining material using lack of antimicrobial properties especially in bad oral hygiene cases. Common microorganism isolated from patient present with denture stomatitis is *C. Albicans*. (3) *C. Albicans* present in oral environment of healthy individual and can become opportunistic but present in greater number in denture wearer because the denture reduce flow of O2 and saliva to the underling tissue. (4)

Aluminum potassium sulfate(alum) having chemical formula KAL(SO$_4$)$_2$.12H$_2$O and generally having no odor, no color sold crystal that return white in color in air that used in food preservation and water purification(5). The alum has been recommended as active ingredient part in mouth wash by the Counter Advisory Panel of U.S. Food and Drug Administration (FDAs)(6).

Material and Method

The study divided into two parts:

1. Incorporation of KAL (SO$_4$)$_2$ into soft liner (0%,1%,2%,3%). In comparison with nystatin (1.4% by wt. Added to the soft liner). Where it mixed with soft liner monomer.

2. Immersion of soft liner specimens in suspension of KAL (SO$_4$)$_2$ (0%, 5%, 10%, 15% during times 0, 10, 30, 60 minutes).

Where5 specimens for each group prepared.

Microbiological part of study

**Specimen preparation:** Plastic pattern disk shaped form (10mm in diameter and 2mm in thickness) used to fabricate soft liner specimens. (7)These plastic disks
placed inside addition silicone, waiting until complete setting of silicone then placed inside lower part of the flask then freshly mixed stone (W/P ratio:25ml/100g) poured on it until lower part of flask completely filled. After complete setting of stone, its surface and surface of silicone with plastic patterns coated with separating medium. After that the upper part placed on the lower part completely filled with stone using vibrator and covered with its lid. After setting of stone, the flask opened and plastic disks removed.

**Proportioning and mixing of heat cure acrylic soft liner:** The liquid mixed with powder according to manufacturer direction (P/L ratio1.2g:1ml) in dry clean glass jar and covered with lid.

**Incorporation of aluminum potassium sulfate into soft liner:** The weighted amount of KAL(SO$_4$)$_2$ added to the soft liner monomer and mixed in clean dry glass jar using probe sonicator until become completely homogenous then soft liner powder added. Keeping in mind to subtract the weight of KAL (SO$_4$)$_2$ from weight of soft liner powder.

**Packing:** When the soft liner reach to dough stage, placed on mold space prepared in silicon and secured with polyethylene sheet then upper part placed on it and transferred to the hydraulic press to expel the excess soft liner. Then the flasks removed from press, opened then remove polyethylene sheet and excess soft liner. Then the flask closed and transferred to hydraulic press for 5 minutes under pressure (100g/cm$^2$) then clamping the flask.$^{(9)}$

**Curing and finishing:** The packed dental flask immersed in digital water path. Curing time according to the manufacturer’s instructions (70°C for 90 minutes then for 30minutes after temperature raising to 100°C) $^{(9)}$When curing cycle completed, the flask removed and allow to cool for 30 minutes then flask opened and specimens removed from their mold. The access soft liner material removed using sharp blade and finished by fine grit polishing silicon bur and fine grit sand paper then sterilized in autoclave.

**Isolation of Candida albicans:** Candida albicans was taken from the oral cavity of twenty patients come to the clinic of prosthodontics in college of dentistry seeking for treatment for their problem which was denture stomatitis with oral thrush.$^{(10)}$The oral lesion scrubbed gently by sterilized cotton swab then cultured in sabouraud dextrose agar medium $^{(11,12)}$ then placed in incubator at 37°C for 48 hrs.$^{(13)}$

**Identification of Candida albicans:**

- **Microscopical examination:** Few numbers of inoculum were taken from colony and placed on glass slide then adding drop of normal saline to form suspension. Then the suspension spread and allows drying on slide at room temperature then fixed by passing it on Bunsen burner flame for few seconds. The glass slide stained according to Gram’s Method$^{(14)}$.

- **Germ tube formation:** Take yeast cells from single colony and suspended in tube containing serum (0.5 ml). These tubes taken to incubator at temperature 37°C for 3hrs. When incubation period completed, a drop of this suspension taken and placed on glass slide. Then the slide examined under low power of magnification to see germ tube$^{(15)}$.

- **Biochemical Identification:** To confirm that the fungal isolated is *C. albicans*, analytical profile index (API) of candida system was utilized. Adding of 1-2 isolated and activated colonies to NaCl (0.85%) with turbidity about 3McFarland standard value(equal to 10$^6$ cell/ml) when candida suspension are prepared. The small tubules filled by this suspension of candida. Where these tubules immediately covered by mineral oil because some of the reactions are anaerobic. Then the API strip system transferred to incubator at 37°C for 24 hrs.

**Evaluating the effect of aluminum potassium sulfate on adherence of *C. albicans* to the soft-liner specimens:**

**Adherence test procedure:** *C. albicans* was diluted using NaCl (0.9), a suspension of 10$^7$ CFU ml (0.5 McFarland standards) was prepared by using a McFarland densitometer $^{(16)}$. Then the sterile soft lining specimens were deposited in sterile bottles containing 10ml of the prepared yeast suspension. Then the specimens incubated at room temperature for 1hour. Then the specimens removed and rinsed two time with phosphate buffered saline solution(PBS) for (1) minute,then the specimens dried by filter paper. The adhered cells fixed through using methanol then staining of specimens by crystal violet for (60) seconds. Then the specimens rinsed again with PBS for(30)seconds. After that drying of the specimens. Then the specimens examined with inverted light microscope $^{(17,18)}$.The adherent yeast cells calculated in three fields of view for each sample and the mean of these three fields was taken for each one specimen. The result expressed as (yeast cells/mm$^3$).
Results

Scanning electron microscope (SEM): SEM results of soft liner before and after the addition of 2% and 3% by wt. KAL(SO$_4$)$_2$ micro particles powder are shown in Figure 1.

Figure 1: Scanning electron microscope results: control group(A,B), 2% group of KAL(SO$_4$)$_2$ (C,D), 3% group of KAL(SO$_4$)$_2$ (E,F).

Test of Homogeneity of Variances: Before starting with ANOVA table multiple comparisons test, the variances of tested groups were analyzed by running the Levene’s test of homogeneity. According to primary analysis of data homogeneity, Games-Howell test was selected for multiple comparisons of incorporation part of candida adherence test while Boneferroni test was selected for multiple comparisons of immersion part of candida adherence test.

Evaluating the adherence ability of C. albicans (incorporation part): Evaluation of specimens’ groups where made by staining the specimens of each group with crystal violet and then examined under the inverted light microscope. The mean value of control group (38.4). The mean value of the first experimental group (incorporation of nystatin (1.4% by wt.) is (8), the mean value of second experimental incorporation group (0.01 of KAI (SO$_4$)$_2$) is (21), the mean value of third experimental incorporation group (0.02 of KAI (SO$_4$)$_2$) is (10) and the mean value of fourth experimental incorporation group(0.03 of KAI (SO$_4$)$_2$) is (8.2).

Comparison of the means of C. albicans adherence test results of the experimental groups using one-way ANOVA was highly significant (table 1).

Table 1: One-way ANOVA table

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>p. value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>3406.640</td>
<td>4</td>
<td>851.660</td>
<td>149.414</td>
<td>0.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>114.000</td>
<td>20</td>
<td>5.700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3520.640</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
To compare the mean values among all study groups, Games-Howell multiple comparison test was conducted. There was significant difference between all groups except the difference between nystatin group and 3% group which was non-significant (Table2).

Table 2: Games-Howell multiple comparison test:

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Difference (I-J)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4% nystatin</td>
<td>30.400*</td>
<td>0.001</td>
</tr>
<tr>
<td>1% KAl(SO₄)₂</td>
<td>17.400*</td>
<td>0.007</td>
</tr>
<tr>
<td>2% KAl(SO₄)₂</td>
<td>28.400*</td>
<td>0.001</td>
</tr>
<tr>
<td>3% KAl(SO₄)₂</td>
<td>30.200*</td>
<td>0.001</td>
</tr>
<tr>
<td>1.4% nystatin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% KAl(SO₄)₂</td>
<td>-13.000*</td>
<td>0.000</td>
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<tr>
<td>2% KAl(SO₄)₂</td>
<td>-2.000*</td>
<td>0.013</td>
</tr>
<tr>
<td>3% KAl(SO₄)₂</td>
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<td>0.993</td>
</tr>
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<td>1% KAl(SO₄)₂</td>
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</tr>
<tr>
<td>2% KAl(SO₄)₂</td>
<td>11.000*</td>
<td>0.000</td>
</tr>
<tr>
<td>3% KAl(SO₄)₂</td>
<td>12.800*</td>
<td>0.000</td>
</tr>
<tr>
<td>2% KAl(SO₄)₂</td>
<td>1.800*</td>
<td>0.039</td>
</tr>
</tbody>
</table>

Evaluating the adherence ability of *C. albicans* (immersion part): The evaluation of specimens’ groups where made after staining specimens with crystal violet and examined under the inverted light microscope. The mean value of control groups: 0/0 t/c group (0/0 time/concentration) is (10.8),10/0 group (10/0 time/concentration) is (15.8), 30/0 group is (22.2) and mean value of 60/0 is (23.2). The mean value of 5% immersion groups: 0/0.05 is (7.2), 10/0.05 is (3), 30/0.05 is (7.2) and the mean value of 60/0.05 is (8.2).The mean value of 10% immersion groups: 0/0.10 t/c is (2),10/0.10 is (1),30/0.10 is (4.8) and mean value of 60/0.10 is (7). The mean value of 15% immersion groups: 0/0.15 t/c is (7), 10/0.15 is (2.8),30/0.15 is (5) and mean value of 60/0.15 is (8.2).

Comparison of the means of *C. albicans* adherence test results of the experimental groups using one-way ANOVA was highly significant (Table 3).

Table 3: One-way ANOVA table:

<table>
<thead>
<tr>
<th>Groups</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adherence control</td>
<td>Between Groups</td>
<td>506.800</td>
<td>3</td>
<td>168.933</td>
<td>116.506</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>23.200</td>
<td>16</td>
<td>1.450</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>530.000</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adherence_0.05</td>
<td>Between Groups</td>
<td>80.400</td>
<td>3</td>
<td>26.800</td>
<td>41.231</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>10.400</td>
<td>16</td>
<td>.650</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>90.800</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adherence_0.10</td>
<td>Between Groups</td>
<td>111.400</td>
<td>3</td>
<td>37.133</td>
<td>87.373</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>6.800</td>
<td>16</td>
<td>.425</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>118.200</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adherence_0.15</td>
<td>Between Groups</td>
<td>84.150</td>
<td>3</td>
<td>28.050</td>
<td>46.750</td>
</tr>
<tr>
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<td>16</td>
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<td></td>
<td>Total</td>
<td>93.750</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To compare the mean values among all study groups, Bonferroni multiple comparison test was conducted. There was significant difference between all groups except the difference in control group between 30/0 and 60/0, in 5% immersion group between 0/0.05 and (30/0.05, 60/0.05) and 30/0.05 t/c with 60/0.05, the difference in 10% immersion group between 0/0.10 and 10/0.10 and finally in 15% immersion group between 0/0.15 and 60/0.15 which are non-significant (Table 4).

Table 4: Bonferroni multiple comparison test:

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Mean Difference (I-J)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0/0% t/c</td>
<td>-5.000*</td>
<td>.000</td>
</tr>
<tr>
<td>30/0% t/c</td>
<td>-11.400*</td>
<td>.000</td>
</tr>
<tr>
<td>60/0% t/c</td>
<td>-12.400*</td>
<td>.000</td>
</tr>
<tr>
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<td>.000</td>
</tr>
<tr>
<td>60/0% t/c</td>
<td>-7.400*</td>
<td>.000</td>
</tr>
<tr>
<td>30/0% t/c</td>
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<td>1.000</td>
</tr>
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</table>

Conted…

<table>
<thead>
<tr>
<th>5% concentration of KAl(SO₄)₂</th>
<th>0/5% t/c</th>
<th>10/5% t/c</th>
<th>4.200*</th>
<th>.000</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>60/5% t/c</td>
<td>-1.000</td>
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<td>.405</td>
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<td>10/5% t/c</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td>-4.200*</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>60/5% t/c</td>
<td>-5.200*</td>
<td></td>
<td>.000</td>
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<table>
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</thead>
<tbody>
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<td>.000</td>
</tr>
<tr>
<td></td>
<td>60/10% t/c</td>
<td>-5.000*</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>10/10% t/c</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30/10% t/c</td>
<td>-3.800*</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td></td>
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<td>-6.000*</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>30/10% t/c</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td>-2.200*</td>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>15% concentration of KAl(SO₄)₂</th>
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<th>10/15% t/c</th>
<th>4.200*</th>
<th>.000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30/15% t/c</td>
<td>2.000*</td>
<td></td>
<td>.005</td>
</tr>
<tr>
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<td>-1.200</td>
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<td>.157</td>
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<td>10/15% t/c</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30/15% t/c</td>
<td>-2.200*</td>
<td></td>
<td>.002</td>
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<td></td>
<td>60/15% t/c</td>
<td>-5.400*</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>30/15% t/c</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>60/15% t/c</td>
<td>-3.200*</td>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>

*: time in min./concentration of aluminum potassium sulphate (g/L)

Discussion

Application of soft lining materials became important for edentulous patients with removable dentures. These soft liners will act as a cushion between the resorbed ridge and the denture to absorb and distribute the applied occlusal forces. (19, 20, 21)

One of the highly important problems associated with the using of soft liners, the colonization of microorganisms on these liners especially C. albicans causing denture stomatitis. (22)

Many studies attempted to prevent colonization of fungi by incorporation of antifungal agents within the soft denture liner material itself and addition of nanoparticles. (23, 24)

In this study an effort was made to develop soft lining material with anti-fungal properties against C. albicans through addition of KAL (SO₄)₂ in to soft liner material.

From the statistical results of this performed study, there was highly significant reduction in the numbers of C. albicans cells that adhered on the soft lining material surface containing KAL(SO₄)₂ in comparison with the other control soft lining specimens.

Aluminum potassium sulfate is natural products have been used for centuries in treating human diseases and they contain components of therapeutic value. Natural products are environmentally safer, easily available, and cheap.

Alum is an effective solution for the removal of the smear layer when used as a final rinse. It does not significantly change the structure of the dentinal tubules. Studies are in progress to determine the efficacy of alum as a root canal irrigant with and without NaOCl for removing the smear layer and completely disinfecting the root canal system. (25)

Aqueous extract of KAL (SO₄)₂ were being good sources for the bioactive compounds that exhibited good antimicrobial properties. It was observed that the bacterial growth inhibition was increase when the alum concentrations increase. Since the body doesn’t absorb aluminum, alum could be considering as a harmless material and has a low toxicity in laboratory animals. (5)

Ethical Clearance: The researchers already have ethical clearance from college of Dentistry, University of Baghdad

Source of Funding: Self funding

Conflict of Interest: No conflict of interest
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21. Akin H, Tugut F, Mutaf B, Akin G, Ozdemir AK. Effect of different surface treatments on tensile


Nurse Feelings When Become a Member of Code Blue Team at Wava Husada Hospital Kepanjen, Malang

Annisa Rahmania¹, Indah Winarni², Septi Dewi Rachmawati²
¹Master of Nursing Student, Department of Emergency, ²Lecturers of Nursing Masters in the Faculty of Medicine, University of Brawijaya

ABSTRACT

Background: Code blue is an emergency management that is used to provide information when patients experience cardiac arrest and respiratory arrest in the hospital. The code blue system consists of a team that is a collection of certified doctors and nurses who are assigned to handle cases of the emergency. But sometimes in the process of implementing the code blue system, the Code Blue team encountered several problems. The aim of this study was to explore the feelings of nurses when joining a member of the Code Blue team.

Method: This study was a qualitative study with an interpretive phenomenology approach. Participants in this study were 8 nurses selected using purposive sampling technique with inclusion criteria are they were nurses who had been members of the code blue team for ± 2 years, had attended ACLS training, were willing to become participants by signing the informed consent. This research was conducted in March 2019 at Wava Husada Hospital. The method used in this study is in-depth interviews supported by a semistructured and open-ended question guide.

Results: The results of this study obtained 4 themes, that were: 1) felt confused when they got a code blue for the first time; 2) faced two choices of tasks; 3) felt useful to others; 4) felt sorry and sad when the patient passed away. Nurses felt confused when getting a code blue call. This is related to those who did not have the experience to work on a team. They not only feel confused but are also faced with two job choices. That sometimes makes them feel like a dilemma. In addition, they also sometimes felt sorry and sad when the patients they helped cannot be saved and continued to stay alive. But behind the confusion and dilemma, they also felt useful because they can help others.

Conclusion: Taking a part as a code blue nurse was not an easy. There was big responsibility that they must embrace besides being a health care provider in their respective service units. This is what caused joy to become a nurse in the code blue team

Keywords: nurses feelings, code blue team

Introduction

Cardiac arrest is a condition when the heart loses its function suddenly, unpredictable time, and can occur in someone with a history of heart disease or not ¹. Cardiac arrest causes 17,668 deaths in the United States². The incidence of cardiac arrest that occurred in the hospital was 209,000 events³,⁴ and most occurred in the ward and not monitored⁵. Cardiac arrest can cause brain death and permanent death when initial treatment is not immediately performed or treatment is delayed＞5 minutes from the occurrence of cardiac arrest⁶. Handling that can be done on someone with cardiac
arrest is to provide basic life assistance in the form of pulmonary heart resuscitation. Resuscitation is the act of putting pressure on the heart and artificial breath to someone who has stopped breathing and cardiac arrest. The hospital emergency code is a code that is used throughout the world that aims to convey information quickly, especially information relating to emergency conditions. This code is often referred to as code blue.

Code blue is emergency management that is used as a means of communication when there are patients who need immediate medical treatment related to breathing and cardiac arrest, such as resuscitation. The code blue system consists of a team formed specifically to handle patients with emergency conditions. This team is called the code blue team which is a collection of several health workers consisting of certified doctors and nurses who are required to be able to provide treatment to patients with emergency conditions, but sometimes in the process of implementing the blue code system, the Code Blue team encountered several problems.

The results of the preliminary study interviews with code blue nurses at Wava Husada Hospital found that nurses who were the code blue team were nurses who also worked in a service unit. When conditions in one service unit are many patients, not all code blue personnel can be present when code blue is activated. This sometimes puts them between two difficult choices. The aim of this research to explore the feeling of nurses in the scope of emergency services in the Code Blue system has not been done much, so further research is needed on this matter.

Method

This research was qualitative with interpretive phenomenology approach. Participants in this study obtained 8 nurses who were selected using a purposive sampling technique with inclusion criteria: nurses who had been members of the code blue team for ± 2 years, had participated in ACLS training, were willing to become participants by signing informed consent. This research was conducted in March 2019 at Wava Husada Hospital. The method used in this study was in-depth interviews supported by a semistructured and open-ended question guide. Data analysis was performed using Interpretative Phenomenology Analysis (IPA), that were: reading and re-reading, initial noting, developing emergent themes, searching for connections across emergent themes, moving the next cases, looking for patterns across cases.

Findings and Discussion

Analysis of the data from the interviews conducted to 8 participants related to their experience as a code blue team, 4 themes were found:

**Theme 1: Feeling confused when they got code blue for the first time**

This theme illustrates that when they got a code blue for the first time, the nurse feels confused to respond to the call. This is in accordance with the following participant statement:

“That thing, that was making me confused, because it takes time so long and there is a lot of simulation, so that how it is. Because it was my first time so I was confused, it was like “what I have to do?” and then which way that I should take to go to that room (laughing) because I was extremely panic (P1)

“When I was the first time doing my “code blue”, it was so nervous, afraid, and panic for real. I have known enough the theory before, but when we exactly do it when the patient is in front of us which is it was my first time I was so panic and confused what else that I could do even though the patient already stable, but finally, we are getting used to it. (P7)”

The participant’s statements show that when they got the first code blue they felt confused and panic. They did not know their roles and duties because they had never been a member of the code blue team even though they knew the theory.

This confusion and panic emerged because they did not have the experience of being on the previous code blue team. The experience intended is the experience of working in a system that is systemized. This made them not aware of their respective roles and duties when there was a code blue call for the first time. This is in accordance with the statement delivered by Patricia Benner which states that “experience-based skills mastery is safer and faster when relying on a strong educational basis”.

This implies that the more the experience of a nurse is supported by a high level of education, the more skilled the nurse will be in carrying out nursing actions. When a nurse is more skilled in carrying out nursing actions, his response will be good in dealing with a condition.
Theme 2: Faced two choices

This theme illustrates that participants are sometimes between two choices of tasks that are just as important when there is a code blue call. This is in accordance with the following participant statement:

“Yes, of course, I was confused because it was still crowded and there is a lot to do around here. When the hospital ward still crowded, there are three of us who in duty and then there is a code blue signal, there is no option except we have to go save someone!” (P2)

“When we have spare time like now, if there is a code blue signal, of course, we will help the others to help and lighten our friend’s burden at the hospital ward. The hectic moment was when there is a patient with cardiac arrest, that will be definitely a very confusing moment, at that moment we really want to help them with pleasure. But sometimes at a code blue moment take some times, 30 minutes maximum. Meanwhile, there are the others patient that have a plan to move to ICU room, the rest of our friends at the ICU have to well prepared, at the other side if we got a lot of patient like this, they have to handle my patient as well. How pity they were... so, if our friends are the type of “yes man/yes woman”, automatically they also handled our patient as well, that’s how the situation is. Then if in one shift there are 3 code blue signal, how long has it been?” (P5)

The participant’s statements above show that when there was a code blue call that coincided with the many patients in the room, they felt confused. In essence, when there is a code blue call, they are happy because they can help friends in the room but it will be a problem when the situation in the service unit is a lot of patients. They feel confused to choose, besides wanting to help nurses’ friends who are in the room, they also feel hard to leave the responsibility in the service unit, therefore they feel they are on two choices that are equally important.

The nurses who were the participants in this study not only served as blue code nurses but also became executive nurses in each of the three different emergency units. Difficulties arise when the code blue call occurs together with the condition of their unit that has many patients. This makes nurses sometimes confused in choosing choices that must be fulfilled. This is consistent with Utkualp’s statement in his study which revealed that nurses working in intensive units faced more ethical dilemmas than nurses who worked in ordinary care units. This relates to the agreement, sharing resources fairly, and deciding responsibilities.

Theme 3: Feel useful for others

This theme illustrates that since becoming a nurse of Code Blue they feel they are useful people. This is in accordance with the following participant statement:

“When I first time joining, it was felt like happy, proud of my self, yeah, as simple as that, because at least we can help our friends at the hospital ward that still have many things to do with their own problems that may still haven’t settled yet” (P2).

“My first feeling was like “oh, at code blue team would be great!”. I felt happy because I can teach to other people about these things, to them at the hospital wards, tell them which one is right and which one is wrong, which one is good and which one is bad. And also we can help to lighten their (nurses) responsibility, right?” (P3)

The participants’ statements above show that participants feel happy because they can be useful for others. They are happy to be able to make easier the duties of other nurses, especially room nurses and feel their own satisfaction when they can help save patients.

The results of research conducted by Sneltvedt & Bondas (2015) reveal that the most important source of pride for a nurse is the relationship with the patient and recognition from the practice community. This is in accordance with the sub-theme feeling useful to others. The blue code nurse feels happy to be able to help others. They feel happy when they can help in the process of saving patients with cardiac arrest, especially if the patient can be saved. This feeling of being happy is not only felt by the patient but also by other nurse friends. They feel happy when they can help ease the work of nurse friends in the ward.

Theme 4: Feeling sorry and sad when the patient dies

This theme illustrates that code blue nurses feel regret and sadness when patients fail to be saved. This is implied in the following participant statement:
“Feeling sad? Yes of course. Because of feeling fail, feels like “why I can’t help, can’t keep the patient alive and become better again” it was like that” (P1)

“Feels very sorry, because everything that we want when we got patient with really bad condition we just wanna be like “come on dude, be alive!” with our big hope that our patient can stay alive. It made me sad and cry at last..... Even though at that moment, it wasn’t us that do the surgery when I help him, I saw that person was really healthy with good condition comparing now, I feel the heavy burden after that. I wish I could have the power to give him a soul and then make him alive again (Participant crying).....” (P7)

“If we did that (CPR) and the patient finally passed away ... I felt like my body was so fatigue or maybe I was the one who was so touched, too, what do you want ... all was a totality, I was so sorry, that was it” (P7)

The participants’ statements above show that participants feel regret when the patient cannot be saved. They hope the patients can survive. One participant likens if the patient’s life can be returned he will get it so that the patient can stay alive.

The feeling of regret that they feel arises because sometimes the expected results do not match the reality. Nurses really hope patients can stay alive after the rescue process but the results are different. Regret is a natural consequence that cannot be avoided in clinical practice. Regret is an emotion experienced by someone when he believes that the situation he is experiencing will be better if someone behaves differently. Although the code blue nurse felt sad and sorry if the patient could not be saved, the feeling of sadness and regret did not affect the psychological condition of the nurses. Nurses can still do their daily tasks smoothly, both as code blue nurses and as nurses in the service unit. This implies that the regret they feel has no effect on their condition. They regret but accept reality.

**Conclusion**

Being a member of code blue team is not an easy eventhough in making emergency handling of cardiac arrest at Wava Husada Hospital is not new thing to them. Many things they experience and feel as long as they become a nurse of a code blue. Starting from the feeling of confusion and panic they feel when there is a code blue call, faced with two choices of tasks, feel useful for others, feel sorry and sad if the patient dies. Things like that that they feel as up and down moment when joining into the code blue team.

**Conflict of Interest:** There is no conflict of interest in this study.

**Source of Funding:** None

**Ethical Clearance:** This research has obtained the approval and ethical feasibility of the Health Research Ethics Commission, Faculty of Medicine, Brawijaya University Malang with number 64/EC/KEPK - S2/02/2019.

**REFERENCES**


Determination of CXCL12 Serum Levels in Breast Cancer Women

Arkan H. Frayyeh¹, Ehab D. Salman¹, Alice K. Melconian¹
¹Biotechnology Department, College of Sciences, University of Baghdad, Iraq

ABSTRACT

Breast cancer is a disease that can be described as malignant cells from the breast tissues. Immune deregulation has been postulated to be one of the mechanisms underlying the pathogenesis of breast cancer. The current study is planned to shed light on the following profiles and identify the relationships serum levels of CXCL12 among obesity postmenopausal, and Breast cancer. This study hypothesized that CXCL12 levels would have a link with breast cancer patients. The serum CXCL12 level was measured by enzyme-linked immunosorbent assay (ELISA) in breast cancer patients (n=60) and healthy controls (n=61). The observations indicate a significant increase (P ≤0.05) in breast cancer patient’s serum level of CXCL12 compared with healthy control. The study also presented a significant difference among age and Body Mass Index (BMI) between patients and control groups. The results supported that the immune disturbance is related to breast cancer patients and might play an important role in the pathophysiology of breast cancer.

Keywords: Breast cancer; Chemokines; obesity; postmenopausal

Introduction

Breast cancer is the most prevalent cancer in women worldwide, and it remains the most common cause of death in females ¹. In Iraq, it ranks as the first among the population accounting for about 19% of all newly diagnosed cancers and 34.4% of the recorded women cancers with an incidence rate approximating 23/100,000 female population ². Risk factors for breast cancer include female sex, older age, genetics, lack of childbearing or lack of breastfeeding, higher levels of estrogens, certain dietary patterns, exposure to radiation, Tobacco smoking, positive family history of breast cancer and obesity ³. Among postmenopausal women, the BMI at diagnosis was positively associated with the risk of breast cancer ⁴. Chemokines play an essential function in the organization of a different cellular, physiological, and developmental processes. Their aberrant expression can lead to a variety of human diseases, including cancer ⁵. Approximately 50 chemokine ligands and 20 chemokine receptors have been recognized in humans ⁶. This system of molecules shows an indistinctive network, in which chemokine receptors interact with various chemokines with inconstant affinities and multiple chemokines link to the same receptor ⁷. The chemokine receptor (CXCL12) is one of two important factors in the cross-talking between tumor cells and their micro-environment regulating diverse processes in cancer including Epithelial Mesenchymal Transition (EMT), invasion, angiogenesis and metastasis ⁸,⁹.

Patients and Method

This study carried out by two groups of subjects that enrolled during the period of March 2017 - June 2018. The first included 60 cases of breast cancer with an age range of 21-72 years. For the purpose of comparison, 61 age and gender matched cases were enrolled as control of healthy individuals. From each participating subject, a venous blood sample (3 ml) was obtained. The serum obtained by putting the blood samples in a clean, dry plain plastic tube and allowed to clot at room temperature (20-25 C) for 15 minutes before centrifugation. The tubes centrifuged at 5000 rpm for
5 minutes; serum was collected and kept in the freezer until used. The laboratory methods included assessment of serum for CXCL12 was determined by enzyme-linked immunosorbent assay (ELISA) method.

**Assessment of Serum Level of CXCL12:** This was prepared according to the company instructions (Elabscience; USA).

The data were calculated for the Body Mass Index is a simple calculation using a person’s height and weight. The formula is BMI = kg/m$^2$ where kg is a person’s weight in kilograms and m$^2$ is their height in meters squared. BMI has 5 classifications as: Underweight: BMI is less than 18.5, Healthy weight: 18.5 to 24.9, Overweight: 25 to 29.9, and Obese: when it is 30 or higher.

**Statistical Analysis:** All data were analysis using SPSS version 21. One-way analysis of variance was used for parametric data while the Kruskal Wallis test was used for non-parametric data.

**Results and Discussion**

For the calculation and comparison of results, the Mean ± SD was used to illustrate the relationship between the control and patient’s groups as in table 1.

<table>
<thead>
<tr>
<th>Sample size</th>
<th>Mean ± SD</th>
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<tbody>
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</tr>
<tr>
<td>Control</td>
<td>26.38 ± 4.393</td>
<td>25.25</td>
</tr>
<tr>
<td>Patients</td>
<td>29.23 ± 5.649</td>
<td>27.77</td>
</tr>
<tr>
<td>Total</td>
<td>27.79 ± 5.233</td>
<td>26.85</td>
</tr>
</tbody>
</table>

The differences between groups were tested by one-way analysis of variance, and the data shows that there is a significance difference ($P \leq 0.002$) between control and patients groups.

The BMI within patients group was statistically significant compared with the control as in Fig. 1. This is supporting for the investigators who reported a modest, but not statistically significant, increased risk of invasive breast cancer among the overweight and obese postmenopausal women from both trials. These results also are matching the observational evidence showing stronger positive associations of obesity with postmenopausal breast cancer risk (Neuhouser *et al.*, 2015).

![Fig. 1: Means of BMI comparison between patient and control groups](image-url)
The following graphic Fig.2 shows the relationship between BMI categories according to nonparametric calculations. It shows that the increasing in weight is getting increased straight line among patients group compared with the control group, which indicates that the BMI increased in Breast tumors.

![Fig. 2: Mean plot between groups and Body Mass Index](image)

Females who were overweight had an increased incident frequency of breast cancer risk relative to normal weight. Females at middle-aged 40-50 years are undergoing the condition of postmenopausal depressions, which is associated with obesity, lower physical activity, and higher caloric intake. The diagram shows that the obesity scale represents a significant difference (P≤0.05) among patient’s groups and healthy individuals. Obesity is associated both with a higher risk of developing breast cancer, particularly in postmenopausal women and with worse disease outcome for women of all ages. It worth to be noticed that a positive association of BMI with breast cancer risk was seen in postmenopausal women, in which women aged 40-50 and above years (Munsell et al., 2014). In the bone marrow, CXCL12 is mainly produced by osteoblasts lining the bone endosteum (Neiva et al., 2005). The current study aims to shed light on the serum levels of CXCL12 in the samples of patients groups and healthy females. The results revealed that the concentration of CXCL12 has significantly increased in patients group compared with control as mean was 5.09 (Fig. 3).

![Fig. 3: Mean concentration of CXCL12 for patients and control groups](image)
The cross analysis showed that the CXCL12 means reflected significant differences in accordance with obesity indicator of the patient’s group. Distributing the patients into age groups revealed that breast cancer group were clustered at the age group ≥ 50 years (70.0%) for CXCL12; this cluster was observed at the first quarter of the age range 40-49 years (70.0%) if it compared with other groups like 30-39.

The concentration of CXCL12 serum level has recognized also a significant increase with the developing of age for both groups, where it showed high increasing at 50> years old with a confidence interval (CI) of error: 95% as described in Fig. 5.

![Fig. 4: Mean CXCL12 ng/ml concentration with age of patients groups](image)

These results are matching the previous reports stated that CXCL12 is displaying angiogenic properties (Lazennec and Richmond, 2010). Orimo et al. (2005) illustrated that elevated levels of CXCL12 expressed by cancer cells and tumor-associated stromal cells directly stimulated the proliferation and invasiveness of breast cancer cells in an autocrine and paracrine manner (Domanska et al., 2013).

The quantitative data of CXCL12 concentration, mean, and median have been analyzed statistically. Means between groups were compared using Kurskal-Wallis test showed that the Mean Ranks of CXCL12 is significantly increased among patient groups.

The Kruskal-Wallis revealed a significant increase in the Mean of patients group compared with control (table 4). As it matched the results of Saski et al. and Wang et al. as they both shown that CXCL12 might be expressed also in many tumor cells (Sasaki et al., 2009; Wang et al., 2009). Therefore, there was increasing evidence that CXCL12 plays an important role in many steps of tumor progression, such as invasion, migration, and proliferation of malignant cells (Łukaszewicz-Zajac et al., 2016). In the current study, all indicators were analyzed in unified graphics to measure the interactions of CXCL12, age, and obesity on breast cancer women and compare it with the control group.

The following graphic (Fig.6) illustrates that CXCL12 concentrations showed high levels in Breast cancer of patients who have BMI≥ 40 and at the age of 40-50 as postmenopausal females. The mean of CXCL12 in this category was 8.4.

![Fig. 5: The concentrations of CXCL12 ng/ml elevated levels of patients’ serum related to the developing of age and BMI](image)
It is obviously showing that CXCL12 levels in breast cancer were significantly higher in postmenopausal and these findings matched the study of Neuhrbouser et al. (2015) stated that females who were overweight and obese had an increased invasive breast cancer risk compared with normal weight women. The risk was greatest for obesity grades 2+3 (BMI>35.0 kg/m2) (hazard ratio [HR] for invasive breast cancer =1.58, 95% CI 1.40–1.79) (Neuhrbouser et al., 2015). On the other hand, these results do not correspond with the research of Berstad et al. (2011) which indicates that Among women at age 35-64, BMI at age 18 is inversely associated with risk of breast cancer, but association with recent BMI varies by menopause status, race and hormone receptor status (Berstad et al., 2011). Arendt et al. (2013) found that interactions between adipocytes and macrophages via an IL-1β/CCL2/CXCL12 signaling nexus promote breast cancer angiogenesis and progression under obesity (Arendt et al., 2013).

These findings should be interpreted with caution because of the sample size, but it can be justified because the cases were randomly selected. Furthermore, it has been established in most of the regional studies that breast cancer is recorded at the approximation of the age of 50 years. Studies showed that Arab countries, almost half of woman with breast cancer are below the age of 50 years or even below 40 years compared to more than 65 years in developed countries (El-Attar, 2005). Furthermore, large studies conducted both in the US and Europe have demonstrated that obesity and weight gain increase breast cancer risk among postmenopausal women (Dumitrescu and Cotarla, 2005). A recent meta-analysis of 25 studies found that obesity increased the risk of developing breast cancer in a non-linear dose-response in postmenopausal breast cancer (Xia et al., 2014). One possible link between obesity and the increased incidence of ER+ breast cancer in postmenopausal women is the elevated level of circulating estrogens from increased aromatization of androgens in adipose tissue (Lorincz and Sukumar, 2006). Also, some recent studies have indicated that circulating estrogens may protect against the development of breast cancer in obese women (Suba, 2013).

**CXCL12 Signaling:** CXCL12 can improve the multiplication, survival, and infestation of cancer cells. It has been appeared to assume a significant part in the managing of breast’s metastasis and growth to explicit organs. High CXCL12 expression also corresponded to poor clinical results. An elevated level of CXCL12, allowing tumor cells to directionally migrate to attack organs via a CXCL12-CXCR4 chemotactic inclination. CXCL12 binding to CXCR4 initiates various downstream signaling pathways that result in a plethora of responses such as an increase in intracellular calcium, gene transcription, chemotaxis, cell survival, and proliferation. Chemokine receptors are pertussis toxin-sensitive GTP-binding proteins of Gi type. After chemokine binding, the heterotrimeric G protein is activated by the exchange of GDP for GTP and dissociates into the GTP-bound α and the βγ subunits. The CXCL12-CXCR4 signaling pathway has been recognized as having a very critical role in the retention and homing of hematopoietic stem cells in the bone marrow microenvironment and lymphocyte trafficking. It has also been implicated in the maintenance of the secondary lymphoid structure. CXCL12 has been found to be expressed constitutively in several organs, including the lungs, liver, bone marrow, skeletal muscle, kidney, brain…etc. Interestingly, the organs which exhibit an enhanced secretion of CXCL12 are also the most common secondary metastatic sites of breast cancer. This observation has further highlighted the important role played by the CXCL12-CXCR4 signaling axis in breast cancer metastasis.

**Conclusion**

Obesity is associated with increased invasive breast cancer risk in postmenopausal women. These clinically meaningful findings of the increased level of CXCL12 among overweight postmenopausal breast cancer women should motivate programs for obesity prevention.

**Conflict of Interest:** The author declares no conflict of interest.

**Source of Funding:** This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Ethical Clearance:** Taken from Biotechnology Department, College of Sciences Ethical committee.

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Relationship of Gestational Age, Folic Acid Intake and Haemoglobin Level of Third-Trimester Pregnancy with Infant Birth Weight in Ende Regency, East Nusa Tenggara Province, Indonesia

Asmulyati Saleh1, Harsono Salimo2, Endang Sutisna Sulaeman3
1Nutrition Postgraduate Student, Sebelas Maret University, Indonesia, 2Paediatrics of Faculty of Medicine, Sebelas Maret University/Dr. Moewardi Public Hospital, Indonesia, 3Faculty of Medicine, Lecturer, Sebelas Maret University, Indonesia

ABSTRACT

LBW (Low Birth Weight) incidence is one of the health problems in Indonesia that still has to be handled properly. This can occur due to several factors, some of which are gestational age, folic acid intake and the Hb level of third-trimester pregnancy. LBW can cause several health problems in infants such as infectious diseases, respiratory problems, central nervous system disorders, and mortality risk. This research is aimed at analysing the relationship of gestational age, folic acid intake and the Hb level of third-trimester pregnancy with infant birth weight in the operational area of Ende Health Centre in East Nusa Tenggara. This research used a cohort design from January to March 2019 with a sample size of 109 respondents selected by using purposive sampling system. The instruments used were the questionnaire sheets about mother and infant characteristics and SQ-FFQ sheets to interview pregnancy consumption patterns. The data were analysed using chi square test. Based on the statistical test, there is a relationship of gestational age (p-value = 0.001), folic acid intake (p-value = 0.000) and haemoglobin level of third-trimester (p-value = 0.000) with infant birth weight in the Ende Health Centre of East Nusa Tenggara. The gestational age classified as not at risk for giving birth to LBW babies is > 38 weeks of gestational age. The folic acid intake considered not at risk for giving birth to LBW babies is > 600 mg. Then, the Hb level of third-trimester pregnancy which are not at risk for giving birth to LBW babies is > 11 g/dl.

Keywords: LBW, gestational age, folic acid, haemoglobin, pregnancy

Introduction

Low birth weight, known as LBW, is one of the health problems that can still be found in Indonesia. LBW is a condition in which a newborn baby has a weight of < 2,500 grams1. LBW incidents can occur due to several factors such as anaemia, nutritional status of pregnant women, and increased body weight during pregnancy2. Another factor that can also affect infant birth weight is the mother’s age when she is pregnant. Infant birth weight can be categorized into three, namely low birth weight weighing < 2,500 grams, normal birth weight weighing 2,500-3,999 grams, and high birth weight weighing ≥ 4,000 grams3.

The prevalence of LBW that could be found in Indonesia in 2013 was 10.2%, where one of the provinces with a high prevalence of LBW was East Nusa Tenggara with a prevalence of 15%1. One of the regencies with a high prevalence of LBW in East Nusa Tenggara in 2017 was Ende Regency of 13.5%. This percentage has increased considerably from the previous year where the percentage of LBW incidence found in the operational area of Ende Health Centre was 12.1%4. The percentage...
of LBW incidence in Ende regency in 2015 was 9.5%, 12.1% in 2016, and 13.5% in 2017.

Low birth weight in infants can cause health problems for them in the future because they have a high risk of mortality and morbidity. LBW is caused by several factors, one of which is lack of nutrition during pregnancy.

Maternal nutritional needs during pregnancy are influenced by the amount of macronutrient and micronutrient intake. There are several micronutrients that have a relationship with the infant birth weight such as folic acid. Pregnant women need the folic acid of 600 µg per day. Folic acid consumption is useful to prevent congenital birth defects.

Nutritional needs during pregnancy will increase by 15% compared to the needs of normal women. The increase in energy and nutrients is needed for fetal growth and development, increase in the content of the uterus, changes in the composition and metabolism of the mother’s body, volume of blood, placenta, and amniotic fluid. Food consumed by pregnant women will be used for fetal growth by 40% and the rest (60%) is used for the metabolism of the mother.

Another factor associated with infant birth weight is gestational age. Gestational age or pregnancy age is the time needed by the mother during conception until giving birth. Another factor also related to infant birth weight is the mother’s haemoglobin level during the third-trimester pregnancy. Anaemia is a condition where the circulation of red blood cells decreases from the normal level where pregnant women classified as anaemia have the Hb level of < 11 g/dl.

This research aimed to analyse the relationship of gestational age, folic acid intake and the haemoglobin level of third-trimester pregnancy with infant birth weight in Ende Regency, East Nusa Tenggara Province.

Material and Method

This research employed an observational analytic quantitative approach with cohort design. It was conducted in Ende Regency from January to March 2019. The research samples were 109 third-trimester pregnant women. The technique was purposive sampling. The inclusion criteria are third-trimester pregnant women who remained permanently in Ende regency area, had MCH books, experienced term and preterm labour, and were willing to be the research subjects. The exclusion criteria are pregnant women who are hospitalized because of congenital diseases before pregnancy and pregnant women with hyperemesis. The independent variables are the folic acid intake and haemoglobin level of third-trimester pregnant women while the dependent variable is the incidence of low-birth weight infants. The data were collected by the interview technique based on the SQ-FFQ, form recall questionnaires, and the scale scale.

The characteristics of mothers and infants taken in this research are maternal age, gestational age, folic acid intake, haemoglobin level, and infant birth weight. The types of data taken in the research are primary data and secondary data. Primary data taken are gestational age, folic acid intake, and infant birth weight while the secondary data are maternal age and haemoglobin level. The data were then analysed using the chi-square test with a significance value of p value < 0.05.

Findings

<table>
<thead>
<tr>
<th>Table 1: Distribution of Maternal and Infant Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respondent Characteristics</strong></td>
</tr>
<tr>
<td><strong>Age (year)</strong></td>
</tr>
<tr>
<td>&gt; 20</td>
</tr>
<tr>
<td>20 – 35</td>
</tr>
<tr>
<td>&gt; 35</td>
</tr>
<tr>
<td><strong>Gestational Age (week)</strong></td>
</tr>
<tr>
<td>&gt; 38</td>
</tr>
<tr>
<td>38 – 42</td>
</tr>
<tr>
<td>&gt; 42</td>
</tr>
<tr>
<td><strong>Haemoglobin Level of Third-Trimester Pregnancy (g/dl)</strong></td>
</tr>
<tr>
<td>&gt; 11</td>
</tr>
<tr>
<td>&lt; 11</td>
</tr>
<tr>
<td><strong>Folic Acid Intake (mg)</strong></td>
</tr>
<tr>
<td>&lt; 600</td>
</tr>
<tr>
<td>&gt; 600</td>
</tr>
<tr>
<td><strong>Infant Birth Weight</strong></td>
</tr>
<tr>
<td>LBW</td>
</tr>
<tr>
<td>NBW</td>
</tr>
</tbody>
</table>
Table 2: Relationship between Gestational Age, Haemoglobin Level, Folic Acid intake and Infant Birth Weight

<table>
<thead>
<tr>
<th>Variable</th>
<th>LBW</th>
<th>NBW</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infant Birth Weight (gram)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>n</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>%</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gestational Age (week)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early (&lt; 38)</td>
<td>30</td>
<td>27.5</td>
<td>20</td>
</tr>
<tr>
<td>Full (38 - 42)</td>
<td>0</td>
<td>0</td>
<td>59</td>
</tr>
<tr>
<td><strong>Haemoglobin Level (g/dl)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anaemia (&lt; 11)</td>
<td>26</td>
<td>23.8</td>
<td>9</td>
</tr>
<tr>
<td>Not Anaemia (&gt; 11)</td>
<td>4</td>
<td>3.7</td>
<td>70</td>
</tr>
<tr>
<td><strong>Folic Acid Intake (mg)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less (&lt; 600)</td>
<td>26</td>
<td>23.8</td>
<td>9</td>
</tr>
<tr>
<td>Enough (&gt; 600)</td>
<td>4</td>
<td>3.7</td>
<td>70</td>
</tr>
</tbody>
</table>

**Discussion**

The results of the distribution of maternal and infant characteristics in this research can be seen in Table 1, which shows that most respondents are 20-35 years old with a total of 82 mothers or 75.2% of the total respondents. 2 respondents are classified as at the risk age of < 20 years and > 35 years and 25 respondents of 1.8% and 23%, respectively. This indicates that most mothers are classified as having a reproductive age that is safe and reduces the risk of abnormal birth weight. Pregnant women aged < 20 years have a greater risk of giving birth to premature and LBW babies, experiencing bleeding during intercourse, and death for both the mother and fetus compared to those aged between 20-35 years10. Pregnant women aged > 35 years are also considered at a risky age because they are more likely to give birth to babies with genetic disorders11.

Based on Table 1, it is known that most of mothers have a relatively full gestational age, ranging from 38-42 weeks with 89 respondents or 81.7%. The second highest number is in mothers with early gestational age of <38 weeks with a total of 20 respondents or 18.3%. This indicates that most mothers give birth at full gestational age and have a lower risk of giving birth to LBW babies. Premature birth or birth with < 38 weeks of gestational age is the birth of a baby that can occur due to one of the factors, namely a growth disorder during the pregnancy12. The distribution of folic acid intake in the third trimester is mostly adequate of > 600 mg similar to the distribution of the haemoglobin level of third-trimester pregnancy of the research respondents, most of whom did not experience anaemia with the Hb level of > 11 mg/dl. The number of respondents who did not experience anaemia is 41 or 68.33%. This indicates that most mothers do not experience anaemia during their pregnancy.

Based on the interview results of consumption patterns during pregnancy, it is known that most mothers consume only a few types of food ingredients as recommended, namely staple foods, vegetable side dishes, milk, and supplements. Most respondents said that they consume animal dishes such as chicken, eggs, and sea fish only 2-3 times a week. Consumption of blood-pressure tablets considered less can occur because most mothers forget to consume and do not understand the use of added blood tablets for pregnant women. Consumption of meat and blood-added tablets is not really able to influence the Hb level during pregnancy due to their association with the anaemia incidence. Most iron sources come from animals such as chicken, beef, and so on13.

Based on Table 2, it is known that there are 59 infants, 54.13% of the total respondents, with normal birth weight and full gestational age. The number of infants with LBW is 30 or 27.5%, all of whom were born with early gestational age. Based on the statistical test, the value of p is 0.001 where the value of p is <α = 0.05, which means that there is a relationship between gestational age and infant birth weight. This is in accordance with the research conducted by Sulityorini where mothers with gestational age less than 38 weeks had a risk of giving birth to LBW babies 2,204 times greater than those with gestational age more than 38 weeks14.
Early gestational age can occur due to maternal age and nutritional status during pregnancy. The age of mothers who are classified as at risk has a problem with pregnancy is the age of less than 20 years and more than 35 years. The research conducted by Mendez et al. in 2015 wrote that mothers of 20 years old and more than 35 years old gave birth to babies at early gestational age far more than those between 20-35 years old. 

Most babies are born with normal birth weight from mothers who do not experience anaemia during pregnancy. The number is 70 or 64.2%. The number of infants that can be found with LBW born to mothers who have anaemia is 26 or 23.8%. Based on the statistical test, the value of \( p \) is 0.00 where \( p < \alpha = 0.05 \), which means there is a relationship between the Hb level of the third-trimester pregnancy and infant birth weight. This is in accordance with the research conducted by Choirunnisa, which an association between the anaemia incidence in pregnant women and infant birth weight. The incidence of anaemia and Hb level during pregnancy has a role in fetal growth, where Hb level of <11 g/dl during pregnancy can cause fetal growth retardation in the womb. 

Most babies are born with normal birth weight from mothers with adequate intake of folic acid. The number is 70 or 64.2%. The number of babies found with LBW from mothers with less folic acid intake is 26 or 23.8%. Based on the statistical test, the value of \( p \) is 0.00 where \( p < \alpha = 0.05 \). It means that there is a relationship between folic acid intake in the third-trimester pregnancy and infant birth weight. This is in accordance with the cross-sectional research that folic acid intake of pregnant women affects the baby’s anthropometry, namely birth weight and birth length. Folate deficiency during pregnancy can be a risk factor for fetal malformations and various placental-related diseases. This result is similar to the research result of the lack of folic acid intake during pregnancy that will affect infant birth weight.

**Conclusion**

There is a relationship between gestational age, folic acid intake, and the haemoglobin level of third-trimester pregnancy in the operational area of Ende Health Enter. The action that can be done to prevent the occurrence of early gestational age, folic acid intake, and anaemia during pregnancy is to improve nutritional status before pregnancy. Premature nutritional status that is classified as abnormal can increase the risk of LBW birth. The action that can be taken is to increase food consumption to be balanced and diverse. Giving education about the age safe for pregnancy also needs to be provided by the health centre midwives to teenagers to avoid pregnancy at the age of mothers who are at risk of giving birth to LBW babies.

**Conflict of Interest:** There is no conflict of interest in this research.

**Source of Funding:** This research was self-funded by the authors.

**Ethical Clearance:** The ethical clearance of this research was taken from the Etiquette of Medical Faculty of Sebelas Maret University, Indonesia.

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Effect of *Lactobacillus* on the Small Intestinal Mucosa Measurement of Healthy Broilers Chicken Under Heat Stress Condition

Balqees H. Ali

*College of Veterinary Medicine, University of Baghdad, Iraq*

**ABSTRACT**

**Objective:** The present study was conducted to investigate the effect of lactobacillus bacteria on the intestinal mucosa morphology in broiler chicks under stressful environmental conditions.

**Materials and Method:** For this study, 180 broiler chicks (day-old) were randomly divided in to 2 rooms (90 chicks for each room were separated to 3 group), each group contains 30 chicks). The first room was exposed to heat stress (38-40°C) on 3 weeks old for a period of 10 days 3 hours daily: first group (G1) received lactobacillus acidophilus $1 \times 10^8$ cfu m$^{-1}$ via crop inoculation one day old; the second group (G2) received the same dose for G1 but at three weeks of age; third group (G3) was consider the control group (without any treatment). The second room also divided into 3 groups (G4, G5 and G6). This room was kept under natural condition; G4 received L. acidophilus $1 \times 10^8$ cfu ml$^{-1}$ via crop inoculation on day old; G5 received the same dose for G4 but at three weeks of age; G6 was consider the control. Collected samples at 42 days old of chicken (duodenum, jejunum and ileum). Histological techniques were applied on each sample and also the ocular micrometers were used to measure the thickness of the intestinal mucosa.

**Results:** Results showed that significantly ($P<0.01$) higher in the crypts of lieberkuhn of duodenum in G4 compared with other groups. Chicks in G6, G2 and G1 respectively have significantly ($P<0.01$) higher in the crypts of lieberkuhn of jejunum. The ileum crypts of lieberkuhn was significantly ($P<0.01$) higher in G2 compared with other groups while chicks in G3, G4, G5 and G6 show significantly ($P<0.01$) higher the villi length of duodenum. So the villi length of jejunum show high significantly ($P<0.01$) was in G2 compared with other groups and chicks in G1 show high significantly ($P<0.01$) in the villi length of ileum.

**Conclusions:** Taken of the lactobacillus acidophilus to the broiler chicks improving the intestinal morphology and integrity of birds subjected to the heat stress and non-heat stressed birds.

**Keywords:** lactobacillus acidophilus, broiler, small intestine and heat stress.

**Introduction**

In healthy chicken, the intestinal microcrobflora remains stable, so this stability may be disrupted by various factors like environmental stress for example poor feeding, overcrowding, high or low temperature, the young chicks under stressfull condition suffer from changes in the composition and activity of the gut microflora. Also, under stress conditions changes in the intestinal microflora have been reported with number of anerobic microorganisms decreasing whilst hat of coliform bacteria increasing some studies writed that disturbance of the intestinal microbiota decrease in growth rate lead to various infectious disease and weakens resistance. Decrease the heat stress in chicken house by using many ways like provision of clean and cool drinking water, feeding during the cooler times of the days decrease the number of birds per cage, addition of electrolyte supplements to their drinking water are being practiced, and feeding during the cooler times of the day. The live microorganisms (probiotics), hat administrated in adequate amounts, confer healthbenefit on the
host through improvements to the intestinal microbial balance. Probiotics are viable microbial additives like lactobacillus acidophilus, staphylococcus faecium and Saccharomyces cerevisiae with the effects of restoring the microbial balance of the gut in the animals they are administrated to, so these microbial additives causing inhibit the growth of pathogenic microorganisms and provide digestive enzymes, adesirable effect for the host, and as a result changes in the intestinal microflora, and synthesis of lactic acid leads to lowering of the intestinal PH, adhesion or colonization to the intestinal mucosa and prevention of ammonium synthesis. In this study, the aim was to detect the effects of heat stress and lactobacillus acidophilus using against heat stress on the villi length and crypts of lieberkuhn of duodenum, jejunum and ileum.

**Materials and Method**

**Poultry House:** done this experiment was in poultry house of pathology and poultry diseases at the college of veterinary medicine-Baghdad university.

**Experimental Animal:** In the study one hundred and eight-day old Rose broiler chicks, from a commercial broiler breed (Rose Jordan origin) were divided randomly in to 6 groups 30 chicks each, and each 3 groups were put in a separate room, the first room contained group one which was given lactobacillus acidophilus bacteria (1×10^8 cfu ml) at one day old by oral inoculation, group two (G2) was Lactobacillus acidophilus bacteria (1×10^8 cfu ml) at three weeks old by oral inoculation and group three (G3) as control group. This room was exposed to heat stress (38-40°C) for three hours continuously in four days at starting from three weeks old. The second room, contained group four (G4) which was inoculated lactobacillus acidophilus bacteria (1×10^6 cfu ml) at one day old by oral inoculation, group five (G5) which was given Lactobacillus acidophilus bacteria (1×10^6 cfu ml) at three weeks old by oral inoculation and group six (G6) as control group, this room was in a normal temperature.

**Histological Test:** At the end of the study the specimens were taken from intestine chicks includes: duodenum, jejunum and ileum from each group after 120 hr. form exposed to heat stress (non-heat and heat stress). The samples were immediately fixed by formalin (10%) for 24 hr. after dehydration with ethyl alcohol increasing concentration (100-70%) of ethylic alcohol and in xylol after that the slides were stained with Hematoxylin and eosin stain. An ocular micrometer were used to measure the thickness of the intestinal wall layer.

**Statistical Analysis:** the data were analyzed by using Spss. To calculated the difference between means Duncan-multiple test was used.

**Results**

Table. (1) showed the average value obtained for the crypts of lieberkuhn under normal conditions and those exposed to heat stress after 120 hr., show significance differences (P<0.01) between groups the high level of the crypts of lieberkuhn in the group receiving lactobacillus acidophilus in one day of chick (G4) non-heat stress compared with other group.

Table (2), show the results of the effect of lactobacillus acidophilus on the crypts of lieberkuhn of the jejunum after 120 hr. from exposed to heat stress, these results showed increase significance differences (P<0.01) in G6, G2 and G1 respectively while G4 and G5 show little increase compared with control group G3 (exposed to the heat stress).

The results presented in table (3) show high significance increase in G2 (P<0.01) compared with other group of the effect of lactobacillus acidophilus on the crypts of lieberkuhn of the ileum after 120 hr. from expose to heat stress while G3 and G4 show significantly decrease (P>0.01) compared with other groups respectively.

The effect of lactobacillus acidophilus on the villi length of duodenum after 120 hr. from exposed to heat stress showed in table (4), the high significant (P<0.01) was in G3, G4, G6 and G5 and the low significant (P<0.01) was in G1 and G2 (exposed to heat stress).

Table (5) shows the results the effect of lactobacillus acidophilus on the villi length of the jejunum after 120 hr. the high significant (P<0.01) was in G2 compared with other groups of experiment the results presented in the table (6) show the high significant (P<0.01) was in G1 compared with other groups also in G2 was show increase in villi length of ileum after 120 hr. from exposed to heat stress compared with G3, G4, G5 and G6 respectively.
Table 1: The effect of lactobacillus acidophilus on the crypts lieberkuhn of duodenum after 120 hr. from exposed to heat stress. (Mean ± SE)

<table>
<thead>
<tr>
<th>Layer thickness</th>
<th>Group</th>
<th>Heat stress</th>
<th>Non-heat stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>duodenum (crypts of lieberkuhn)</td>
<td>G1</td>
<td>19.12 ± 0.46d</td>
<td>23.79 ± 1.40c</td>
</tr>
<tr>
<td></td>
<td>G2</td>
<td>23.78 ± 0.47c</td>
<td>30.78 ± 0.93a</td>
</tr>
<tr>
<td></td>
<td>G3</td>
<td>30.78 ± 0.93a</td>
<td>27.05 ± 0.89b</td>
</tr>
<tr>
<td></td>
<td>G4</td>
<td>27.05 ± 0.89b</td>
<td>20.05 ± 0.04d</td>
</tr>
</tbody>
</table>

*Small letters between groups (row) denoted significant differences (P≤0.01).

Table 2: The effect of lactobacillus acidophilus on the crypts lieberkuhn of jejunum after 120 hr. from exposed to heat stress. (Mean ± SE)

<table>
<thead>
<tr>
<th>Layer thickness</th>
<th>Group</th>
<th>Heat stress</th>
<th>Non-heat stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>jejunum (crypts of lieberkuhn)</td>
<td>G1</td>
<td>20.98 ± 0.45ab</td>
<td>21.45 ± 0.91a</td>
</tr>
<tr>
<td></td>
<td>G2</td>
<td>16.79 ± 0.20c</td>
<td>19.12 ± 0.46b</td>
</tr>
<tr>
<td></td>
<td>G3</td>
<td>19.12 ± 0.46b</td>
<td>21.92 ± 0.47a</td>
</tr>
</tbody>
</table>

*Small letters between groups (row) denoted significant differences (P≤0.01).

Table 3: The effect of lactobacillus acidophilus on the crypts lieberkuhn of ileum after 120 hr. from exposed to heat stress. (Mean ± SE)

<table>
<thead>
<tr>
<th>Layer thickness</th>
<th>Group</th>
<th>Heat stress</th>
<th>Non-heat stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>ileum (crypts of lieberkuhn)</td>
<td>G1</td>
<td>18.19 ± 0.47bc</td>
<td>25.19 ± 2.80ab</td>
</tr>
<tr>
<td></td>
<td>G2</td>
<td>15.85 ± 0.94c</td>
<td>16.30 ± 0.49bc</td>
</tr>
<tr>
<td></td>
<td>G3</td>
<td>21.92 ± 0.47ab</td>
<td>22.85 ± 1.40ab</td>
</tr>
</tbody>
</table>

*Small letters between groups (row) denoted significant differences (P≤0.01).

Table 4: The effect of lactobacillus acidophilus on the villi length of duodenum after 120 hr. from exposed to heat stress. (Mean ± SE)

<table>
<thead>
<tr>
<th>Layer thickness</th>
<th>Group</th>
<th>Heat stress</th>
<th>Non-heat stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>duodenum (villi length)</td>
<td>G1</td>
<td>142.74 ± 0.96ab</td>
<td>134.35 ± 6.53b</td>
</tr>
<tr>
<td></td>
<td>G2</td>
<td>161.40 ± 0.98a</td>
<td>156.27 ± 1.40ab</td>
</tr>
<tr>
<td></td>
<td>G3</td>
<td>156.27 ± 1.40ab</td>
<td>147.87 ± 3.26ab</td>
</tr>
<tr>
<td></td>
<td>G4</td>
<td>151.14 ± 15.86</td>
<td>151.14 ± 15.86</td>
</tr>
</tbody>
</table>

*Small letters between groups (row) denoted significant differences (P≤0.01).

Table 5: The effect of lactobacillus acidophilus on the villi length of jejunum after 120 hr. from exposed to heat stress. (Mean ± SE)

<table>
<thead>
<tr>
<th>Layer thickness</th>
<th>Group</th>
<th>Heat stress</th>
<th>Non-heat stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>jejunum (villi length)</td>
<td>G1</td>
<td>97.02 ± 1.86c</td>
<td>103.09 ± 1.40bc</td>
</tr>
<tr>
<td></td>
<td>G2</td>
<td>108.22 ± 2.80b</td>
<td>96.09 ± 1.86c</td>
</tr>
<tr>
<td></td>
<td>G3</td>
<td>120.55 ± 3.73a</td>
<td>99.82 ± 1.86c</td>
</tr>
<tr>
<td></td>
<td>G4</td>
<td>103.09 ± 1.40bc</td>
<td>96.09 ± 1.86c</td>
</tr>
<tr>
<td></td>
<td>G5</td>
<td>103.09 ± 1.40bc</td>
<td>103.09 ± 1.40bc</td>
</tr>
<tr>
<td></td>
<td>G6</td>
<td>103.09 ± 1.40bc</td>
<td>103.09 ± 1.40bc</td>
</tr>
</tbody>
</table>

*Small letters between groups (row) denoted significant differences (P≤0.01).

Table 6: The effect of lactobacillus acidophilus on the villi length of ileum after 120 hr. from exposed to heat stress. (Mean ± SE)

<table>
<thead>
<tr>
<th>Layer thickness</th>
<th>Group</th>
<th>Heat stress</th>
<th>Non-heat stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>ileum (villi length)</td>
<td>G1</td>
<td>97.02 ± 1.81a</td>
<td>63.44 ± 1.79c</td>
</tr>
<tr>
<td></td>
<td>G2</td>
<td>70.90 ± 2.77b</td>
<td>56.44 ± 0.56d</td>
</tr>
<tr>
<td></td>
<td>G3</td>
<td>70.90 ± 2.77b</td>
<td>56.44 ± 0.56d</td>
</tr>
<tr>
<td></td>
<td>G4</td>
<td>63.44 ± 1.79c</td>
<td>57.84 ± 1.82cd</td>
</tr>
<tr>
<td></td>
<td>G5</td>
<td>63.44 ± 1.79c</td>
<td>57.84 ± 1.82cd</td>
</tr>
<tr>
<td></td>
<td>G6</td>
<td>63.44 ± 1.79c</td>
<td>57.84 ± 1.82cd</td>
</tr>
</tbody>
</table>

*Small letters between groups (row) denoted significant differences (P≤0.01).
Discussion

The present study showed the high significant increase in the crypts of liber Kuhn of the small intestinal parts (duodenum, jejunum, ileum) in the groups that inoculated of lactobacillus acidophilus in the one day or 2 wk – of chick age with or without exposed to heat stress.

Those agree with14 who small intestinal lactobacillus and bifidobacterium, jejunal villus height, protein level of occluding but no temperature and diet interaction was observed in the present study revealing that the supplemented probiotics had the same effect at both temperatures. Also15 referred to that the symbiotic and probiotic resulted in an increased in the crypt depth of intestinal mucosa of broilers and these lead to improve the gut health16. Reported that inclusion of 10^7 cfu/g of bacillus licheniformis in the diet of heat-stressed hens was effective in the gut by increasing the crypt depth and restoring the impaired villus structure. So the increasing in crypts depth lead to more activity in degeneration of absorptive epithelial cells which covered the vilii, and active in releasing the digestive enzymes17,18. 19 showed that the increase to the depth of crypt result from the intestinal formation which more digestible, with improved absorption and protein analysis, in addition to a few equipment of the food components of the intestinal maintenance. Increasing the height of the villus in groups inoculated with lactobacillus acidophilus bacteria (1x10^9 cfu/ml)at one day or at 3 weeks old by oral inoculation with heat stress or non-heat stress groups of small intestine (duodenum, jejunum, ileum) specially in jejunum and ileum of G2 group that inoculated lactobacillus acidophilus bacteria (1x10^9 cfu/ml)in 3 weeks old with heat or non-heat stress that agreement with14 who found supplemental probiotics increased (p< 0.05) jejunal villus height and revealing that the supplemented probiotics had the same effect at both temperatures. Also the different of intestinal wall thickness resulted mainly from different in thickness of mucosal layer because presence of villi and intestinal glands and the increasing of villi length increased the absorptive area20. But, 21 found that the heights of villi in the duodenum jejunum and ileum of quails exposed to head stress decreased with the decreased in the number of goblet cells located in the ileum villi found to be statistically significant compared with duodenum and jejunum that non-significant it was also deterrent that in those treated with yeast against head stress, the height of the villi in the jejunum decreased with group that treat with bacitracin zinc the height of the villi in the jejunum and ileum decreased and the goblet cell count increased. While, 22 reported that the effect of lactobacillus acidophilus and bacitracin zinc causes a higher effect on weight gain and benefit from feet much more that their individual effect probiotics may reverse the impaired villus–crypt structure of head stressed birds23. So, several studies have revealed the potential benefits of probiotics in improving the intestinal morphology and integrity of birds subjected to head stress and as part of the nutritional strategies, inclusion of the impaired physiological condition in poultry due to heat stress24,25,26,27,28,29.

Conflict of Interest: This research is a personal non-profit work and there is no conflict of interest.

Source of Funding: None.

Ethical Clearance: Ethical clearance was obtained from the Faculty Scientific Committee (College of Veterinary Medicine, University of Baghdad, Iraq) to Study the effect of lactobacillus on the small intestinal mucosa measurement of broilers chicken under heat stress condition.

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Bacterial Contaminants Associated with Poultry Feeds

Bushra Mohammad Kadhim¹, Haifa Nori Mater²

¹Master of Science in Biology (Zoology), Assistant Teacher in Ministry of Education, General Education in Baghdad Karkh; ²Department of Biotechnology, Collage of Science, University of Baghdad

ABSTRACT

Feeds is the common constituents includes vitamins, soya beans, whole cereals and vegetables. For Salmonella and Escherichia successful control, the feed should be exposed to 85.7°C temperature because of spores are heat resistant. Crops of oilseed and grains shows the presence of diverse microflora, and to low moisture content these are highly resistant. As with natural microbial contaminants of feed, the inoculation’s primary vector is soil. Animal feces mixed soil can contaminate the crops which are standing by direct deposition or if used as fertilizer. Lowering the feeds pH (haylage, silage) or feeds which are dry (meat meals, grains) may considerably reduce the activities of spoilage and allows the long time storage of animal feeds. Cl. Perfringens, Cl. Botulinum, Listeria, E.coli, Salmonella and other pathogens are involved in the pathogenesis of the poultry feeds. Cl. Botulinum is an obligate anaerobe, generally associated with silage, haylage, and contaminated carion. Listeria spp. are not possessing spore cycle, but may survive for 10-12 years. Strains of E. coli are normal microflora of human and animal intestine, and hence serves as feeds fecal contaminant. Salmonella is ubiquitous in nature and can spread horizontally and vertically throughout the livestock herd or poultry flock. In grains and feed other pathogens also may be present, though their routes of transmission are not clear. Various methods are used to avoid and treat the contamination of feed like rapid drying, shortening the time of storage, soybean oil supplementation and other chemical treatment methods are also included.

Keywords: Poultry birds, Poultry feeds, Control methods, Livestock, Long time feed storage

Introduction

For a range of microbial contaminants poultry feeds serves as carrier like mycotoxins, bacteria and moulds¹. All the birds domesticated by man are referred to as poultry, it includes geese, duck, turkey, ostriches, pigeons, domestic fowl, guinea fowl². In the environmental contamination of feed material many bacteria are associated from the enterobacteriaceae family. Enterobacteriaceae family consists of many genera involving Salmonella, Enterobacter, Escherichia etc³. Feeds common constituents includes vitamins, soya beans, whole cereals and vegetables such as amaranthus spp, tridax, water leaf. Generally, feed is a major vector for Salmonella and other bacteria’s transmission to the processing plant and farm. With Salmonella, other pathogens also can be introduced from the feed, such as Clostridia, Listeria and Escherichia. Some of these bacteria may be found higher than Salmonella in feed⁴. Extensive contamination of feed and feed ingredients may occurs by antibiotic resistant bacteria i.e. multi-antibiotic resistant strains of Salmonella⁵, Streptococcus⁶. Enterococcus and Escherichia are found in feed. In feed high level of bacteria is generally found to be associated with poultry’s productivity problems⁷⁹.

Salmonella, Escherichia, Cl. Perfringens, Cl. Botulinum, Listeria, E.coli, Salmonella and other pathogens are the major contaminants which should be avoided in the feed. The main target of this study is to determine the control measures of these above contaminants. Ekperigin et al.¹⁰ have described that for Salmonella and Escherichia successful control the feed should be exposed to 85.7°C temperature because

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of spores heat resistance\textsuperscript{11,12}. Bacteria can be controlled by chemical disinfection and recontamination can be prevented, such as treatment with formaldehyde/organic acid blend, organic salt and organic acid\textsuperscript{13}. Researcher carried out study in Iraq found that Salmonella occurs in various animal feeds\textsuperscript{14} (Table 1).

Table 1: Occurrence of salmonellae in animal feed and their ingredients

<table>
<thead>
<tr>
<th>Types of feed</th>
<th>No. of Samples</th>
<th>Positive Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Sheep</td>
<td>30</td>
<td>8</td>
</tr>
<tr>
<td>Cow</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>Chicken starter</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>Chicken second stage</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>Calves</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>Chicken growth</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>Chicken layers</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>Chicken production</td>
<td>60</td>
<td>0</td>
</tr>
<tr>
<td>Chicken first stage</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Imported feed</td>
<td>40</td>
<td>0</td>
</tr>
</tbody>
</table>

Ingredients

<table>
<thead>
<tr>
<th></th>
<th>No. of Samples</th>
<th>Positive Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Local protein</td>
<td>45</td>
<td>2</td>
</tr>
<tr>
<td>Fish powder</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>Yeast</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>CaCO3</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>Rice</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>Wheat</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Corn</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Soya beans</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Rice shell</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Malt</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Bone powder</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Dried blood</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Muhsin et al\textsuperscript{15} carried out a study on bacterial contamination of imported poultry feed in Iraq found various bacterial contaminants in various quantities as shown in Figure 1.

**Raw feed ingredients of bacterial ecology**

**Bacteria found in feed and their origin:** Crops of oilseed and grains shows presence of diverse microflora, with range of population from $5\times10^3$ to $1.6\times10^8$ CFU/g to low moisture content these are highly resistant\textsuperscript{16,17}. Primary inoculation of plant material is by generated dust during strong wind or rain or while mechanical harvesting when the soil is disturbed. The environment of soil is microhabitats collection consisting of organic matter, aqueous domains and clay particles that are variable in ionic strength, minerals, nutrients, gas composition, redox potential and pH\textsuperscript{18}. This soil microhabitats variability translates to population of diverse microorganisms, both aerobic and anaerobic.
Survival and origin of pathogens in feed: When the human or animal pathogenic bacteria contaminates feed, becomes a disease transmission’s potential route to both the populations, and is of great concern to consumers and producers. As with natural microbial contaminants of feed, the inoculation’s primary vector is soil. Animal feces mixed soil can contaminate the crops which are standing by direct deposition or if used as fertilizer. In the animal intestine the unattached bacteria or sloughed off bacteria leave the environment of soil and mix in bacteria from soil.

Factors influencing pathogens survival in feed: Pathogenic microorganisms variety may live alive in feeds. Lowering the feeds pH or feeds, which are dry may considerably reduce the activities of spoilage and allows the long time storage of animal feeds. Drying and ensiling cannot do complete elimination of population of pathogens. Pathogens may utilize cycles of sporulation (Cl. Perfringens and Cl. botulinum) or acid resistance mechanisms (L. monocytogenes) and/or desiccation (E. coli) to animal feed survival. These resistance mechanisms are bacterial life cycles important natural part. So, as to continue their species they must colonize intestines of animal.

Transition of pathogens from poultry to human: There are several diseases are transmitted from the poultry to humans includes Cl. perfringens, Cl. botulinum, Listeria, E. coli, Salmonella spp etc. Some strains of Salmonellanoticeably predominate in birds. S. galzinarum and S. cubanaaare the most common examples of purely poultry borne agents.

Important bacterial pathogens present in feeds

Clostridia: In feed two species of Clostridia which are anaerobics of major concern: Cl. Botulinum and Cl. Perfringens. Cl. Perfringens is linked to necrotic enteritis in poultry and tin primates to bloat (gastric dilation). Cl. Perfringens is isolated from animal feeds at 3-8000 organisms/g populations. Cl. Perfringens can be isolated from feed which is pelleted due to its high heat resistance in spore state.

Cl. Botulinum is an obligate anaerobe, generally associated with silage, haylage, and contaminated carion or spore contaminated sandy pastures. Cl. Botulinum type B and C can be isolated from hay cubes, mixed poultry feeds, brewers grains, damp alfalfa hay.

Listeria: Species of Listeria are invasive microorganisms which causes septicemia, encephalitis, abortions in ruminants. Listeria spp. Are not possessing spore cycle, but may survive for 10-12 years.

E. coli: Strains of E. coli are normal microflora of human and animal intestine, and hence serves as feeds fecal contamination. E. coli different strains causes variable diseases syndromes involving cellulitis, airsacculitis, swollen head syndrome, septicemia. Some E. coli serotypes, are found to cause avian cellulitis.

Salmonella: It is ubiquitous in nature and can spread horizontally and vertically throughout the livestock herd or poultry flock. Contamination of Salmonella spp. in feeds and their methodologies of detection and measures of control are reviewed extensively elsewhere. The Salmonella spp. physiology lends itself to survival and contamination on feeds wide range and ingredients of feed. The Salmonella spp. survival in bone meal, meat, poultry feeds and dry milk is shown to be inversely proportional to moisture content, having great survivability at 0.43 and 0.52 than at 0.75 water activity.

Other Pathogens: In grains and feed other pathogens also may be present, though their routes of transmission are not clear. Feed thus contains a diverse microflora which originates from soil which is characterized by its survival ability under desiccation conditions and micronutrients wide range. When the storage of animal feed is done under anaerobic moist conditions such haylage or silage, diversity of bacteria is inhibited by low pH.

Control Strategies

Control of Bacterial Contamination: Several methods overview used to control contamination of bacteria in feeds is presented in Table 2.
Table 2: Control methods for bacterial feed contaminants, mode of action and notes

<table>
<thead>
<tr>
<th>Control strategy</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid drying</td>
<td>Reduces the amount of available water</td>
</tr>
<tr>
<td>Shorter storage time</td>
<td>Reduces the amount of caking, mustiness, and browning of feed</td>
</tr>
<tr>
<td>Zinc bacitracin</td>
<td>Controls Gram-positive growth and hinder Clostridium spp sporulation</td>
</tr>
<tr>
<td>Mineral acids, short-chain fatty acids, isopropyl alcohol, aldehydes, trisodium phosphate</td>
<td>Added to feed as disinfectants</td>
</tr>
<tr>
<td>Bacteriophages</td>
<td>Kills actively growing bacteria in feed</td>
</tr>
<tr>
<td>Propionic acid producing bacteria</td>
<td>Added to silage to aid in acid production</td>
</tr>
<tr>
<td>Bacteriocin producing bacteria</td>
<td>Added to silage to control pathogens</td>
</tr>
</tbody>
</table>

Conclusions

The inoculation’s primary vector is soil for the natural microbial contaminants of feed. Animal feces mixed soil can contaminate the crops which are standing by direct deposition or if used as fertilizer. Various methods are used to avoid and treat the contamination of feed like rapid drying, shortening the time of storage, soybean oil supplementation and other chemical treatment methods are also included. Several strategies are made like rapid drying, shortening the storage time, addition of zinc bacitracin Mineral acids, short-chain fatty acids, isopropyl alcohol, aldehydes, trisodium phosphate as disinfecting agents, addition of bacteriophages, propionic acid, bacteriocin producing bacteria so as to avoid contamination of poultry feeds.

Recommendation

So as to overcome feed degradation, several strategies are made which includes: shortening the time of storage to prevent the caking and browning of the feed, and soybean oil supplementation so as to overcome losses of fat50. To prevent overgrowth by storage microorganism, method of rapid drying is widely used for grain preservation51. To control growth of gram positive bacteria and hinder sporulation of Clostridium perfringens in feed, zinc and bacitracin can be added52. In order to control pathogens addition of other disinfecting agents is done. Some of which include aldehydes, isopropyl alcohol, trisodium phosphate, short chain fatty acids, mineral acids52. However, these disinfectants microbial activity is inhibited by the organic matters high concentration in feed. From large period, Encilage method is used for preservation of feed.

Ethical Clearance: The present study is a review article. So, it does not need any ethical clearance.

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES


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An Exploratory Study on the Roles of Bhutanese Primary Health Care Managers in Responding to Childhood Obesity

Chimi Wangmo¹, Phudit Tejativaddhana², Mary Cruickshank³, David Briggs⁴

¹College of Health Systems Management, Naresuan University, Thailand and Ministry of Health, Royal Government of Bhutan; ²ASEAN Institute for Health Development, Mahidol University (MU), Thailand; ³Professor of Nursing, School of Nursing & Healthcare Professions, Federation University, Australia and Adjunct Professor, CHSM, NU, Thailand; ⁴Adjunct Prof. CHSM, NU, Thailand and University of New England, Australia

ABSTRACT

This is initial research that examines the status of childhood obesity in Bhutan in the context of data that describes global, national, cultural and continental contexts.

The study aims to assess the understanding of health policymakers, health professionals and other stakeholders’ perceptions of the challenges posed by childhood obesity, and to assess their state of readiness to address those challenges.

A qualitative method using in-depth semi-structured interviews of a purposeful sample with primary healthcare managers (PHC), policy makers and school coordinators in one district in Bhutan.

The respondents described the major challenges and barriers, and roles in the management of childhood obesity. PHC managers were not aware or had little awareness of childhood obesity. This result extended to the policy level, to health professionals, school teachers, communities and parents. In other words, the unawareness was extensive and, preparedness was not evident.

Bhutan needs to recognise the challenges an impending emergence of childhood obesity presents and move to establish policy and practices for the health system to implement.

Keywords: Bhutan, primary health care managers, childhood obesity, exploratory

Introduction

The Kingdom of Bhutan is in the Himalayan region with a population of 735,553 and a land area of 38,394 square kilometres¹. PHC is the core policy focusing on health for all². There is free basic public health services delivered through a PHC approach³ with a Ministry of Health (MOH) supporting the district health system⁴ Modern health care in Bhutan began in 1961 with two hospitals, two doctors, and two nurses⁵. Today, healthcare services are delivered throughout 31 hospitals, 178 basic health unit clinics and 654 outreach clinics. Bhutan is confronting an increasing challenge from Non-Communicable Diseases (NCDs)⁶. One of the risk factors for NCD is obesity. Childhood obesity is strongly correlated with obesity as an adult⁷. Worldwide obesity has doubled since 1980⁸. Globally, 1.5 billion adults are either overweight or obese and that number is expected to increase to 3 billion by 2030⁹. The worldwide prevalence of childhood obesity has increased from 4.2% in 1990 to 6.7% in 2010 and is expected to reach 9.1% by 2020¹⁰. In South East Asia, it has increased from 1.2 million to 2.5 million over 20 years. Studies conducted in Asia¹¹ suggest about 48% of obese children under five live in Asia and developing countries¹². Similarly, in the Pacific States obesity is significant¹³. In a US study that

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reviewed the prevalence of obesity and overweight in some of the Pacific region sees rates set at 10% at age 2 years and 23% at age 8 years14.

The study aims to assess the understanding of health policymakers, health professionals and other stakeholders’ perceptions, of the challenges posed by childhood obesity, and to assess their state of readiness to address those challenges.

Method

A qualitative method using in-depth semi-structured interviews with the PHC managers and others to provide a deep understanding of the roles of the PHC managers and to provide an account that explores and captures the participants’ perceptions, feelings, and meaning15.

The study was conducted in the Mongar District, Bhutan. Among twenty districts, Mongar is one of the fastest developing district with a population of 37,150, has good highways and most of the regional offices are in this district. Health services in this region include the eastern regional referral hospital (ERRH), a Basic Health Unit (BHU) grade I, 22 BHUs grade II, 5 sub-posts, 5 indigenous units and 52 Outreach Clinics (ORC). The Mongar district has 2 District Health Officers, 2 Medical Doctors, 7 Nurses, 1 Clinical officer and 47 Health assistants16.

The participants in this study included the District Health Officer, Head of the regional hospital and PHC Staff from Mother and Child Health unit (MCH), NCD focal person, a Medical officer (1) or BHU grade I in charge, and Health assistants (6) (BHU grade II) who have managerial and supervisory roles and work with PHC services and disease prevention. The BHU included larger medium BHUs and small BHUs; classified as per the area size and population. A further four participants included two school health coordinators (primary and high school) and two from the health policy level. The total number of participants in the purposive sample was fifteen.

Table 1: Provides a summary of the demographic data from the key informants in this study

<table>
<thead>
<tr>
<th>Participants</th>
<th>Gender</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHC Managers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHC 1</td>
<td>Male</td>
<td>MBBS, MPH</td>
</tr>
<tr>
<td>PHC 2</td>
<td>Male</td>
<td>Certificate in PHC</td>
</tr>
<tr>
<td>PHC 3</td>
<td>Male</td>
<td>MBBS</td>
</tr>
<tr>
<td>PHC 4</td>
<td>Male</td>
<td>Dip. in nursing and midwifery</td>
</tr>
<tr>
<td>PHC 5</td>
<td>Male</td>
<td>Certificate in PHC</td>
</tr>
<tr>
<td>PHC 6</td>
<td>Male</td>
<td>Certificate in PHC</td>
</tr>
<tr>
<td>PHC 7</td>
<td>Female</td>
<td>Certificate in PHC</td>
</tr>
<tr>
<td>PHC 8</td>
<td>Male</td>
<td>Certificate in PHC</td>
</tr>
<tr>
<td>PHC 9</td>
<td>Female</td>
<td>Certificate in PHC</td>
</tr>
<tr>
<td>PHC 10</td>
<td>Male</td>
<td>Certificate in PHC</td>
</tr>
<tr>
<td>PHC 11</td>
<td>Male</td>
<td>Certificate in PHC</td>
</tr>
<tr>
<td><strong>Other Stakeholders</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL 1</td>
<td>Female</td>
<td>MBBS, MPH</td>
</tr>
<tr>
<td>PL 2</td>
<td>Male</td>
<td>BBA</td>
</tr>
<tr>
<td>SHC 1</td>
<td>Female</td>
<td>Bachelor in Science</td>
</tr>
<tr>
<td>SHC 2</td>
<td>Female</td>
<td>Bachelor in Education</td>
</tr>
</tbody>
</table>

*Note: PHC: Primary Health Care; PL: Policy Level; SHC: School Health Coordinator; MBBS: Bachelor in Medicine and Surgery; MPH: Master’s in Public Health; BBA: Bachelor in Business Administration

The data was collected between January and March 2018, utilising semi-structured interviews. The 15 informants were interviewed at their places of work. The duration of interviews was approximately 60 minutes. The record of what was said and done during the interviews was audio recorded, and then transcribed.
prior to data analysis, using content analysis. Themes were finalized and illustrated with quotations from the original text to help communicate meaning. The data and emergent themes were confirmed with the advisor’s guidance and included comparison of the coded concepts by other researchers.

**Results**

The respondents described major challenges and barriers, and roles in the management of childhood obesity. The challenge faced by PHC managers was that they were not aware or had little awareness of childhood obesity. This result extended to the policy level, to health professionals, school teachers, communities and parents.

At the policy level the participants emphasised the current concern about undernutrition:

…I think the major problem is still related to undernutrition in children under 5…1 in 5 children are either undernourished or stunted… obesity in children is about a percent [1%] in the 2015 nutrition survey. (PL 1).

While PHC managers felt that childhood obesity cases are minimal:

From my perspective, we do have childhood obesity in the community, not much but a few cases … (PHC 5).

There are few obese children … especially those children from urban areas not from rural. (PHC 6).

Some PHC managers felt that they do not have any childhood obesity cases:

Under the age of 5 years we don’t have childhood obesity. We have malnutrition… I have been here for four years, but I haven’t encountered obese children. (PHC 7).

A PHC manager who is a medical doctor said they do not have to focus on childhood obesity:

…We are not focusing on childhood obesity … because we are focusing more on stunting and lower weight children…we have not dealt with any children with obesity but that doesn’t mean to say there won’t be children with obesity … (PHC 3).

The school health coordinators stated that:

In school, I don’t think it is a very serious issue. I think health coordinators are informed at this stage. It doesn’t mean it doesn’t exist. I think we have around 2-3 cases. I think it is okay. (SHC1).

PHC managers talked about the unawareness of community and parents. Obesity is considered healthy and treated as normal in the community:

In the village, obesity is considered healthy… it is still considered as healthy and a child is normal and eating well. Maybe some of the population understand it but I see many considering childhood obesity as normal. (PHC 7).

The PHC managers shared their views on the future agreeing that there will be an increased problem of childhood obesity:

Looking into 10 years down the line, there will be childhood obesity because now the living and eating styles of the population have changed… However, now the time has changed, and we get every day. Eating habits have totally changed to refined products from high fibre intake. (PHC 6).

In the future there will be an impact of childhood obesity on health systems with increased NCDs particularly if rural populations migrate:

…if we do not act … now this will shift from the people who are young right now, they will become an adult one day and … their health problems may go up. (PHC 1).

There is a lack of strategic direction and policies to guide PHC managers:

We do not have a policy regarding childhood obesity rather we do have one for the management of underweight children. Whatever, if there are underweight cases, we refer to the child specialist until a child is fine. (PHC 2).

PHC managers mentioned the shortage of human resources for not being able to focus on childhood obesity:

My health centre is in one of the highest populated communities with only two of us. One of us must look after OPD and one attends outside. Especially during heavy patient load, we can’t show concern in this area of childhood obesity. (PHC 8).
Guidelines on the management of childhood obesity are lacking:

…we don’t have such guidelines; hence we are not able to do much. Also, we have our own responsibilities to cover the syllabus. (SHC 2).

…we are focusing more on undernutrition… but I think in the areas of obesity health professionals might need some guidance on what to do. (PL 1).

Two PHC managers serve as fully fledged managers in the district and one in a regional hospital, the others have a dual role as managers and practitioners in their health centres:

We have multi-tasking both clinical as well as administration of the health centre. Therefore, we can’t focus only on one problem such as childhood obesity although we have a bigger responsibility to look after the childhood obesity. (PHC 6).

As there are only two of us, one of us look after the OPD and one attends outside. (PHC 8).

Bhutanese are changing their eating habits:

…Marketing has reached everywhere right after birth… a child has everything to eat …and formula feeding…parents don’t have time and … give the child to a caregiver where the habits of taking junk foods pick up. (PHC 10).

Health literacy about obesity amongst PHC managers is minimal or non-existent:

… I feel health workers are not serious themselves because even their children … are obese…. I feel they are not worried about the obesity. Just forget about other children, health workers themselves have obese children. (PHC 4).

The roles of PHC managers in the management of childhood obesity are ineffective:

I don’t follow up actively, but the obese child often visits the hospital when he is sick with other conditions. Then I take the opportunity to monitor his weight and blood sugar. (PHC 3).

We have recorded overweight children, but action is not taken. (PHC 2).

School health coordinators shared that:

I did not call anyone from the hospital. Usually, we give instruction ourselves related to healthy eating habits and other related matters. (SHC1).

PHC managers and health professionals have not carried out health education related to childhood obesity:

No as of now we have not carried out any mass health education but when we come across a few cases of obese children, we do inform their parents and relatives on risks and the probable future health condition of the children. (PHC 3).

One informant from the policy level informed:

At present, we don’t have a BMI measurement for the children. We are using the same standard as the adult. That is one thing missing in the children’s BMI measurement. (PL 1).

Some PHC managers said that they did not manage obese children because they never came across anyone with such issues:

We haven’t managed an obese child because we did not get any cases yet. (PHC 7).

I haven’t managed childhood obesity because I did not get any of them. (PHC 11).

Discussion

The main objectives of this study were to identify the challenges and barriers, and the roles of Bhutanese PHC managers in the management of childhood obesity at the district level in Bhutan. The perceptions of PHC managers is that childhood obesity is a small problem, but the incidence of obesity is rising. The perception is also reflected in the perspectives of policy managers, school coordinators, parents and communities.

If Bhutan does not recognize childhood obesity as one of the public health concerns and issues at present, then it is highly likely that Bhutan will be like other developed and developing countries with a high incidence of rising childhood obesity. At an individual level, the PHC managers have little control factors which contribute to childhood obesity. At the social level, both parents and health workers were not concerned about the growing incidence of obese children. Some saw a level of obesity as representing being healthy and well.

This study has highlighted the improper or inadequate management of childhood obesity. PHC managers have a limited role in the management of obesity, and the duality of roles requires them to manage the organization as well as to see the patients. Their roles were usually focused
towards curative aspects. The management role in healthcare requires a dual set of skills that requires one to be proficient in leadership, business, and communication, as well as a strong healthcare background. Their roles should include advocacy that includes healthy key messages on obesity and modelling healthy behaviours in the community. The Bhutanese health care system needs to move to a participatory model where there is active participation from the community during the decision-making process.

**Strengths and limitations of the study:** The study adds body of knowledge in strategic directions for the policy makers in preventing childhood obesity. The only limitation of the findings may not be able to generalizable to other PHC managers from other districts and may not be applicable to secondary and tertiary health managers.

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**Conflict of Interest:** The authors declare that there is no conflict of interest

**Ethical Clearance:** Ethical approval was sought from the Institutional Review Board at Naresuan University in Thailand (IRB No. 1088/60) and the research ethics board of health in Bhutan (REBH/PO/2017/101. The written informed consent were also obtained.

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Determination of Safe Benzene Concentration at Kebon Jeruk Toll Gate Keeper Jakarta Indonesia

Danang Setia Budi1, Abdul Rohim Tualeka1, Pudji Rahmawati2, Syamsiar S Russeng3, Bambang Wispriyono4

1Department of Occupational Health and Safety, Public Health Faculty, Airlangga University, 60115, Surabaya, East Java, Indonesia; 2Department of Development of Islamic Society, State Islamic University Sunan Ampel, Surabaya, Indonesia; 3Department of Occupational Health and Safety, Public Health Faculty, Hassanudin University, Makassar, Indonesia; 4Department of Environmental Health, Public Health Faculty, University of Indonesia, Makassar, Indonesia

ABSTRACT

Benzene is a liquid aromatic hydrocarbon compound that is clear, colorless, flammable, and volatile. High concentrations of benzene in the body through inhalation can cause health problems. The purpose of this study is to determine the safe concentration of benzene exposure (C6H6) in Jakarta Kebon Jeruk toll gate keeper. Toll gate keepers are vulnerable to exposure to benzene compounds in the air. 20 toll gate keeper who are divided into toll gate 1 and toll gate 2 were population in the study. The sample technique used total population sampling. The present study used quantitative data analysis manually calculated through the calculation of safe concentration in the environmental toxicology concept. Safe concentration data on Jakarta Kebon Jeruk toll gate keeper were based on data from rat experimental animals, experimental body surface, workers’ characteristics of body weight, body height, body surface area, breathing rate and working duration. In addition, data on benzene concentration, animal km, human km, NOAEL and safe limits for toxin doses were also used. The average measurement results of benzene concentration in the air entering the body of workers through inhalation was 0.00167 mg/m3 (0.0052 ppm). This value is lower than benzene threshold according to the Minister of Manpower Regulation Number 5 of 2018 of 0.5 ppm. The safe concentration of benzene calculated was 0.0875 mg/m3 (0.0273 ppm). Based on the calculation of safe concentration, the concentration of benzene in the environment of the Kebon Jeruk toll gate keeper indicated safe.

Keywords: benzene, safe concetration, toll gate keepers

Introduction

The development of the transportation sector makes it easy for people to move and carry out their activities. On the other hand, the development of the transportation sector also has a negative impact towards the community. The negative impacts include congestion and air pollution due to motor vehicle gas emissions. Air pollution can have a negative impact on public health and cause health problems such as respiratory problems, respiratory infections and even systemic diseases such as cancer.

Jakarta is one of the big cities in Indonesia with the highest pollution level. The increasing number of the volume of motor cycle is also one of the causes of increasing environmental pollution. Directorate of Metro Police Traffic Subdistrict Registration and vehicle identification reported that in 2013 the number of vehicles in Jakarta and its surrounding areas reached 16 million units.

One of the air pollutants caused by motorized activities include aromatic hydrocarbon compounds such as benzene, toluene and xylene. According to the Agency for Toxic Substances and Disease Register, chemical compounds that can cause health effects on humans and are found in petroleum content namely benzene,
toluene, xylene, ethylene, Total Petroleum Hydrocarbon and Polycyclic Aromatic Hydrocarbon. Benzene is a clear, colorless, flammable and volatile liquid aromatic hydrocarbon compound. Exposure to benzene in high concentrations that enter the body through inhalation can cause health problems and lead to death.

Toll gate keepers are prone to be exposed to benzene. Most benzene exposure received by toll gate keepers comes from inhalation exposure lines sourced from gasoline and exhaust vehicles. Toll is a state development facility that aims to facilitate traffic, improve distribution services, improve equity in development and justice outcomes.

Researches on benzene risk analysis on human activities is mostly done at gas stations and workshop mechanics. Rusdiyanto stated that workshop workers exposed to chemical substances in the form of gas exhaust motor vehicles inhaled benzene levels that exceed the Threshold Value (NAB) of 0.5 ppm.

A research measured the concentration of benzene at the toll gate 1 and the toll gate 2 of the Jakarta Kebon Jeruk and produced a value of 0.00163 mg m$^{-3}$ and 0.00171 mg m$^{-3}$. The research was conducted on 20 respondents of Kebun Jeruk toll gate keepers who were divided into toll gate 1 keeper and toll gate 2 keeper. Based on previous research, the researchers have not calculated Safe Concentration calculation. Toll gates are one of the work environments with benzene exposure. Therefore, the calculation of safe concentration is important to ensure the health of workers. Safe concentration is calculated by using the Reference Concentration formula with No Observed Adverse Effect Level which is adjusted to the research data so that a safe value can be found on pollutant chemicals to avoid health problems. This study was conducted to calculate safe concentration through the Reference Concentration calculation with No Observed Adverse Effect Level as the safe limit of benzene concentration in the Kebun Jeruk toll gate keepers.

### Material and Method

This study aims to determine the safe concentration of benzene in the work area of the Kebun Jeruk toll gate in Jakarta. The approach used in this study is a cross-sectional approach and is in the form of observational descriptive research. The population in this study was 20 respondents of toll gate keepers who were exposed to benzene chemicals. Population determination was carried out through total working population of Kebun Jeruk toll gate keepers, Jakarta.

The study was conducted in May 2019. It begins with literature study on the analysis of toxicological health risks which included calculation of intake, type of risk and value of dose-response. Secondary data collection was carried out by conducting a literature study of previous research. Supporting research data were also used such as the type of chemical, weight of the experimental animal and results of the measurement of benzene in the air obtained through measurements of NIOSH1501 with activated carbon adsorbing pipe using Chromatography technique.

The variables used in this study were the characteristics of the experimental animals which included weight and surface area, worker characteristics including weight, body surface area, and worker breathing rate. The concentration of benzene in the workplace is also obtained through previous research literature studies. Processing variables by calculating factor Km in animals, No Observed Adverse Effect Level, RfC benzene in workers and calculation of safe concentration on workers is carried out. Data analysis was carried out using the Environmental Health Risk Analysis method.

### Results

**A. Characteristics of Experimental Animals:**

Measuring the level of toxicity of chemical compounds using experimental animals is the process of supporting testing. The experimental animals used were white rats.

### Table 1: Distribution of Characteristics of White Mice

<table>
<thead>
<tr>
<th>Experimental animal</th>
<th>W (kg)</th>
<th>BSA (m$^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024050</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
</tr>
</tbody>
</table>

Where:

- **BSA:** Body Surface Area (m$^2$)
- **W:** Weight (kg)

The body surface area calculated was 0.024165 m$^2$.  

B. Workers’ Characteristics: The characteristics of workers used were body weight, height, and exposure duration. The population of 15 workers Kebon Jeruk toll gate keepers with an average weight of 67.9 kg and an average height of 159 cm. The duration of occupational exposure is 8 hours per day.

1. Workers’ Body Surface Area: This is calculated with the following formula

\[
\text{BSA} = \sqrt{\frac{W \cdot H}{3600}}
\]

Where

BSA: Body Surface Area (m²)
W: Weight (kg)
H: Height (cm)

\[
\text{BSA} = \sqrt{\frac{67.9 \cdot 159}{3600}} = 1.73 \text{ m}^2
\]

2. Workers’ Respiratory Rate: Breathing rate calculations can be done using the following formula

\[
\text{BR} = 5.3 \ln W - 6.9/24
\]

Where

BR : Breathing Rate
W : Weight

\[
\text{BR} = 5.3 \ln 67.9 - 6.9/24 = 0.64 \text{ m}^3/\text{hour}
\]

C. Benzene Concentration: Measurement of benzene concentrations inhaled by workers was carried out at two different toll gate points. The concentration of benzene at the door of Kebon Jeruk toll, Jakarta has an average of 0.00167 mg/m³ (0.00052 ppm).

Table 2: Distribution of Benzene Concentration

<table>
<thead>
<tr>
<th>Location</th>
<th>C (mg/m³)</th>
<th>Berat Molekul</th>
<th>C (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toll gate 1</td>
<td>0.00163</td>
<td>78.11</td>
<td>0.00051</td>
</tr>
<tr>
<td>Toll gate 2</td>
<td>0.00171</td>
<td>78.11</td>
<td>0.00054</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td>0.00052</td>
</tr>
</tbody>
</table>

Based on the results of the above measurements the highest benzene concentration was 0.00171 mg m³ (0.00054 ppm) at toll gate 2, while the lowest concentration was 0.000163 mg/m³ (0.00051 ppm) at toll booth 1. The value of benzene concentration is lower than Threshold Value by 0.5 ppm.

D. Animal Km and Human Km: Determination of safe dosage limits or safe concentration on workers begins with the calculation of Animal km and human km

1. Animal Km

\[
\text{Animal Km} = \frac{W \text{ animal}}{\text{BSA animal}}
\]

Where

Animal Km: Km factor on experimental animal
W: Weight (kg)
BSA: Body Surface Area (m²)

The distribution of Animal Km is as follows:

Table 3: Calculation of Animal Km in White Mice

<table>
<thead>
<tr>
<th>Experimental animal</th>
<th>W (kg)</th>
<th>BSA (M²)</th>
<th>Animal Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.814194082</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.814194082</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
<td>5.820914007</td>
</tr>
<tr>
<td>4</td>
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<td>0.1395</td>
<td>0.024050</td>
<td>5.8004158</td>
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<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
<td>5.855576247</td>
</tr>
<tr>
<td>Average</td>
<td>0.1407</td>
<td>0.024165</td>
<td>5.82</td>
</tr>
</tbody>
</table>

The calculation results of Animal Km are shown by the table above with an average of 5.82 in white rats.

2. Human Km: Human Km calculations are also needed for workers to support risk analysis

\[
\text{Human Km} = \frac{W \text{ human}}{\text{BSA human}}
\]

Where:

Human Km: Km factor on human
W: Weight (kg)
BSA: Body Surface Area (m²)

Table 4: Human Km calculations for workers

<table>
<thead>
<tr>
<th>Number of worker</th>
<th>W avg (kg)</th>
<th>BSA avg (m²)</th>
<th>Human Km avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>67.9</td>
<td>1.73</td>
<td>39.24</td>
</tr>
</tbody>
</table>

Based on the calculation of human km above, the average human km value is 39.24.

E. No Observed Adverse Effect Level (NOAEL): Toxicity test was performed by determining
the highest dose without causing effects on experimental animals or No Observed Adverse Effect Level.

Saridewi and Tualeka stated that the calculation of the highest toxins without causing effects on experimental animals was 3.0 mg/m$^3$ (0.022 mg/kg). NOAEL calculations in this study can be obtained from the following formula:

$$\text{NOAEL benzene} = \frac{3 \times 0.00013 \times 8}{0.1405}$$

$$\text{NOAEL benzene} = 0.022 \text{ mg/kg}$$

**F. Inhalation Reference Concentration (RfC):**

Shaw et al. in a study conducted by Saridewi and Tualeka, show that the calculation of the reference concentration on workers or the Inhalation Reference Concentration can use the following formula.$^8$

$$\text{RfC} = \frac{\text{NOAEL}}{\text{Animal KM}} \times \frac{1}{\text{Human KM}}$$

Where

RfC: Inhalation Reference Concentration

NOAEL: No Observed Adverse Effect Level

Animal Km: Km factor on animal

Human Km: Km factor on human

Based on the calculation of reference concentration on toll gate keepers obtained from the NOAEL value, the average Animal Km and the Human Km average are as follows.

$$\text{RfC} = \frac{\text{Animal KM}}{\text{Human KM}}$$

$$\text{RfC} = 0.022 \frac{5.82}{39.24}$$

$$\text{RfC} = 0.0033 \text{ mg/kg}$$

The reference concentration value of the Jakarta Kebon Jeruk toll gate keepers is 0.0033 mg/kg.

**G. Safe Concentration (C safe) of Benzene:**

In Saridewi and Tualeka, it is shown that the calculation of safe concentration on benzene substances can be calculated using a formula obtained from William, Davis and Soemirat.$^7$ Calculation of safe concentration using the value of Inhalation Reference Concentration, No Observed Adverse Effect Level (NOAEL), average length of work, average body weight and breathing rate of the Kebun Jeruk Jakarta toll gate keepers are as follows.

$$\text{C Safe (mg/m}^3\text{)} = \frac{\text{RfC} \times \text{W} \times \text{BR} \times \text{T}}{\alpha}$$

Where,

C safe: The safe concentration (mg/m$^3$ or ppm)

RfC: Inhalation Reference Concentration (mg/kg)

W: Weight (kg)

$\Delta$: Percentage of substances absorbed by workers’ lungs (%)

BR: Breathing Rate (m$^3$/hour)

T: Time

Calculation of safe Concentration can be seen in the formula as follows.

$$\text{C safe (Mg/m}^3\text{)} = \frac{0.033 \times 67.9}{50\% \times 0.64x8}$$

$$\text{C safe (Mg/m}^3\text{)} = 0.224 \text{ Mg/m}^3$$

$$\text{C safe (Mg/m}^3\text{)} = 0.0875 \text{ Mg/m}^3$$

$$\text{C safe (ppm)} = \frac{\text{Berat Molekul}}{\text{Berat Molekul}}$$

$$\text{C safe (ppm)} = \frac{0.0875 \times 24.45}{78.11}$$

$$\text{C safe (ppm)} = 0.0273 \text{ ppm}$$

**Discussion**

Benzene concentrations in Kebon Jeruk toll gates was 0.00163 mg/m$^3$ (0.00051) on toll gates 1 and 0.00171 mg/m$^3$ (0.00054) on toll gate 2. Benzema concentration at toll gate 2 concentration is higher than benzene concentration at toll gate 1. Based on the regulation of the Minister of Manpower Number 5 of 2018 concerning the Threshold Limit Value, benzene concentration is 0.5 ppm.$^5$ The concentration of benzene in the gate of Jakarta Kebon Jeruk toll was below the threshold value. Calculation of safe concentration at the Jakarta Kebon Jeruk toll gate is based on calculations of Reference
Concentration and No Observed Adverse Effect Level. The result of No Observed Adverse Effect Level is 0.022 mg/kg. This result is comparable with study by Swaen et al. which states that NOAEL benzene compounds are 3.0 mg/m³ or equivalent to 0.022 mg/kg.⁸ According to the Agency of Toxic and Substances, the value of No Observed Adverse Effect Level for exposure through inhalation of 3 ppm through the respiratory system.¹ Thus, the value of No Observed Adverse Effect Level benzene is safe for workers.

Reference Concentration through the inhalation pathway for benzene can be calculated through the value of NOAEL, Animal Km, Human Km for Jakarta Kebon Jeruk toll gate keepers. The results show that the Reference Concentration value through inhalation is 0.0033 mg/kg. These results were considered the same as the study by Kartikasari which had an RfC value of 0.0039 in workers exposed to benzene in the petroleum processing laboratory.⁹ In addition, based on the Reference Concentration value through inhalation based on U.S EPA National Center for Environmental Assessment, RfC value is 0.03 mg/m³. This shows that the value of RfC for Kebon Jeruk toll gate keepers is still smaller than Integrated Risk Information System Chemical Assessment Summary.¹⁰

Reference Concentration through the inhalation pathway for benzene can be calculated through the value of NOAEL, Animal Km, Human Km for Jakarta kebon Jeruk toll gate keepers. The results show that the Reference Concentration value through inhalation is 0.0033 mg/kg. These results reconsidered similar to the study by Kartikasari which had an RfC value of 0.0039 in workers exposed to benzene in the petroleum processing laboratory.⁹ In addition, based on the determination of the Reference Concentration value through inhalation based on U.S EPA National Center for Environmental Assessment, RfC value is 0.03 mg/m³. This shows that the value of RfC for Kebon Jeruk toll gate keeper is still lower than that of Integrated Risk Information System Chemical Assessment Summary.¹⁰

**Conclusion**

Benzene concentration in the air that entering the body of workers through inhalation on average was 0.00167 mg/m³ (0.0052 ppm). This value is still below the Benzene Threshold Value according to the Minister of Manpower Regulation Number 5 of 2018 of 0.5 ppm.⁵ Calculation of safe concentration on workers shows the safe level by 0.0875 mg/m³ (0.0273 ppm). Through the results of the calculation of safe concentration, benzene in the work environment of Kebon Jeruk toll gate keepers is in the safe category.

Control measures and efforts to minimize health effects can be in the form of the use of personal protective equipment for workers and work shift arrangements. Personal protective equipment can be in the form of respiratory masks to protect workers from direct benzene exposure.

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**Ethical Clearance:** The study was approved by the institutional Ethical Board of Health Ministry of Tangerang City

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Analysis of Patient Safety Culture and Work Team in Educating the Effect of Leadership Style on Patients Safety Performance

Dike Widyakti Sawfina Maharani¹, Margono Setiawan², Dodi Wirawan Irawanto², Mintarti Rahayu²

¹Doctoral Program in Management Science, ²Departement of Management, Faculty of Economics and Business, University of Brawijaya

ABSTRACT

This research was compiled to test and analyze the influence of patient safety culture, leadership style and team work on patient safety performance at the Ulin Hospital in Banjarmasin. A research concept framework that brings together four variables, namely leadership, teamwork, patient safety culture and safety performance. This study uses a positivist paradigm based on quantitative research. This study aims to examine and analyze analyzing patient safety culture and teamwork in mediating the influence of leadership style on patient safety performance. The results of the research obtained were a culture of patient safety and team work mediating the influence of leadership style on patient safety performance.

Keywords: Leadership, Mediation, Patient Safety Culture, Safety Performance, Team work

Introduction

The results of the patient safety study in the late 1990s found a 3.9% and 2.7% unwanted incidence in hospitalized patients. In 2008, the Ministry of Health and Services of the US Inspector General conducted measurements with the Global Trigger Tool which showed that unwanted events increased 10-fold (to 32%).

In Indonesia, safety law has been made related to patient safety in 2009 which states that hospitals as health care agencies that deal directly with patients must prioritize safe, quality, anti-discriminatory and effective health services by prioritizing patient interests in accordance with standard hospital service.¹

Patient safety is a top priority in health services and is the first critical step to improve service quality and is related to the quality and image of hospitals.² Research in various hospitals in Australia reports that supportive leadership has a positive impact on safety motivation which then improves patient quality and safety. Safety culture is an organizational goal, a top priority, and driven by leadership. Studies conducted by Nieva and Sorra report that poor patient safety culture is an important risk factor that can threaten patient safety.³

Based on Minister of Health Regulation 1691/MENKES/PER/VIII/2011 concerning Hospital Patient Safety that each hospital is required to carry out patient safety management. Ulin Banjarmasin Hospital is a hospital owned by the Provincial Government of South Kalimantan type A with complete classification according to the 2012 Hospital Accreditation Commission assessment Ulin Hospital Banjarmasin has a commitment to maintain and continue to improve the quality of care and patient safety so that excellent continuously for the community.

The culture of reporting an error is hampered because the formation of blaming culture is an event that often occurs, so that solutions sometimes stop by pointing to someone’s mistakes. So that a system is needed where it can be seen how far the patient’s safety performance in the hospital can make continuous and continuous quality improvement efforts and to meet the needs and demands of the community and refer to the law on hospitals.

Corresponding Author:
Dike Widyakti Sawfina Maharani
Doctoral Program in Management Science,
University of Brawijaya
Email: dike_maharany@yahoo.com
Method

This study uses a positivist paradigm based on quantitative research. More specifically, this study aims to analyze the effect of exogenous variables on endogenous variables. Exogenous variables include: leadership style, teamwork. Endogenous variable is patient safety performance. In addition to exogenous and endogenous variables, in this study there are also mediating variables, namely the culture of patient safety.

The population in this study were all employees working in all installations in Ulin Hospital Banjarmasin. The need for the number of samples will be calculated using the Slovin formula. Then the number of samples needed is:

\[ N = \frac{N}{Nd^2 + 1} = \frac{1215}{(1215)0.05^2 + 1} = 300.9 \approx 301 \]

In variable measurement techniques, when viewed from the nature of their influence, the research variables can be classified into endogenous variables and exogenous variables. In this study, to be able to measure and study the hypothesized variables, it will use the second order CPA measurement model, where the dimensions reflect the first level latent variables while the hypothesized variables are called the second level latent variables. The measurement scale that will be used in this study on all variables is the ordinal scale in this case the Likert scale.

The data to be collected and analyzed in this study come from primary data and secondary data. Primary data is collected from research instruments, namely questionnaires, which are the main instruments in this study. The secondary data will be collected from internal data from Ulin Banjarmasin Hospital.

In the research instrument test consisted of validity and reliability tests. Data analysis methods used are descriptive statistical methods and inferential statistical methods. The purpose of the descriptive statistical method is to describe the demographic characteristics of respondents such as gender, age, profession, position, length of work as an employee at Ulin Hospital Banjarmasin. While the inferential statistical analysis method that is data analysis used in inferential statistical methods in this study is partial least square (PLS).

Partial Least Square (PLS) analysis is done through two stages, namely evaluating the outer model and inner model. Outer model is a measurement model to assess construct validity and reliability. The second stage in PLS analysis is the evaluation of the inner model to find out the coefficient R² for the dependent construct and the t-statistical value for the construct significance test in the structural model.

Results

Identification of Characteristics of Respondents

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
</tr>
<tr>
<td>≤30</td>
<td>4.7</td>
</tr>
<tr>
<td>31-40</td>
<td>43.0</td>
</tr>
<tr>
<td>41-50</td>
<td>26.7</td>
</tr>
<tr>
<td>≥50</td>
<td>25.6</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>64.0</td>
</tr>
<tr>
<td>Female</td>
<td>36.0</td>
</tr>
<tr>
<td>Tenure (years)</td>
<td></td>
</tr>
<tr>
<td>1-5</td>
<td>10.5</td>
</tr>
<tr>
<td>6-10</td>
<td>20.9</td>
</tr>
<tr>
<td>11-15</td>
<td>25.6</td>
</tr>
<tr>
<td>16-20</td>
<td>23.3</td>
</tr>
<tr>
<td>&gt;20</td>
<td>19.8</td>
</tr>
</tbody>
</table>

The patient safety performance variables of each item have an average value ranging from 2.66-4.79 which can give an idea that patient safety performance is good enough. The highest mean value of 4.79 is in identifying patients before administration of drugs,
blood, or blood products. While the lowest 2.66 is in carrying out the provision of information that is timely, accurate, and relevant in the hospital environment. This study uses six indicators to describe variable patient safety performance, including safe, effective, patient-centered, timely, efficient and equitable indicators.

Based on the results of the descriptive study that based on the average score of the respondents’ answers to the leadership style variables are included in the good category, thus it can be said that actually all indicators are included in the criteria of good. Therefore, all of these indicators should be maintained or reused. This study uses six indicators to describe the variable patient safety performance, including contingent reward indicators, active management by exception, passive management by exception, inspirational motivation, intellectual simulation, and individualized consideration, idealized influence.

The variable value of team work for each item has an average value ranging from 3.51 - 4.24 which can give an idea that the value of the team work is good. The highest average value of 4.24 is in the team members committed to achieving common goals/missions, while the lowest 3.51 is in me giving to other team members in decision making. This study uses three indicators to describe the value of team work variables, including indicators of commitment to shared goals (TW1), decision making (TW2), and conflict management (TW3).

The variable patient safety culture of each item has an average value ranging from 2.26 - 4.31 which can give an illustration that the patient safety culture is quite good. The highest average score of 4.31 is in our mutual support for one another, while the lowest of 2.26 is unpleasant if working with other parts of the hospital. This study uses twelve indicators to describe the variable of patient safety culture, including perception indicators (BK1), frequency of reporting (BK2), supervision (BK3), organizational learning (BK4), intra-sub-departmental collaboration (BK5), openness of communication (BK6), reciprocal errors (BK7), error sanctions (BK8), staff/employees (BK9), management support for patient safety (BK10), collaboration between sections (BK11), and transfer and replacement (BK12).

**Model Confirmatory Factor Analysis:** This section presents the confirmatory factor analysis (CFA) model in the construct of transformational leadership style and construct of transformational leadership style to determine the validity of item-based construct. The item loading factor (Model Transactional Leadership Style) ranges from 0.747-0.854 already has good validity. Reliability on each indicator is well measured, cronbach alpha values range from 0.733-0.792, composite reliability ranges from 0.849-0.873 and average variance extracted (AVE) ranges from 0.652-0.706. The results of the analysis after evaluation, all items meet the requirements. The item loading factor (Model Transformational Leadership Style) ranges from 0.608 to 0.874 has good validity. Reliability on each of the measured indicators is good, cronbach alpha values ranging from 0.625-0.803, composite reliability ranges from 0.830 to 0.871 and average variance extracted (AVE) ranges from 0.553 to 0.733. The results of the analysis after evaluation, all items meet the requirements.

**Testing Linear Assumptions:** Before conducting further evaluation of this analysis, it is necessary to conduct a linear assumption test, namely that the relationship between constructs to be tested has a linear relationship. Linearity results explain that all paths meet linearity assumptions, namely the results of the F test in the linearity section are significant (p <0.05). These results provide the conclusion that linearity requirements have been fulfilled in all paths in the hypothesis model. The results of the linearity test result of the F test are significant (p <0.05).

**Outer Model Testing**

**Discriminant Validity:** Discriminant validity testing in research uses cross loading values and square root of average (AVE) with the aim of checking (testing) whether indicators were valid in explaining or reflecting latent variables. The results show that the discriminat value of the validity of a variable is higher than the correlation value between variables. Thus it can be concluded that the outer model of this study has fulfilled discriminant validity.

**Composite Reliability:** Composite reliability tests the value of reliability between indicators of the construct that forms it. The composite reliability results are said to be good, if the value is above 0.70. Reliability test results show that all constructs have a composite composite coefficient of more than 0.70. Thus, all measurement models used in this study already have high reliability. So that further analysis can be done by examining the goodness of fit model by evaluating the inner model.
Convergent Validity: Convergent validity measures the validity of an indicator as a measure of a construct, can be seen from the outer loading. Indicators are considered valid if the outer loading loading value is 0.5 to 0.6 is considered sufficient, the number of indicators per construct is not large, ranging from 3 to 7 indicators. In the PLS model, the loading factor for the reflexive indicator is outer loading, and for the formative indicator is the outer weight.

Model Compatibility: The model determination coefficient is calculated using all coefficients of determination (R2) in the model.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Leadership style</th>
<th>Team work</th>
<th>Patient safety culture</th>
<th>Patient safety performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership style</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team work</td>
<td>0.496</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient safety culture</td>
<td>0.574</td>
<td>0.707</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Patient safety performance</td>
<td>0.473</td>
<td>0.452</td>
<td>0.602</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Table 3: Inter-Variable Correlation Matrix

In the hypothesis model, team work and patient safety culture are mediators in the relationship of leadership style to patient safety performance. The alleged teamwork and patient safety culture as a mediator is quite strong, because the correlation coefficient between leadership styles with these two variables ranges from 0.496 and 0.574.

Inner Model Testing: Inner model testing aims to determine the value of path coefficient, inner T-statistic model, and total effect value that shows the level of variation in changes in the independent variable on the dependent variable.

Table 4: Path Coefficient Test Results in the Inner Model

<table>
<thead>
<tr>
<th>Variable with indicator</th>
<th>Path Coefficient</th>
<th>Standar Error</th>
<th>Statistics t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership style -- &gt; Transaksional</td>
<td>0.940</td>
<td>0.007</td>
<td>129.904 *</td>
<td>0.000</td>
</tr>
<tr>
<td>Leadership style -- &gt; Transformasional</td>
<td>0.961</td>
<td>0.005</td>
<td>184.162 *</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Noted: ns = p > 0.05; * = p < 0.05

The second order model of leadership style explains that transactional leadership (loading factor = 0.940) and transformational (loading factor = 0.961) is significant (p <0.05) in explaining leadership style.

Mediation Test Results: In the hypothesis model, the variable teamwork and patient safety culture are mediating variables for the relationship of leadership style to patient safety performance. In the hypothetical model, there are six paths that have a direct influence, and there are four relationships containing indirect effects. In particular the relation to the research hypothesis there are only two indirect effects to be discussed.
Table 5: Indirect Influence Test Results

<table>
<thead>
<tr>
<th>Relation</th>
<th>Indirect influence coefficient</th>
<th>Standard Error</th>
<th>Statistics t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership style -&gt; Team work -&gt; Patient safety culture</td>
<td>0.278</td>
<td>0.034</td>
<td>8.135 *</td>
<td>0.000</td>
</tr>
<tr>
<td>Leadership style -&gt; Patient safety culture -&gt; Patient safety performance</td>
<td>0.143</td>
<td>0.031</td>
<td>4.657 *</td>
<td>0.000</td>
</tr>
<tr>
<td>Leadership style -&gt; Team work -&gt; Patient safety culture -&gt; Patient safety performance</td>
<td>0.134</td>
<td>0.027</td>
<td>4.951 *</td>
<td>0.000</td>
</tr>
<tr>
<td>Leadership style -&gt; Team work -&gt; Patient safety performance</td>
<td>0.009</td>
<td>0.039</td>
<td>0.224 ns</td>
<td>0.412</td>
</tr>
</tbody>
</table>

Indirect effects on the path of leadership style on patient safety performance through team work were obtained from the results of the path coefficient of leadership style, team work and patient safety performance which was 0.496 x 0.017 of 0.009 which was not significant (p > 0.05). Indirect influence on the path of leadership style on patient safety performance through a patient safety culture was obtained from the results of the path coefficient of leadership style, patient safety culture and patient safety performance of 0.296 x 0.482 of 0.143 was significant (p < 0.05).

Variance account for (VAF) is 43.2% and 4.6% calculated from the ratio of indirect effects to total influence. Hair et. al. (2014) divided mediation based on VAF values into three, namely not mediating if VAF <20%, partial mediation on VAF between 20% -80%, and complete mediation if VAF was more than 80%. In the results of this analysis the mediating nature of the patient safety culture is partial mediation, whereas in teamwork it is not proven as a mediating variable.

Conclusion

Patient safety culture mediates the influence of leadership style on patient safety performance. In this hypothesis will be related to the coefficient test results indirect influence of leadership style on patient safety performance through a patient safety culture has a coefficient with a positive direction of 0.298 (p <0.05). Team work mediates the influence of leadership style on patient safety performance. In this hypothesis will be related to the coefficient test results of the indirect influence of leadership style on patient safety performance through team work has a coefficient with a positive direction of 0.298 (p <0.05).

Ethical Clearance: Not required

Source of Funding: Self funding.

Conflict of Interest: Nil

REFERENCES

Maternal Death Model Decreases the Expression of BDNF in Rattus Norvegicus Newborns’ Cerebrum and Cerebellum

Duhita Dyah Apsari¹, Hermanto Tri Joewono², Widjiati³

¹Postgraduate Student of Reproductive Health Sciences, Faculty of Medicine, ²Department of Obstetrics and Gynecology, ³Department of Embryology, Faculty of Veterinary Medicine, Airlangga University, Surabaya, Indonesia

ABSTRACT

Maternal death occurred in the initial pregnancy period up to 42 days after giving birth. Maternal death could cause early life stress in newborns which activated the HPA axis and glucocorticoid secretion as a stress hormone marker. The developing brain was very sensitive to the initial exposure to stressors that would affect the Brain Derived Neurotrophic Factor (BDNF) expression, which was one of the most important endogenous mediators of stress responses in the brain. This study aimed to analyze BDNF expression in the cerebrum and cerebellum of Rattus norvegicus newborn with the maternal death model. The control group (K1) consisted of newborns Rattus norvegicus which were not separated from the mother until 3 days old and the treatment group (K2) is maternal death model consisted of newborns Rattus norvegicus which were separated immediately from the mother after birth until 3 days old and fed with animal milk as a substitute nutrient. After 3 days treatments, 3 newborns with the heaviest, medium, and lowest weights were taken from each mother to sacrifice. BDNF examination was carried out on cerebrum and cerebellum with immunohistochemical method and the results were analyzed with Mann Whitney test. The results showed that the mean BDNF expression in the cerebrum and cerebellum of 3 days old Rattus norvegicus with maternal death model which were separated from the mother lower than the mean BDNF expression of control group.

Keywords: BDNF expression, separation from mother, maternal death model

Introduction

Maternal death is the death of a woman during pregnancy, childbirth, or within 42 days after the end of pregnancy. Maternal death did not depend on the length and location of the pregnancy. This death could be caused by anything related to pregnancy, childbirth, or medical handling. Maternal and infant death rates were a benchmark in assessing the health status of a country.¹⁷,²⁶

Maternal death could affected the children survival, especially in the first 1,000 days of life for children up to 3 years old. The main impact of maternal death was the direct loss of the relationship between the mother and the newborn baby, causing by the absence of bonding and attachment between mother and baby and the immediate cessation of breast milk intake. Mothers also played an important role in giving and responding to communicative signals from babies after birth. The absence of bonding and attachment was one of the causes of neonatal stress. Neonatal stress is an early life stress occurred in neonatal period (birth to 1 month).¹,¹⁰

In early life, babies were prone to experiencing pain and stress. When a baby faced a particular stressor, the hypothalamic-pituitary-adrenal axis would be activated and the paraventricular hypothalamus secretes Corticotropin-releasing hormone (CRH) which then stimulated the secretion of Adrenocorticotropic hormone (ACTH) by the pituitary gland. This hormone would induce the adrenal gland cortex to secrete
glucocorticoids (GC), namely cortisol, which was considered a stress indicator hormone. Neonatal stress in newborns was associated with cortisol hormone responses and baby behavior. Neonatal stress caused glucocorticoid increasing which could had an impact on the baby’s brain development. In addition, the socio-emotional stress reactivity during the early period of neonatal life would affected the brain development.10,11

The part of the brain that had cognitive function was the cerebral cortex, but recent research showed that the cerebellum contained more neurons than the cerebral cortex that allowed it to be involved in cognitive function.2 The cerebrum and cerebellum were interconnected through polysinaptics and form a system associated with cognitive function and interference neuropsychiatry.7

Brain Derived Neurotrophic Factor (BDNF) is a neurotrophic factor that played an important role in brain development because of its ability to protect brain cells from various pathological conditions. BDNF also functioned to maintain neuron survival and regulate synaptic plasticity by increasing the number of dendritic spines and synapse formation. This molecular mechanism underlies cognitive function and brain development which was influenced by BDNF regulation.14 BDNF was also one of the most important endogenous mediators of stress response in the brain. The developing brain was very sensitive to the initial exposure to stressors which would also affected BDNF expression.9 Based on this background, this study was conducted to analyze the differences in BDNF expression in the cerebrum and cerebellum of Rattus norvegicus newborns with maternal death model.

Material and Method

This research was true laboratory experimental with randomized post-test only control group design. The 3-day-old Rattus norvegicus as sample unit. Female rats were pregnant through the superovulation technique by giving a 10 IU injection of the hormone Pregnant mare serum gonadotropin (PMSG). After 48 hours, they were given 10 IU injection of HCG hormone and later continued to monomating. Pregnant rat diagnosis was seen at 17 hours after mating with the presence of a vaginal plug.25 The pregnant rats were cared until aterm and gave birth naturally.

Experimental animal samples were divided randomly into 2 groups, namely the control group (K1) consisting of newborn rats which were not separated from the mother until 3 days old and the treatment group (K2) is maternal death model consisting of newborn rats which were separated from the mother immediately after birth until 3 days old and fed with animal milk as a substitute nutrient. After 3 days treatments, 3 newborns with the heaviest, medium, and lowest weights were taken from each mother to be sacrificed and the head decapitation was performed. The head part was separated and then put into 10% formalin. Imonohistochemical examination of BDNF expression was carried out on histochemical cerebrum and cerebellum preparations.

Findings

Figure 1: Histopathology of BDNF expression in the 3 days old Rattus norvegicus cerebrum between control group and treatment group. BDNF expression represented by brown color chromogen. Yellow arrow indicated the area was the maximum expression. (Immunohistochemical staining, 400x magnification; Miconos microscope MCX50LED; Optilab Plus camera)
Table 1: Mean and standard deviation of BDNF expression cerebrum

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>BDNF Expression (iRS)</th>
<th>Mean ± Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>18</td>
<td></td>
<td>2.96 ± 1.36</td>
</tr>
<tr>
<td>K2</td>
<td>18</td>
<td></td>
<td>2.34 ± 1.02</td>
</tr>
</tbody>
</table>

Table 2: Analysis of BDNF expression cerebrum

<table>
<thead>
<tr>
<th>Group</th>
<th>p Value</th>
<th>Differences test Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>0.348*</td>
<td>Mann Whitney</td>
</tr>
</tbody>
</table>

Information:

K1 = Newborns not separated from the mother until 3 days (control group)

K2 = Newborns separated from the mother until 3 days (treatment group)

*Significantly different p <0.05

Table 3: Mean and standard deviation of BDNF expression cerebellum

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>BDNF Expression (iRS)</th>
<th>Mean ± Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>18</td>
<td></td>
<td>3.06 ± 1.48</td>
</tr>
<tr>
<td>K2</td>
<td>18</td>
<td></td>
<td>2.39 ± 1.01</td>
</tr>
</tbody>
</table>

Table 4: Analysis of BDNF expression cerebellum

<table>
<thead>
<tr>
<th>Group</th>
<th>p Value</th>
<th>Differences Test Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>0.392*</td>
<td>Mann Whitney</td>
</tr>
</tbody>
</table>

The results showed that BDNF expression mean in cerebrum of treatment group was lower than control group (Table 1) and by Mann Whitney test result showed that not significant differences in the BDNF expression in cerebrum between control group and treatment group with a p value = 0.348 (significantly different need p value <0.05) (Table 2) which mean that the decrease of BDNF expression were not happened drastically based on statistical analysis. Similar results also showed in cerebellum that the BDNF expression mean of treatment group was lower than control group (Table 3) with no significant different (p value = 0.392) (Table 4).

Discussion

The novelty of this research is the maternal mortality model which was carried out by separation of newborns from the mother from day 0 to day 3. Some previous research was carried out by separating newborn from the mother a few days after birth or not fully separation which mean separation only done few hours before returned back to the mother. The full separation immediately after birth and examination of BDNF cerebrum and cerebellum expression of 3 days old newborn had never been done before. The separation treatment from day 0 to day 3 early in newborn rats would be the same as the human baby separation immediately after birth from the mother for approximately 1 month. This was included in the criteria for maternal death (42 days after birth).

This research showed that BDNF expression mean of 3 days old Rattus norvegicus cerebrum and cerebellum with maternal death model was lower than control group (Table 1; Table 3). The decrease of BDNF expression could caused by several things.

In early life, babies were prone to experiencing pain and stress. Research by Shi et al (2010) states...
that chronic stress could reduce mRNA expression and BDNF protein expression in hippocampus. The study by Calabrese et al (2015) also showed that the separation of rat’s pups from the mother in the postnatal day 2 to day 14 had reduced BDNF expression in the ventral hippocampus and ventromedial prefrontal cortex. However, the separation in the study was only carried out 3 hours every day then returned to the mother after the treatment. In another study, Binggio et al (2014) showed that a decrease in BDNF expression occurred significantly in the postnatal separation from the third to the 15th day postnatal.4,8,21

Brain-Derived Neurotrophic Factor (BDNF) was a protein that played an important role in the development, maintenance, and synaptic plasticity.16 This protein was expressed in the brain, which included the frontal cortex, parietal, cingulate, temporal, retrosplenial, prirhinai, hippocampal, entorhinal cortex, brain stem, cerebrum, and cerebellum. Each area in the brain had different BDNF concentrations.5 The BDNF gene expression in the brain was influenced by many stimuli, both in physiological and pathological conditions. BDNF regulation was influenced by activation of NMDA receptors (NMDAR), calcium influx (Ca$^{2+}$), and through activation of CREB.10 BDNF was one of the most important endogenous mediators of stress response in the human and mammalian brains. The developing brain was very sensitive to the initial exposure to stressors, especially because of the reprogramming number of stress-sensitive gene pathways.9

Stressor at early of life would cause glucocorticoid to increase. Glucocorticoid played an important role in the BDNF regulation. Glucocorticoid decreased the activity of activator protein-1 (AP-1) and CREB needed in transcription of BDNF genes, influenced the cascade of BDNF signals via TrkB and p75NTR receptors, decreases the infusion of Ca$^{2+}$ ions in postsynapsed membranes, inhibits trkB-mediated signal cascades, and decreases expression phospho-TrkB (pTrkB), and influence the PLC-γ signal cascade regulation by BDNF and inhibit the PI3K-Akt pathway.22,23

With the BDNF presence, the TrkB receptor homodimerizes and initiates several signaling pathways and would support neuron survival, growth, and differentiation. Glucocorticoid(GC) passed through the plasma membrane and entered the cytosol to bind to glucocorticoid receptor (GR), and induces homodimerization (GR-GC complex). The GR-GC complex would target BDNF promoters. Increased glucocorticoid levels caused relocation of nucleus CREB regulated transcription coactivator 2 (CRTC2) to the cytosol. This could decreased the transcription activity of CREB which would caused a decrease in BDNF expression.12

In addition, regulation of BDNF expression by glucocorticoid was also related to DNA methylation and histone modification.BDNF transcripts containing exons I, II, IV, and VI were mostly expressed in transcript neurons so that they display different subcellular localization and could showed that protein was translated by different efficiency in soma or dendritic which would produce local effects. Decreasing BDNF expression was also often associated with increased DNA methylation in BDNF promoters. DNA methylation was one of the contributing factors to long-term epigenetic reprogramming and gene activity in the developing brain. Methylation of BDNF genes was often considered a key mechanism of early life stress and influenced brain function.13,24 Research by Roth et al (2009) and Blaze et al (2013) showed that early life stress in children caused changes in DNA methylation in BDNF accompanied by reduced expression in BDNF.5,18

Stress also could caused the glucocorticoid receptor translocation from the cytoplasm to the nucleus that would result in the imbalance of mitochondria and the production of NADPH oxidase (NOX). Some stress signaling pathways would follow NOX stimulation and would led to cell damage and lower BDNF expression.19

Changes in BDNF expression indicated a dependence on the time period, that was on direct or long-term effects, an acute or chronic. A recent analysis of hippocampal transcriptomies showed that the stress effects on children on BDNF expression were very dependent on age and could vary over the lifetime.24

Some of the above could explained that the maternal death model with separation from the mother could affected the BDNF expression mean, both in the cerebrum and cerebellum of 3 days old Rattus norvegicus.

**Conclusion**

The results showed that the BDNF expression mean of 3 days old Rattus norvegicus cerebrum and
cerebellum with maternal death model which newborns immediately separated from the mother after birth until 3 days was lower than the BDNF expression from control group which not separated from the mother.

**Ethical Clearance:** This study had obtained an ethical feasibility permit based on the Research Ethics Commission of the Faculty of Veterinary Medicine, Airlangga University.

**Source of Funding:** This study was self funding by authors.

**Conflict of Interest:** There was no conflict of interest in this study.

**REFERENCES**


Lipid Accumulation Product: A Simple and Useful Surrogate Marker for Glycemic Control in Women with Type 2 Diabetes Mellitus

Ekhlas Khalid Hameed¹, Noor Saadi Hassan², Zina Hassan Abdulqahar²

¹The Clinical Biochemistry Department, Al-Kindy College of Medicine, University of Baghdad, Iraq; ²Clinical Biochemistry Department, College of Medicine, University of Baghdad, Iraq

ABSTRACT

Aim: Lipid accumulation product had developed as a surrogate marker of central fat accumulation. It mirrors the combined anatomical (waist circumference) and biochemical changes (fasting serum triglyceride level) associated with excess lipid accumulation. We aimed to study the association between lipid accumulation product and glycated hemoglobin in type 2 diabetic patients.

Materials and Method: During January 2017 to July 2018 one hundred eighty consecutive type 2 diabetic women (age 25-60 years) were enrolled in this study at Baghdad Medical city. Waist circumference, weight, height and blood pressure was measured. Fasting blood sample was analyzed for blood glucose, glycated hemoglobin and lipid profile. The Lipid accumulation product and Visceral Adiposity Index were calculated based on a published mathematical model. Statistical analysis was done by SPSS version 23.

Result: The glycated hemoglobin was higher across the quartiles of Lipid accumulation product, the number of diabetic patients with poor glycemic control increased with the increase in Lipid accumulation product. Significant positive correlation exists between HbA1C and Lipid accumulation product. In addition, the area under the curve showed that Lipid accumulation product has a good predictive power to identify the state of poor glycemic control.

Conclusion: Lipid accumulation product is significantly associated with glycemic control. As HbA1C evaluation is not available in daily clinical application, it is reasonable to suggest the use of LAP as a simple and indirect assessment of long term glycemic control.

Keywords: lipid accumulation product; type 2 Diabetes Mellitus; Glycated hemoglobin

Introduction

Diabetes Mellitus (DM) is increasing to an alarming global level. It is associated with low quality of life and a devastating micro and macro vascular complications. Strict glycemic control is pivotal in preventing its complications and improves the quality of life (1).

Glycated hemoglobin (HbA1c) is used as a measure of glycemic control in diabetic patients, however, this test is not widely available in every clinical setting especially in the undeveloped countries. In addition, it is relatively expensive making follow up of glycemic control in diabetic patients unsatisfactory (2).

Lipid accumulation product (LAP) is developed as a surrogate marker of central fat accumulation. It combine an anthropometric measure -the waist circumference (WC) and a biochemical measure -the blood triglyceride level (TG). LAP has been suggested as a marker of obesity, metabolic syndrome, insulin resistance and polycystic ovarian syndrome (3, 4, 5).

Many previously published studies confirmed the role of LAP as a simple, inexpensive and accurate index
to estimate cardiovascular risk and all-cause mortality (6). Higher LAP is associated with atherogenic lipid profile, higher level of lipoysis, higher interleukin -6 level, increased plasminogen activator inhibitor, abnormal glucose metabolism, higher oxidative stress and systemic inflammation (7, 8). LAP index was proposed for the first time in 2005 in an epidemiological study with the database of the National Health and Nutrition Examination Survey (NHANES III). In that survey, LAP was superior to body mass index (BMI) in the evaluation of cardiovascular risk in Americans (9).

The aim of this study is to study the utility of LAP as a marker of glycemic control in type 2 diabetic patients.

Material and Method

Study Population: This study was conducted from January 2017 to July 2018. One hundred eighty women, aged 25 to 60 years, with a clinical diagnosis of type 2 diabetes mellitus for at least one year and on oral hypoglycemic medications, were recruited from the Baghdad Medical city.

Patients were excluded from the study if they were pregnant, lactating, smoker, had severe impairment of hepatic, cardiac, or renal function, or if they use insulin. So twenty patients, were excluded from the study and the final participants number was 160 adult women.

Demographics, anthropometric, and clinical measurements: Information on the patients age, medical history and medications, duration of diabetes and antidiabetic medications, was collected.

Anthropometric measurements were assessed by trained personnel. Height was measured using a tape measure to the nearest 0.2 cm, in a standing position without shoes. Weight was measured while the subjects were wearing lightweight clothing without shoes. BMI was calculated as weight (kg), divided by the square of the height (m²). WC was measured to the nearest 0.1 cm, midway between the lower margin of the ribs and the iliac crest using a soft measuring tape, without applying any pressure. Written informed consents were obtained from all participants.

Biochemical Measurement: An overnight 12-hour fasting blood samples were collected into plain tubes and allowed to clot and then centrifuged at 4°C for 10 minutes to separate serum. serum glucose, triglyceride and total cholesterol levels were measured by the enzymatic colorimetric methods. High density lipoprotein cholesterol (HDL-C) was measured by the immunoturbidimetry after precipitation of apo B-containing lipoproteins with phosphotungstic acid. Low density lipoprotein-cholesterol (LDL-C) was calculated from serum total cholesterol, HDL-C and triglycerides, according to the Friedewald equation (10). EDTA tubes was used to obtain plasma sample for HbA1c measurement which was performed with high-performance liquid chromatography.

Definition of Index (7, 11)

LAP and Visceral adiposity index (VAI) in women was calculated as:

\[ \text{LAP} : \left[ \text{WC (cm)} - 58 \right] \times \left[ \text{triglycerides (mmol/L)} \right] \]

\[ \text{VAI} : \left[ \frac{\text{WC}}{36.58 + 1.89 \times \text{BMI}} \right] \times \left( \frac{\text{TG}}{0.81} \right) \times \left( 1.52 / \text{HDL} \right) \]

(The TG and HDL-C concentrations in the indices are measured in mmol/L).

The patients were categories into two category on the basis of HbA1c levels; < 7% good glycemic control, ≥ 7% poor glycemic control. The selection of these cutoff values of HbA1c was based on American Diabetes Association guidelines (12).

Statistical Methods: Statistical analysis was performed with SPSS version 23.0 software. The data are represented as mean and standard deviation (SD). A P value of less than 0.05 was considered statistically significant. The LAP index was categorized into quartiles (<44.98, 44.98 to 57.88, 57.89-82.20, and > 82.20) and the parameters of the patients were compared across the quartile categories.

Comparisons between the groups were performed by analysis of variance (ANOVA) test. The associations between LAP and other parameters assessed using linear Regression and correlation analysis.

Pearson chi-square test was used to examine the difference in frequency between the groups. Receiver-operating characteristic (ROC) analyses were performed to assess and compare the discriminative power of LAP for glycemic control. The area under the receiver operating characteristics curve (AUC) and 95% confidence intervals (CIs) were computed.
Results

The mean age of participants was 55.72 ± 9.4 years. The range of LAP index was < 44.98, 44.98-57.88, 57.89-82.20 and > 82.20 in the 1st, 2nd, 3rd, and 4th quartile categories of LAP, respectively. The clinical, biochemical and anthropometric characteristics of the participants across LAP quartile are presented in table 2. Participants in the highest quartile of LAP had higher HbA1c, FSG, TC, LDL-C, TG, BMI, WC, VAI. Significant increasing trends of all of the measured parameters are observed across increasing LAP quartile except for HDL-C which shows a decreasing trend. Mean levels of HDL-C decreased significantly across increasing LAP quartiles.

Linear regression analysis showed that LAP correlate significantly with HbA1C (r=0.290, P=0.001), FSG (r=0.257, P=0.001), WC (r=0.553, P=0.000), BMI (r=0.530, P=0.000), HDL (r=0.679, p=0.00), TG (r=0.915, P=0.000) and TC (r=0.355, P=0.000).

In ROC analysis, the area under the curve showed that LAP had good predictive power to identify the state of poor glycemic control which was comparable to that of the Visceral adiposity index (VAI) while BMI has the least AUC (table 3).

### Table 1: Baseline, anthropometric and biochemical characteristics of participants

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>55.72 (9.4)</td>
</tr>
<tr>
<td>Waist Circumference (cm)</td>
<td>100.83 (11.08)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>75.67 (15.2)</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.56 (0.05)</td>
</tr>
<tr>
<td>Body Mass Index (Kg/m²)</td>
<td>30.26 (4.85)</td>
</tr>
<tr>
<td>Serum Cholesterol (mg/dl)</td>
<td>179.09 (47.19)</td>
</tr>
<tr>
<td>Low Density Lipoprotein (mg/dl)</td>
<td>104.67 (13.7)</td>
</tr>
<tr>
<td>High Density Lipoprotein (mg/dl)</td>
<td>44.84 (3.16)</td>
</tr>
<tr>
<td>Very Low Density Lipoprotein VLDL (mg/dl)</td>
<td>27.78 (2.75)</td>
</tr>
<tr>
<td>Serum Triglyceride (mg/dl)</td>
<td>142.17 (35.59)</td>
</tr>
<tr>
<td>Fasting serum glucose (mg/dl)</td>
<td>180.36 (5.39)</td>
</tr>
<tr>
<td>Haemoglobin A1c Level (%)</td>
<td>8.49 (1.82)</td>
</tr>
<tr>
<td>Systolic Blood Pressure (mmHg)</td>
<td>137.62 (18.33)</td>
</tr>
<tr>
<td>Diastolic Blood Pressure (mmHg)</td>
<td>85.61 (0.79)</td>
</tr>
<tr>
<td>Lipid accumulation product index</td>
<td>70.11 (3.2)</td>
</tr>
<tr>
<td>Visceral adiposity Index</td>
<td>2.84 (0.12)</td>
</tr>
</tbody>
</table>

Results are expressed as mean ± SD

### Table 2: Characteristics of the participants according to the lipid accumulation product quartiles

<table>
<thead>
<tr>
<th>Quartile</th>
<th>Q1 Less than 44.98</th>
<th>Q2 44.98-57.88</th>
<th>Q3 57.89-82.20</th>
<th>Q4 More than 82.20</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>54.55 ± 9.345</td>
<td>57.18 ± 10.578</td>
<td>54.79 ± 10.313</td>
<td>56.44 ± 7.155</td>
<td>0.536</td>
</tr>
<tr>
<td>Waist Circumference (cm)</td>
<td>89.5 ± 8.8</td>
<td>100.4 ± 5.9</td>
<td>104.9 ± 8.6</td>
<td>108.3 ± 10.3</td>
<td>0.000</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>62.9 ± 10.8</td>
<td>74.7 ± 10.4</td>
<td>80.4 ± 12.6</td>
<td>84.5 ± 17.15</td>
<td>0.026</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.53 ± 0.05</td>
<td>1.56 ± 0.06</td>
<td>1.57 ± 0.04</td>
<td>1.56 ± 0.05</td>
<td>0.000</td>
</tr>
<tr>
<td>Body Mass Index (Kg/m²)</td>
<td>26.72 ± 3.58</td>
<td>29.77 ± 3.47</td>
<td>31.36 ± 4.12</td>
<td>33.40 ± 5.39</td>
<td>0.000</td>
</tr>
<tr>
<td>Serum Cholesterol (mg/dl)</td>
<td>156.88 ± 33.51</td>
<td>177.58 ± 42.99</td>
<td>178.03 ± 43.03</td>
<td>207.87 ± 52.39</td>
<td>0.000</td>
</tr>
<tr>
<td>Low Density Lipoprotein (mg/dl)</td>
<td>84.77 ± 31.33</td>
<td>104.86 ± 38.18</td>
<td>104.48 ± 33.34</td>
<td>116.35 ± 43.09</td>
<td>0.018</td>
</tr>
</tbody>
</table>
Conted…

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group 1 (Mean ± SD)</th>
<th>Group 2 (Mean ± SD)</th>
<th>Group 3 (Mean ± SD)</th>
<th>Group 4 (Mean ± SD)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Density Lipoprotein (mg/dl)</td>
<td>46.63 ± 2.46</td>
<td>45.78 ± 2.05</td>
<td>45.45 ± 2.17</td>
<td>41.38 ± 3.07</td>
<td>0.000</td>
</tr>
<tr>
<td>Serum Triglyceride (mg/dl)</td>
<td>96.45 ± 13.52</td>
<td>107.65 ± 17.48</td>
<td>135.90 ± 30.61</td>
<td>231.21 ± 70.48</td>
<td>0.000</td>
</tr>
<tr>
<td>Fasting serum glucose (mg/dl)</td>
<td>166.42 ± 9.99</td>
<td>170.50 ± 8.65</td>
<td>175.56 ± 10.4</td>
<td>207.87 ± 12.63</td>
<td>0.026</td>
</tr>
<tr>
<td>Haemoglobin A1c Level (%)</td>
<td>7.87 ± 1.6</td>
<td>8.11 ± 1.75</td>
<td>8.63 ± 1.76</td>
<td>9.33 ± 1.80</td>
<td>0.011</td>
</tr>
<tr>
<td>Systolic Blood Pressure (mmHg)</td>
<td>135.32 ± 22.20</td>
<td>137.74 ± 17.11</td>
<td>138.63 ± 17.09</td>
<td>139.39 ± 19.59</td>
<td>0.786</td>
</tr>
<tr>
<td>Diastolic Blood pressure (mmHg)</td>
<td>82.70 ± 9.6</td>
<td>84.53 ± 8.85</td>
<td>87.10 ± 9.94</td>
<td>88.57 ± 11.16</td>
<td>0.048</td>
</tr>
<tr>
<td>Visceral adiposity Index</td>
<td>1.75 ± 0.030</td>
<td>2.05 ± 0.33</td>
<td>2.63 ± 0.64</td>
<td>4.99 ± 1.8</td>
<td>0.000</td>
</tr>
<tr>
<td>Glycemic control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.000</td>
</tr>
<tr>
<td>Good (%)</td>
<td>24 (61.53 %)</td>
<td>15 (37.5 %)</td>
<td>6 (14.63 %)</td>
<td>4 (10 %)</td>
<td></td>
</tr>
<tr>
<td>Poor (%)</td>
<td>15 (38.46 %)</td>
<td>25 (62.5%)</td>
<td>35 (85.36%)</td>
<td>36 (90 %)</td>
<td></td>
</tr>
</tbody>
</table>

P value less than 0.05 is statistically significant.

Results are expressed as mean ± SD

Chi-square test is used to examine the difference in frequency

Table 3: Area under the curve of different parameters in predicating glycemic control

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Area under the curve</th>
<th>P-value</th>
<th>Asymptomatic 95 % confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAP</td>
<td>0.776</td>
<td>0.000</td>
<td>Lower bound 0.693 Upper bound 0.860</td>
</tr>
<tr>
<td>VAI</td>
<td>0.755</td>
<td>0.000</td>
<td>Lower bound 0.668 Upper bound 0.842</td>
</tr>
<tr>
<td>BMI</td>
<td>0.617</td>
<td>0.028</td>
<td>Lower bound 0.512 Upper bound 0.721</td>
</tr>
</tbody>
</table>

Discussion

The present study evaluated the ability of the surrogate marker, LAP in identifying glycemic control in type 2 DM patients. The glycated Hb was higher across the LAP quartiles, the number of diabetic patients with poor glycemic control increased with the increase in LAP Index. Significant positive correlation exist between HbA1C and LAP. In addition, the area under the curve showed that LAP has a good predictive power to identify the state of poor glycemic control.

The LAP was developed in an attempt to mirror the combined biochemical and anatomical changes associated with excess lipid accumulation. Measurements of serum TG concentrations and waist circumference are accessible and low-cost procedures, On the other hand, HbA1C measurement is relatively expensive and not routinely available in every clinical setting, at least in most of the undeveloped countries.

It is suggested that lipoprotein particle that have small diameters are linked to diseases risk more than those with large diameters (13, 14) and that the abdominal size correlate inversely with the diameter of lipoprotein particles (15), accordingly, LAP may state disease risk through the relations between its two components (TG and WC).

Excessive lipid accumulation, predominantly in the abdominal region, is characterized by an increased insulin resistance. As the lipid is structured, it is reasonable to assume that LAP is able to mirror both visceral fat mass deposition and an increased lipolytic activity (16, 17). the increased lipolytic activity in the visceral fatty tissue is associated with less suppression by insulin, more free fatty acids released, more free fatty acids delivered to the liver and eventually more hepatic glucose production. Additionally, excess fatty acids slow down the hepatic insulin removal and this add to the insulin resistance (18).

Many previously published studies demonstrated the role of LAP in prediction of disease. LAP levels were independently linked with all-cause, cardiovascular and congestive heart failure mortality in normal weight postmenopausal women (19). Chiang et al (20) investigated the accuracy of LAP in predicting metabolic syndrome in Taiwanese adults in China, and he concluded that LAP is a simple index with higher predictability. Comparable results were found in Iran population (21). Another
population based cohort study suggested that the level of LAP was an independent predictor of cardiovascular events in normal BMI Iranian individuals (22).

In the NHANES III (Third National Health and Nutrition Examination Survey) population LAP level demonstrated a higher association with T2DM than BMI (23).

Another finding of this study was the strong association of LAP with total cholesterol, HDL-C levels - the independent risk factors of cardiovascular disease-. Rui et al [24] found that LAP correlated positively with serum total TG,TC, FPG,WC but negatively with HDL. Similar to the finding of this study, in addition, he found that LAP could be a better parameter than Triglyceride glucose index and VAI for predicting Metabolic syndrome.

The area under the curve showed that LAP had good predictive power to identify the state of poor glycemic control. Although Visceral adiposity index (VAI) has a comparable power, but it require additional measurements (BMI and HDL-C).

Several limitations in this study needed to be pointed out. Firstly, it was a cross-sectional study with a relatively small sample size, Secondly, the lack of information on the use of lipid-lowering drugs may possibly influence the results. Thirdly, the participants in this study were all women.

In conclusion, it is crucial to assess the glycemic control in a convenient and inexpensive way. Our study suggests that LAP is significantly associated with glycemic control. As HbA1C evaluation is not available in daily clinical application, it is reasonable to suggest the use of LAP as a simple and indirect assessment of long term glycemic control.

Conflicting Interest: None

Source of Funding: Self

Ethical Clearance: Ethical approval was obtained from the Ethical Committee of the Al-Kindy college of medicine.

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The Safe Concentration Determination for Public Health Problems Due to Inhalation of Air Containing Hydrogen Sulfide Around Industrial Area of Medan Indonesia

Erlinda Rasikhah Hadi Salma¹, Abdul Rohim Tualeka¹, Pudji Rahmawati², Syamsiar S Russeng³, Atjo Wahyu³

¹Department of Occupational Health and Safety, Faculty of Public Health, Airlangga University, 60115 Surabaya, East Java, Indonesia; ²Department of Development of Islamic Society, State Islamic University Sunan Ampel, Surabaya, East Java, Indonesia; ³Department of Occupational Health and Safety, Faculty of Public Health, Hasanuddin University, Makassar; East Java, Indonesia

ABSTRACT

Hydrogen sulfide or H₂S was a chemical compound which is colorless, flammable, explosive, corrosive, dangerous, and poisonous with the smell like rotten eggs. The source of H₂S came from human activities namely industrial activity and waste. The animal feed industry and the seafood processing industry were industries that produced waste containing H₂S gas. This research was done to determine the safe concentration of H₂S which had the potential to disrupt the health of the community around Medan industrial area. This was an observational research, cross sectional and descriptive. The research population was residential community around the industrial area of animal feed and seafood processing at a radius of 300m and 800m. The number of research sample was 104 people. The data analysis used quantitative data analysis manually to decide the safe concentration (C safe) of H₂S for community which were obtained from the data of experimental animal weight that was white mice (Wanimal), body surface area of white mice (BSA animal), worker weight (W), worker height (h), worker respiratory rate (BR), body surface area of worker (BSA), length of working time (t), concentration of H₂S (C), NOAEL, animal Km, human Km, and safe human dose of toxin (SHD).

The results showed measurements of H₂S concentrations in the industrial area of animal feed and seafood processing at 300m was 0.0022 ppm while at 800m was 0.0064 ppm, which means that both were above the Threshold Limit Value (TLV) of 0.0005 ppm according to the ATSDR provisions regarding the Odor TLV H₂S. According to KepMenLH No. KEP-50/MENLH/1996 concerning standard level of odor with TLV of 0.02 ppm, then only for the community around industrial areas at radius 300 m with a concentration of 0.022 ppm which was above the TLV. Akan tetapi konsentrasi hidrogen sulfida pada radius 300 m dan 800 m tersebut berada di bawah Minimal Risk Levels (MRL) tingkat pemaparan inhalasi hidrogen sulfida yang ditetapkan oleh Agency for Toxic Substances and Disease Registry (ATSDR) 2016 untuk efek akut sebesar 0.07 ppm.

Upaya pengendalian yang dilakukan untuk masyarakat berisiko adalah pengkonsumsi enzim sitokrom P450 yang terkandung dalam makanan yang mengandung zat besi seperti kacang-kacangan, sayuran, daging, kuning telur, dan ikan untuk menurunkan tingkat hidrogen sulfida dalam tubuh. Control efforts taken for people at risk were consuming the cytochrome P450 enzyme in iron-containing foods such as nuts, vegetables, meat, egg yolks, and fish to reduce the level of H₂S in the body. TSelain itu adanya gangguan pada enzim sitokrom oksidase menyebabkan suplai energi hasil oksidasi di mitokondria berkurang, untuk itu perlu mengkonsumsi makanan yang mengandung antioksidan seperti alpukat, delima dan anggur (Tualeka, 2013). The interference with the cytochrome oxidase enzyme caused the energy supply from oxidation in the mitochondria to decrease, so it is necessary to consume foods that contain antioxidants such as avocados, pomegranates and grapes (Tualeka, 2013).

Keywords: Hydrogen Sulfide, safe concentration, public, animal feed and seafood processing industries.

DOI Number: 10.5958/0976-5506.2019.02570.1
Introduction

Yong Bai (2019) explains that H₂S is a colorless gas, flammable, poisonous, and has a smell like rotten eggs. (1) Humans can smell hydrogen sulfide at low concentrations in the air, starting at 0.0005 ppm. This can increase the risk of exposure to air levels which can cause serious health effects. H₂S is mainly absorbed through the lungs, digestive tract and skin (ATSDR, 2016). (2)

H₂S inhibits the cytochrome oxidase enzyme that contains iron inside mitochondria as an energy-producer. (3) Mitochondria are susceptible to oxidative stress which requires adequate antioxidants. The interference with the cytochrome oxidase enzyme causes the energy supply from oxidation in the mitochondria to decrease, called hypoxia (Tualeka, 2013). (4)

ACGIH sets the Threshold Limit Value of H₂S is 10 ppm. (5) In Indonesia according to KepMenLH No.KEP-50/MENLH/11/1996, the TLV is set at 0.02 ppm. (6) Sedangkan berdasarkan Agency for Toxic Substances and Disease Registry (ATSDR) Nilai Ambang Batas (NAB) hydrogen sulfida sebesar 0,0005 ppm sesuai ketentuan ATSDR tentang Nilai Ambang Batas Bau Hidrogen Sulfida (H₂S). Based on the ATSDR, the TLV of H₂S is 0,0005ppm in accordance with ATSDR provisions regarding the odor TLV of H₂S. (2)

In Dipa study (2016), the results of measurements of the H₂S concentration in kawasan industri pakan ternak and pengolahan hasil laut radius300 m sebesar 0,03 mg/m³ (0,0022 ppm) sedangkan konsentrasi H₂S pada radius 800 m sebesar 0,009 mg/m³ (0,0064 ppm), yang berarti keduanya berada di atas Nilai Ambang Batas (NAB) hydrogen sulfida sebesar 0,0005 ppm sesuai ketentuan ATSDR tentang Nilai Ambang Batas Bau Hidrogen Sulfida (H₂S). Industrial areas at 300m is 0.0022ppm while the concentration of H₂S at 800m is 0.0064ppm. (7) It means both are above the TLV of 0.0005ppm according to the ATSDR provisions regarding the odor TLV of H₂S. Sedangkan menurut KepMenLH No.KEP-50/MENLH/1996 tentang baku tingkat kebauan dengan Nilai Ambang Batas Bau Hidrogen Sulfida (H₂S), sebesar 0,02 ppm maka hanya pada masyarakat kawasan industri pakan ternak dan pengolahan hasil laut (radius 300 m) dengan konsentrasi sebesar 0,022 ppm yang berada di atas Nilai Ambang Batas (NAB). According to KepMenLH No.KEP-50/MENLH/1996 concerning standard level of odor with TLV is 0.02ppm, then only for the community around industrial areas at 300m with a concentration of 0.022 ppm is above the TLV. Berdasarkan penelitian yang dilakukan tidak menimbulkan efek karsinogenik, namun berdampak pada kesehatan jika terpapar secara kontinyu.

Research in Norway regarding the assessment of exposure H₂S in wastewater treatment workers has shown that 93 workers are above the safe limit of the H₂S concentration which is 0.1 ppm. It can be concluded that the majority of wastewater treatment workers experience respiratory problem. (8)

Based on previous research on H₂S there has been no research on H₂S safe concentrations. The concentration of H₂S should be within safe limits so that it does not cause health problems for the community. Oleh karena itu, berdasarkan penjelasan di atas, penulis akan mengukur batasan konsentrasi aman hydrogen sulfida di pemukiman penduduk sekitar industri pakan ternak dan pengolahan hasil laut. Therefore, the author will measure the limits of the H₂S safe concentration in residential area around Medan industrial area.

Material and Method

This study was an observational, cross sectional and descriptive study. Populasi dalam penelitian ini adalah ibu rumah tangga yang tinggal di sekitar kawasan industri pada Radius 300 m dan radius 800 m. The number of samples in this study were 52 people at a radius of 300 m and 800 m, so the total sample was 104 people.

Data mengenai konsentrasi benzena di udara didapatkan dengan melakukan pengukuran langsung menggunakan atuk Spektrofotometer dan dialisis dengan Iont sulfida bereaksi dengan p-amino-dimethyl anilin dan FeCl₃ membentuk metilen biru, mengacu pada metode SNI 19-7119.7-2005. The direct measurement of H₂S concentration used a spectrophotometer and analyzed with sulfide ions reacting with p-amino-dimethyl aniline and FeCl₃ forming methylene blue, referring to the SNI 19-7119.7-2005 method.

The research variables were H₂S concentrations, housewife weight, height, respiration rate, length of work day, body surface area, weight and body surface of white mice, the highest dose of toxin without effect on experimental animals (NOAEL), Animal Km, Human Km, safe limit of dose (SHD), and H₂S concentration.
The data analysis in this study was done by using quantitative data analysis manually to determine the \( \text{H}_2\text{S} \) safe concentrations.

**Results**

A. Characteristics of Animals and the Surface Area of Experimental Animals (White Mice):
Suatu senyawa dikatakan toksik ketika masuk ke dalam tubuh dan berpotensi menyebabkan gangguan kesehatan tubuh. Pada umumnya, respon manusia terhadap toksikan secara kualitatif memiliki kesamaan dengan respon hewan yaitu sekitar 90% gen hewan ini mirip dengan manusia, sehingga fakta ini menjadi dasar ekstrapolasi dari data hewan ke manusia. In general, the human response to toxicity qualitatively had similarities with the response of animals that was about 90% of the genes of these animals were similar to humans.

<table>
<thead>
<tr>
<th>Experimental Animals (Tikus Putih) (White rat)</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024050</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
</tr>
</tbody>
</table>

Based on the data of white rat body weight, the body surface of mice could be calculated using the following formula:

\[ \text{Animal BSA} = 0.09 \times W^{0.67} \]

B. Community Characteristics, Community Body Surface Area and Community Respiratory Rate:
Based on Table 2, it was known that the average body weight at a 300 m and 800 m was 68 kg. Lama waktu penduduk khususnya ibu rumah tangga yang terpapar gas \( \text{H}_2\text{S} \) pada radius 300 m dalam sehari adalah 18 jam sedangkan lama waktu ibu rumah yang terpapar gas \( \text{H}_2\text{S} \) pada radius 800 m dalam sehari adalah 15 jam. The length of time residents, especially housewives who were exposed to \( \text{H}_2\text{S} \) gas at 300 m in a day was 18 hours while at 800 m in a day was 15 hours. Tinggi badan menggunakan nilai rata-rata tinggi badan wanita dewasa Indonesia yaitu 153 cm. Height used the average value of Indonesian adult women’s height was 153 cm.

Based on this data, the body surface area and the respiration rate of workers could be calculated using the following formula.

1. **Body Surface Rate**

\[ \text{BSA} = \frac{\sqrt{W \times h}}{3600} \]

2. **Respiratory Rate**

\[ \text{BR} = \frac{5.3 \times \ln W - 6.9}{24} \]

**Information:**

BSA: Body Surface Area (m²)
WW: Weight (kg)
H h: Height (cm)
BR: Breathing Rate (m/hour)

<table>
<thead>
<tr>
<th>Population</th>
<th>W (Kg)</th>
<th>h (Cm)</th>
<th>BSA (m²)</th>
<th>t (hour/day)</th>
<th>BR (m³/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>65</td>
<td>153</td>
<td>1.66</td>
<td>14</td>
<td>0.63</td>
</tr>
<tr>
<td>2</td>
<td>76</td>
<td>153</td>
<td>1.8</td>
<td>16</td>
<td>0.67</td>
</tr>
<tr>
<td>3</td>
<td>63</td>
<td>153</td>
<td>1.64</td>
<td>17</td>
<td>0.62</td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>78</td>
<td>153</td>
<td>1.82</td>
<td>18</td>
<td>0.67</td>
</tr>
<tr>
<td>Average</td>
<td>68</td>
<td>153</td>
<td>1.7</td>
<td>16.87</td>
<td>0.64</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Radius 300 m</th>
<th>Population</th>
<th>W (Kg)</th>
<th>h (Cm)</th>
<th>BSA (m²)</th>
<th>t (hour/day)</th>
<th>BR (m³/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>65</td>
<td>153</td>
<td>1.66</td>
<td>15</td>
<td>0.63</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>76</td>
<td>153</td>
<td>1.8</td>
<td>14</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>63</td>
<td>153</td>
<td>1.64</td>
<td>16</td>
<td>0.63</td>
<td></td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>78</td>
<td>153</td>
<td>1.82</td>
<td>15</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>68</td>
<td>153</td>
<td>1.7</td>
<td>14.9</td>
<td>0.64</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Radius 800 m</th>
<th>Population</th>
<th>W (Kg)</th>
<th>h (Cm)</th>
<th>BSA (m²)</th>
<th>t (hour/day)</th>
<th>BR (m³/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>65</td>
<td>153</td>
<td>1.66</td>
<td>15</td>
<td>0.63</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>76</td>
<td>153</td>
<td>1.8</td>
<td>14</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>63</td>
<td>153</td>
<td>1.64</td>
<td>16</td>
<td>0.63</td>
<td></td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>78</td>
<td>153</td>
<td>1.82</td>
<td>15</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>68</td>
<td>153</td>
<td>1.7</td>
<td>14.9</td>
<td>0.64</td>
<td></td>
</tr>
</tbody>
</table>
The analysis results of the BSA and BR calculation according to tables 2 and 3 showed that the average BSA of workers was 1.27 m² and the average workers BR was 0.64 m³/hour.

C. Hydrogen Sulfide Concentration (H₂S): The measuring results of H₂S concentration in the industrial area showed different results at a radius of 300 m and 800 m which was equal to 0.03 mg/m³ (0.022 ppm) and 0.009 mg/m³ (0.0064 ppm).

Based on the measurements results, both were above the TLV of 0.0005 ppm according to ATSDR provisions regarding the Odor Limit Value of H₂S. According to KepMenLH No. KEP-50/MENLH/1996 regarding the standard level of odor with the TLV of 0.02 ppm then only for the industrial area community at radius 300 m was above the TLV.

D. Animal Km and Human Km

1. Animal Km

   \[ \text{Animal Km} = \frac{W_{\text{Animal}}}{\text{BSA Animal}} \]

   The results of the Animal Km calculation were shown in table 5, with the average of Animal Km was 5.81.

<table>
<thead>
<tr>
<th>Experimental Animals</th>
<th>Animal Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.814209516</td>
</tr>
<tr>
<td>2</td>
<td>5.814209516</td>
</tr>
<tr>
<td>3</td>
<td>5.821029467</td>
</tr>
<tr>
<td>4</td>
<td>5.821029467</td>
</tr>
<tr>
<td>5</td>
<td>5.800520675</td>
</tr>
<tr>
<td>6</td>
<td>5.827833234</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>5.81</strong></td>
</tr>
</tbody>
</table>

2. Human Km

   \[ \text{Human Km} = \frac{W_{\text{Human}}}{\text{BSA Human}} \]

   The results of the Human Km calculation were shown in table 6, with the average of Human Km was 39.26.

<table>
<thead>
<tr>
<th>Population</th>
<th>Human KM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>38.46</td>
</tr>
<tr>
<td>2.</td>
<td>41.53</td>
</tr>
<tr>
<td>3.</td>
<td>37.72</td>
</tr>
<tr>
<td>Etc.</td>
<td>41.93</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>39.26</strong></td>
</tr>
</tbody>
</table>

E. NOAEL: To determine the safe limit concentration of a chemical begun with the toxicity test determining the highest dose without causing effects on experimental animals or No Observed Adverse Effect Level (NOAEL). Based on US Environmental Protection Agency research stated that H₂S NOAEL was 1 mg/m³ or equivalent to 0.0074 mg/kg obtained from the following calculations.

\[
\text{H₂S NOAEL} = 1 \text{mg/m}^3 = \frac{1 \times 0.00013 \times 8}{0.1405} = 0.0074 \text{mg/kg}
\]

F. Safe Human Dose: The safe limit for the dose of toxins for humans or Safe Human Dose (SHD) was found to be initiated using the following formula from Shaw et al (2007).

\[
\text{SHD} = \text{NOAEL} \times \frac{\text{Animal Km}}{\text{Human Km}}
\]

Information:

SHD: Safe Human Dose (mg/kg)
Animal KM: KM factors in animals
Human KM: KM factors in humans

Based on the formula, the calculation obtained from the NOAEL value, the average animal Km, and the average human Km were:

\[
\text{SHD} = 0.0074 \times \frac{5.81}{39.26} = 0.001 \text{mg/kg}
\]

G. Safe Limits of Hydrogen Sulfide Concentration (H₂S): Determining the safe limits of H₂S concentrations used the following formula (William, 1985; Soemirat, 2003; Davis, 1991).
Caman = \frac{(SHD)(W)}{(\delta)(BR)(t)} \text{ mg/m}^3 \\
To convert units of mg/m\(^3\) to ppm the following formula was used. \(10\)

\[ C\text{aman} = \frac{\#mg/m^3}{(MW)} \times 24.45 \text{ ppm} \]

Information:

C safe: The concentration of toxins in the air which is safe for the community (mg/m\(^3\))

SHD: Safe Human Dose (mg/kg)

W: Weight (kg)

\(\delta\): % of substances absorbed by the lungs

BR: Human respiratory rate (m\(^3\)/hour)

t: Working time (hours)

MW: Molecular Weight

Based on formula above, the calculation of the safe concentration of H\(_2\)S on average in residential areas around industries at radius 300 m and 800 m shown in table 7 and 8 were equal at 0.01 ppm.

\[ C\text{ safe average} = \frac{(SHD)(W)}{(\delta)(BR)(t)} \]
\[ = \frac{(0.0011)(68)}{(50\%)(0.64)(17)} \]
\[ = 0.0137 \text{ mg/m}^3 \]
\[ = 0.01 \text{ ppm (radius 300 m)} \]

\[ C\text{ safe average} = \frac{(SHD)(W)}{(\delta)(BR)(t)} \]
\[ = \frac{(0.0011)(68)}{(50\%)(0.64)(15)} \]
\[ = 0.0155 \text{ mg/m}^3 \]
\[ = 0.01 \text{ ppm (radius 800 m)} \]

**Table 5: Calculation Results of Safe Concentration in Community Around Medan Industrial Area at Radius 300 m**

<table>
<thead>
<tr>
<th>Population</th>
<th>SHD</th>
<th>W</th>
<th>(\delta)</th>
<th>BR</th>
<th>t</th>
<th>C safe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0011</td>
<td>65</td>
<td>50%</td>
<td>0.63</td>
<td>14</td>
<td>0.0161</td>
</tr>
<tr>
<td>2</td>
<td>0.0010</td>
<td>76</td>
<td>50%</td>
<td>0.67</td>
<td>16</td>
<td>0.0144</td>
</tr>
<tr>
<td>3</td>
<td>0.0011</td>
<td>63</td>
<td>50%</td>
<td>0.63</td>
<td>17</td>
<td>0.0132</td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 6: Safe Concentration Calculation Results in Community Around Medan Industrial Area at Radius 800 m**

<table>
<thead>
<tr>
<th>Population</th>
<th>SHD</th>
<th>W</th>
<th>(\delta)</th>
<th>BR</th>
<th>T</th>
<th>C safe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0011</td>
<td>65</td>
<td>50%</td>
<td>0.63</td>
<td>15</td>
<td>0.0150</td>
</tr>
<tr>
<td>2</td>
<td>0.0010</td>
<td>76</td>
<td>50%</td>
<td>0.67</td>
<td>14</td>
<td>0.0165</td>
</tr>
<tr>
<td>3</td>
<td>0.0011</td>
<td>63</td>
<td>50%</td>
<td>0.63</td>
<td>16</td>
<td>0.0140</td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>0.0010</td>
<td>78</td>
<td>50%</td>
<td>0.67</td>
<td>15</td>
<td>0.0155</td>
</tr>
<tr>
<td>Average</td>
<td>0.0011</td>
<td>68</td>
<td>50%</td>
<td>0.64</td>
<td>14.9</td>
<td>0.0155</td>
</tr>
</tbody>
</table>

The lowest C safe = 0.0113 mg/m\(^3\)

Based on the safe concentration calculation in 52 people who were housewives living around the industrial radius of 800 m, the calculation result of the lowest safe concentration of H\(_2\)S or the safest limit for the community was 0.00113 mg/m\(^3\) (0.0081 ppm).

\[ \text{The lowest C safe} = \frac{\#mg/m^3}{(MW)} \times 24.5 \text{ ppm} \]
\[ = \frac{0.0113}{34.08} \times 24.5 \text{ ppm} \]
\[ = 0.0081 \text{ ppm} \]

The calculation results of safe limits at radius 300 m was of 0.007 ppm and 0.0081 ppm at radius 800 m could be used to predict the concentration of toxins in the air that was safe if there was no determination of TLV and for comparison with TLV which had been set by various institutions both by the National Standardization Agency, ACGIH, NIOSH and OSHA (William, 1985 in Tualeka, 2013).
Discussion

Berdasarkan hasil perhitungan, NOAEL hidrogen sulfida sebesar 1 mg/m³ setara dengan 0,72 ppm. Based on the calculation results, H₂S NOAEL is 1 mg/m³ (0.72ppm). Hasil NOAEL ini lebih kecil dari ATSDR tahun 2016 yaitu 2,5 ppm untuk sistem per napasan dengan paparan menengah. This NOAEL result is smaller than ATSDR in 2016, which was 2.5 ppm for respiratory systems with medium exposure. Selain itu besdasarkan NOAEL hasil perhitungan lebih kecil dari penelitian yang dilakukan Brenneman et al (2000) dalam EPA-IRIS NOAEL H₂S sebesar 14 mg/m³ yang menunjukkan bahwa kisaran paparan menengah dengan tingkat keparahan kontinyu. Based on NOAEL, the calculation results are smaller than the research conducted by Brenneman et al (2000) in EPA NOAEL H₂S of 14mg/m³ which indicates that the range of exposure is medium with continuous severity. (11)

Based on the calculation of the H₂S SHD value hidrogen sulfida didapatkan hasil yaitu 0.001 mg/kg.s obtained at 0.001mg/kg. Hasil SHD ini lebih kecil dari penelitian yang dilakukan Brenneman et al (2000) dalam EPA-IRIS (2009) yaitu 0,0044mg/kg yang menunjukkan bahwa paparan kronis tingkat rendah terhadap H₂S. Dengan demikian hasil perhitungan nilai SHD yang dilakukan lebih aman bagi manusia dengan menggunakan NOAEL sebagai perhitungan RfC. The results of this SHD are smaller than the research conducted by Brenneman et al (2000) in EPA (2009) which was 0.0044mg/kg which indicates the low levels of chronic exposure to H₂S. (12) Thus the calculation of SHD values performed is safer for humans by using NOAEL as SHD calculation.

Based on the results of this study, the safe concentration of H₂S in Medan industrial area is 0.0077ppm (radius 300 m) and 0.0081 ppm (radius 800 m). Hasil penelitian ini lebih lebih kecil dari nilai ambang The results of this study are smaller than the H₂S TLV concentrationmenurut (ACGIH) yaitu 10 ppm., Badan Standarisasi Nasional Indonesia (SNI 19-0232-2005) yaitu 10 ppm. according to ACGIH which is 10ppm. The Indonesian National Standardization Agency (SNI 19-0232-2005) is 10 ppm. Sedangkan untuk kawasan industri radius 800 m berada di bawah batasan konsentrasi aman yaitu 0,022 ppm konsentrasi H₂S > 0,0077 ppm konsentrasi aman H₂S. This was compared to the concentration of H₂S at a radius of 300 m above the safe concentration limit of 0.022 ppm H₂S concentration > 0.0077 ppm H₂S safe concentration. Sedangkan untuk kawasan industri radius 800 m berada di bawah batas konsentrasi aman yang di tentukan yaitu 0,0064 konsentrasi H₂S < 0.0081 ppm konsentrasi aman H₂S. Whereas for the radius of 800 m was below the safe concentration limit, which was determined to be 0.0064 H₂S concentration > 0.0081 ppm H₂S safe concentration.

Recommendation

Recommendations for controllers are people at risk of consuming the cytochrome P450 enzymeyang terkandung dalam makanan yang mengandung zat besi seperti kacang-kacangan, sayuran, daging, kuning telur, 50/MENLH/11/1996 the TLV odor is set at 0.02ppm. Dengan demikian, nilai hasil penelitian dapat dijadikan acuan dalam menentukan nilai ambang batas hydrogen sulfida (H₂S) di lingkungan pemukiman sekitar industri pakan ternak dan pengolahan hasil laut dan juga aman bagi pekerja yang terpapar H₂S. The value of research results can be used as a reference in determining the TLV of H₂S in residential areas around Medan industries so that it is safe for workers exposed to H₂S.

Conclusion

The measurement results of the H₂S concentration of inhaled by the public, especially housewives in industrial area at 300m radius was 0.03 mg/m³ (0.022 ppm), while the measurement results of H₂S concentration at a radius of 800 m is 0.009 mg/m³ (0.0064 ppm) which means that both were above the TLV of 0.0005 ppm according to ATSDR provisions regarding the Odor TLV of H₂S. Whereas according to KepMenLH No.KEP-50/ MENLH/1996 concerning standard level of odor with TLV of 0.02 ppm, it was only in the industrial community radius of 300 m with a concentration of 0.022 ppm which was above the TLV.

Based on manual calculations for the lowest safe concentration limits of H₂S was 0.0077ppm (radius 300m) and 0.0081ppm (radius 800m). Hal ini jika dibandingkan dengan konsentrasi hidrogen sulfida yang ada di kawasan industri pada radius 300 m berada di atas batasan konsentrasi aman yaitu 0,022 ppm konsentrasi H₂S > 0,0077 ppm konsentrasi aman H₂S. This was compared to the concentration of H₂S at a radius of 300 m above the safe concentration limit of 0.022 ppm H₂S concentration > 0.0077 ppm H₂S safe concentration. Sedangkan untuk kawasan industri radius 800 m berada di bawah batas konsentrasi aman yang di tentukan yaitu 0,0064 konsentrasi H₂S < 0.0081 ppm konsentrasi aman H₂S. Whereas for the radius of 800 m was below the safe concentration limit, which was determined to be 0.0064 H₂S concentration > 0.0081 ppm H₂S safe concentration.
Danielikan untuk menurunkan tingkat hidrogen sulfida dalam tubuh. Contained in the iron-containing foods such as beans, vegetables, meat, egg yolks, and fish to lower the H2S levels in the body. Adanya gangguan pada enzim sitokrom oksidase menyebabkan suplai energy hasil oksidasi di mitokondria berkurang, untuk itu perlu mengkonsumsi makanan yang mengandung antioksidan seperti alpukat, delima dan anggur (Tualeka, 2013). The interference with the enzyme cytochrome oxidase causes the supply of energy from oxidation in mitochondria to decrease, so it is necessary to consume foods that contain antioxidants such as avocado, pomegranate and grapes (Tualeka, 2013).

**Conflict of Interest:** All authors have no conflicts of interest to declare.

**Source of Funding:** This is an article “Penentuan Konsentrasi Aman Pada Gangguan Kesehatan Masyarakat Akibat Menghirup Udara yang Mengandung Hidrogen Sulfida di Sekitar Kawasan Industri Medan Indonesia” of Occupational Health and Safety Department that was supported by Faculty of Public Health, Airlangga University.

**Ethical Clearance:** The study was approved by the institutional Ethical Board of the Public Health, North Sumatera.

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Biscuit Enriched with Bilih Fish (Mystacoleucus-padangensis) Increases Cognitive in Experimental Rat

Fivi Melva Diana¹, Rimbawan Rimbawan², Evy Damayanti², Mira Dewi², Vetnizah Juniantito³, Nur Indrawaty Lipoeto⁴

¹Faculty of Public Health, Andalas University, Padang 25137, Indonesia; ²Department of Community Nutrition, Faculty of Human Ecology, IPB University, Bogor 16680, Indonesia; ³Faculty of Veterinary Medicine, IPB University, Bogor 16680, Indonesia; ⁴Medical Faculty, Andalas University, Padang 25128, Indonesia

ABSTRACT

Background: Bilih fish (Mystacoleucus padangensis) contains omega-3 fatty acids and has the potential to be included as an ingredient in biscuits for children. Objective this study to develop biscuits formulated with Bilih fish and to analyze the effect of bilih fish-based biscuit treatment in cognitive learning abilities of Sprague Dawley rats.

Method: One biscuit formula was selected based on the best organoleptic test, and then given to 24 growing rats (21 days old Sprague Dawley strain male) for 28 days using a complete randomized design study. Treatments were P1 (standard feed (SF)), P2 (SF + standard biscuits (F0)), P3 (SF + F0) + pure omega-3 oil) and P4 (SF + the best formula biscuit (F20)). Parameters measured on rats were weight, consumption of standard feed, %FCE (food conversion effective) and Y-Maze score.

Result: Organoleptic test showed the best formula biscuit to administration 20 g Bilih fish flour to one formula dough with chocolate flavor. The consumption of standar feed of rat taken from P4 was significantly different from P2 but undifferent with P2 and P3. The highest Y-Maze score were obtained from P4, which was significantly different from P1, P2, and P3 in five days treatment. The highest persen of FCE in P4 was not significantly higher than P1, P2, and P3.

Conclusions: Production of biscuits by adding 20 g of bilih flour to one formula dough with chocolate flavor increased consumption of standar feed and Y-Maze score of growing rats significantly, but %FCE was not significantly.

Keywords: Bilih fish, omega-3 fatty acid, y-maze score.

Introduction

The first 1000 days of life is a golden period for child development. It starts with 270 days during pregnancy and followed by 730 days after birth or two years. The lack of nutrient in 1000 days of life impact stunting and low cognitive. Early age malnutrition, in children aged 3-11 years in all genders and ethnicities, led to a reduction in IQ scores about 15.3 points at the age of 11. The lack of omega-3 consumption may cause a direct problem in children’s growth and development. Bernardi (2012) stated that omega-3 needed for brain growth and development in children aged 0-2 years is very rapid. Thus malnutrition that occurs during this golden period will lead to growth faltering and impaired brain development. Adequate nutrients intake to support growth and increase cognitive aspects in 0 – 2 years age is pivotal. The adequacy of nutrients includes energy, carbohydrates, proteins, fatty acids, especially omega-3, which is a brain fatty acid. Omega-3 plays a role in brain growth and development both in normal and stunting children. It can help the growth in birth weight, body length and help improve the child’s cognitive ability.
Omega 3 is widely present in various types of fish. However, fish products have specific organoleptic properties which are not necessarily favored by children. Thus, research to improve acceptance of fish products amongst children is still a need. Research related to locally processed food products with fresh fish in the form of biscuit has been carried out by Widodo et al. (2015) to improve the nutritional status of children under five through the intervention with Snakehead fish-based biscuits.7

The development of local freshwater fish-based processed products into biscuits has several advantages, namely simple to produce, store, and distribute with relatively low prices with long shelf life. It can also be adjusted to the child’s digestion and shaped in such a way as to increase the children’s acceptance. Thus for the development of local fish-based biscuit products in Solok Regency, West Sumatra the Bilih fish was chosen. The results of the preliminary research showed that Bilih contains a high level of omega-3, about 0.553 g/100g of fresh fish.8

Previous study Cutuli et al (2016) found that the cognitive development and improvement in skill observed in mice using the Y-Maze test was related to the supplementation of omega-3 fatty acids.9 Further, Bernardi (2012) stated that omega-3 fatty acid play an important role in brain development and brain health and the low levels of omega-3 fatty acid in the body of experimental animals would affect dysfunctional brain development and disruption of growth, showing that omega-3 supplementation, DHA is useful for brain development, especially in memory and cognitive aspects in hippocampus.5

Previous studies by Mirza (2012) related to the development and cognitive improvement of the hippocampus in experimental animals were carried out using the Multiple T-Maze methods resulted in significant differences between the rat (given Centella Asiatica leaf extract) and the control. Experimental animals with the Centella Asiatica leaf extract intervention had increased in activity (walking, climbing, and smelling) compared to control experimental animals.10

This study aims to determine the effect of biscuits containing Bilih fish flour on the development of cognitive (the learning ability) of the experimental rat. Animal subjects (male neonatal Sprague-Dawley rats aged 21 days post-weaning) were used as the experimental animal because it is the same with under five years children. Thus it is crucial to study the potential of biscuits enriched with Bilih fish to improve the growth of children which started with animal study before further steps in a human subject is taken.

Materials and Method

This research was conducted from September 2017 until January 2018. The ethical clearance number 72-2017 was issued from the Institute for Research and Community Service of animal ethics commission, IPB University. This study used experimental rats was a completely randomized design.

The material used in this research was Bilih fish that was made into flour and then formulated into biscuits. The location, formula of fish-based biscuit product, rat treatment design and omega-3 fatty acid dose that use to this study refer to Diana et al. (2019).8 For the animal study, the effect of biscuit intervention on cognitive learning abilities Sprague Dawley rats. Purchase of Sprague Dawley rats was from PT. Indoanilab laboratory. The rats were bred and kept in the animal laboratory in PT. Indoanilab Bogor which is a semi-barrier type of facility. These rats are the 6th generation descendants of the female and male Sprague Dawley SPF (Specific Pathogen Free) strain rat, originated from Food and Drug Supervisory Agency (BPOM) Indonesia.

The research subjects were 21 days old male rats (post-weaning) of the Sprague Dawley strain (24 rats). The rats were moved and adapted for 14 days in Animal Veterinary Hospital (RSHP) research laboratory. The rats were given standard daily rations (including water) ad libitum for 14 days as an acclimatization period. Before treatment was given, the rats were placed in cages, weighed, and measured. Next, 24 rats were divided into four treatment groups and fed with standard feed for 14 days (acclimatization). After the acclimatization, all the rats entered the treatment period for 28 days. Every 2-7 days, the white rats were weighed using a digital measurement instrument with the accuracy of 1 gram. The cognitive aspect parameters were tested on rats using the Y-Maze method to measure cognitive abilities and spatial memory.11 The measurement of the Y-Maze score was done twice a week. Y-Spontaneous Maze Alternation is a behavioral test for measuring spatial working memory based on the willingness of rodents to explore new environments. The advantages of Y-Maze are the refinement of T-Maze, and if compared to other methods, Y-Maze is easier to be executed, many parts of the brain including the hippocampus, septum, basal forebrain, and prefrontal cortex--are involved in this task. This test is used to quantify cognitive deficits and evaluate effects on cognitive. Rat typically prefer to investigate a new arm of the maze rather than returning to one that was previously visited.12 The Y-Maze values are expressed in % alternation with a value >50%, which
is considered normal. The parameters were observed to calculate the frequency of recurrent error entering the arm and the frequency of error entering the empty arm at the labyrinth Y. At each labyrinth arm, the rat can develop a cognitive map of spatial relationships on which path the rat has visited. The Y-Maze was performed for 5 minutes in all treatment rats P1, P2, P3, and P4.

Statistical analysis used the ANOVA test procedure in a completely randomized design at 95% confidence level (α = 0.05) as well as further testing of Tukey test to determine the difference in the effects of treatments. Data processing was carried out on the computer using SAS 9.1 software.

**Results**

Table 1. The ANOVA results showed that there was a significant difference in the overall average of rats’ standard feed intake between treatments. The results of Tukey’s test indicated that the overall average amount of standard feed intake of P4 group (10.06 ± 1.81 g) was not different from P3 (9.43 ± 0.41 g) and P1 (9.33 ± 0.56 g) but significantly different from P2 (9.03 ± 1.33 g).

<table>
<thead>
<tr>
<th>Treatment</th>
<th>The overall average of rats’ standard feed intakes</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td></td>
</tr>
<tr>
<td>P1</td>
<td>9.33 ± 0.15ab</td>
<td>0.01</td>
</tr>
<tr>
<td>P2</td>
<td>9.03 ± 0.55b</td>
<td></td>
</tr>
<tr>
<td>P3</td>
<td>9.43 ± 0.08ab</td>
<td></td>
</tr>
<tr>
<td>P4</td>
<td>10.06 ± 0.96ab</td>
<td></td>
</tr>
</tbody>
</table>

**Table 1: The average standard feed intake of experimental rats during the 28-d treatment period**

The standard feed given was produced by PT Indofeed. Table 1 showed that the high standard feed intake of the P4 group could be caused by the nutrient content in P4 (the administration of 20 g Bilih fish flour to one formula dough with chocolate flavor). The best biscuit in P4 group had complete nutritional content such as carbohydrates, fat, fatty acids (omega-3, EPA, DHA, omega-6, and AA), and protein which were nutrients that played a significant role in the growth and cognitive development. The interaction between nutrients in P4 (F20 (the administration of 20 g Bilih fish flour to one formula dough with chocolate flavor) -- i.e., omega-3 fatty acids, protein, affected the growth and cognitive development. DHA plays a role in myelinization, synaptogenesis, and neuronal membrane structures, thereby increasing the appetite of rats against the standard feed given in the afternoon.

The high intake of standard feed in the P4 group might be caused by the nutrient contents of P4 such as omega-3 fatty acids, EPA, DHA, omega-6, and AA. Omega-3 could increase the rats’ appetite; thereby, the amount of standard feed consumption of the P4 group was higher than P1, P2, and P3 groups.

Table 2 showed that the ANOVA test results of the treatments were not significant in food conversion effective (FCE) of rats despite the differences in the average FCE. The highest increment in FCE was observed in P4 (21.87 ± 2.70%), compared to P3 (20.37 ± 8.03%), P2 (20.32 ± 5.13%) and P1 (17.75 ± 8.63%).

**Table 2: Effect of the standard feed (g) given on Food Conversion Effective (FCE) value of experimental rats (%)**

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Mean feed consumption (g)</th>
<th>Mean rats weight difference (g)</th>
<th>FCE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>261.20 ± 19.44</td>
<td>45.20 ± 18.21</td>
<td>17.75 ± 8.63</td>
</tr>
<tr>
<td>P2</td>
<td>252.79 ± 12.93</td>
<td>51.60 ± 14.55</td>
<td>20.32 ± 5.13</td>
</tr>
<tr>
<td>P3</td>
<td>264.16 ± 9.23</td>
<td>53.60 ± 20.45</td>
<td>20.37 ± 8.03</td>
</tr>
<tr>
<td>P4</td>
<td>281.58 ± 4.00</td>
<td>61.57 ± 7.70</td>
<td>21.87 ± 2.70</td>
</tr>
</tbody>
</table>

**Description:** Different letters in the same column show *significant differences p<0.05 (ANOVA test), * not significant with p > 0.05 (ANOVA test). P1= SF, P2= SF + F0, P3= SF+F0+ pure omega-3 oil and P4= SF + F20 (administration of 20 g Bilih fish flour to one formula dough with chocolate flavor).
feed given to increase the weight of experimental rats. Although the FCE value of P4 was not significant, it tended to be higher than P1, P2, and P3. The consumption of P4’s standard feed was more efficient in increasing the weight of experimental rats than other treatments (P1, P2, and P3). The results of this study were similar to the results of a study conducted by Fajri et al. (2013) who found that the FCE values were not significantly different between the treatments. 

Table 3 showed that the ANOVA test results of the average Y-Maze rat score in five days treatment were significant differences in Y-Maze score in the treatment group. Tukey test results showed that the highest score Y-Maze (63.34 ± 12.40) in P4, which was significantly different from P1 (20.00 ± 27.39), P2 (52.15 ± 14.16) but insignificant different from P3 (45.84 ± 26.69). This result research confirms that proliferation neuron cell happened 2-3 years old children is the same with 40 days of age rats in this research. The results of this study are supported by the by Cutuli et al. (2016), who stated that the treated rats showed better new recognition skills in Y-Maze tests with objects compared to control rats.

Table 3: Y-Maze score of rats on pre and post treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Awal</th>
<th>Akhir</th>
<th>Δ</th>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>35.16 ± 20.82</td>
<td>44.64 ± 41.57</td>
<td>9.48 ± 48.47</td>
<td>20.00 ± 27.39</td>
</tr>
<tr>
<td>P2</td>
<td>22.20 ± 20.77</td>
<td>38.38 ± 22.94</td>
<td>16.18 ± 19.9</td>
<td>52.15 ± 14.16</td>
</tr>
<tr>
<td>P3</td>
<td>29.22 ± 21.16</td>
<td>51.42 ± 32.03</td>
<td>22.20 ± 48.6</td>
<td>45.84 ± 26.69</td>
</tr>
<tr>
<td>P4</td>
<td>22.96 ± 22.74</td>
<td>54.22 ± 27.39</td>
<td>31.26 ± 29.8</td>
<td>63.34 ± 12.40</td>
</tr>
</tbody>
</table>

P-value: 0.864 0.035

Description: Different letters in the same column show *significant differences p<0.05 (ANOVA test), * not significant with p > 0.05 (ANOVA test). P1= SF, P2= SF+F0, P3= SF+F0+pure omega-3 oil and P4= SF+F20 (administration of 20 g Bilih fish flour to one formula dough with chocolate flavor).

Tabel 3 the rats in the P4 treatment F20 (20g Bilih fish flour to one formula dough with chocolate flavor) had the greatest Y-Maze score. This is because P4 contains complete nutrients such as energy (518.09 kcal/100g biscuit), fat (27.81 %/100g biscuit), protein (6.60 g/100g biscuit), carbohydrates (60.29 g/100 g biscuit) and omega-3 fatty acids (0.66 %/100 g biscuit), linolenic acid (0.66 g/100g biscuit), DHA (0.01 g/100g biscuit), EPA (0.01 g/100g biscuit), AA (0.01 g/100g biscuit) and omega 6 (3.48 g/100g biscuit). Based on RDA (2013), the nutrient requirement need for children aged 1-3 years is 1125 kcal in energy, 155 g of carbohydrate, 26 g of protein, 44 g of fat and 0.7 g of omega-3 fatty acid. The contribution of energy from biscuits in this study can be considered as a good source of energy and omega-3 fatty acid.

Conclusion and Suggestion

The addition of 20g Bilih fish flour to one formula dough with chocolate flavor significantly increased the consumption standard feed and the Y-Maze score, although it was not significant for weight and %FCE in rats. Therefore Biscuits with enrich with Bilih Fish can be recommended for the government to be used as an alternative to ASI complementary foods in optimizing growth and cognitive in infants.

Conflict of Interest: The authors declare that they have no competing interests.

Source of Funding: This study support by Ministry of Research, Technology and Higher Education (Kemenristekdikti).

Ethical Clearance: This research was approved by the ethical clearance number 72-2017 was issued from the Institute for Research and Community Service of animal ethics commission, IPB University.

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Determination of Safe Duration of Exposure to Benzene at Public Gas Stations Around Diponegoro University Semarang, Indonesia

Genduk Lintang Rusmawardai, Abdul Rohim Tualeka, Dimas Triyadi, Pudji Rahmawati, Syamsiar S Russeng, Atjo Wahyu, Ahsan

1Department of Occupational Safety and Health, Faculty of Public Health, Airlangga University, 60115 Surabaya, East Java, Indonesia; 2Department of Environmental Health, Faculty of Public Health, Diponegoro University, Semarang, Indonesia; 3Department of Development of Islamic Society, State Islamic University Sunan Ampel, Surabaya, Indonesia; 4Department of Occupational Safety and Health, Faculty of Public Health, Universitas Hassanudin, Makassar, Indonesia; 5Faculty of Nurse, University of Brawijaya, Malang, Indonesia

ABSTRACT

Benzene in the air can be found from emissions of coal and oil combustion, gas stations, and motor vehicle workshops. This research was descriptive, observational, and cross sectional and aimed to determine safe duration of exposure (Safe Dt) to benzene for officers of the public gas stations around the area of Diponegoro University Semarang. The subjects of this research were 28 officers determined by Slovin formula and proportional random sampling and taken by purposive sampling technique according to the inclusion criteria of the researchers. The variables of this research were animals weight, BSA experimental animals, officers weight, Body Surface Area, officers breathing rate, benzene concentration, Animal Km, Human Km, NOAEL, officers RfC, and Safe Dt.

The average concentration was 0.25 ppm and the highest concentration was 2.08 ppm. From the comparison of results and the Threshold Limit Value according to Permenakertrans No.5/MEN/X/2018, there is still a need for efforts to control benzene exposure by companies and governments, such as determining the period of service of officer who refers to the calculation of safe duration of exposure (Safe Dt) to benzene by 2.2 years. In addition, efforts to control benzene exposure can be also performed by providing Personal Protective Equipment (PPE), i.e half mask respirator with an organic vapor cartridge for officers and regular monitoring of benzene exposure in the work environment.

Keywords: Benzene, public gas stations, duration of safe exposure

Introduction

Benzene in the air is resulted from emissions of coal and oil combustion, gas stations, and motor vehicle workshops. Chronic benzene exposure or long term inhalation can cause various circulatory disorders, including reduced red blood cells and aplastic anemia. The Environmental Protection Agency (EPA) classifies carcinogenic benzene for humans through various exposure routes(2).

The level of exposure to benzene at gas stations in low and middle income countries according to Navasumrit et al. (2005) and Bahrami et al. (2007) in IARC
Monographs showed higher concentrations of benzene\(^{(3)}\). Severity of poisoning caused by benzene depends on concentration, route, and duration of exposure, as well as age and medical conditions of the exposed person\(^{(4)}\). Benzene compounds as solvents have the value of the Inhalation Reference Concentration (RfC) and Cancer Slope Factor (CSF) that have been determined by the US Environmental Protection Agency’s Integrated Risk Information System (IRIS U.S. EPA) in 2003. The value of Inhalation Reference Concentration (RfC) for non-effect carcinogenic 3\(\times 10^{-2}\) mg/m\(^3\) converted to 0.0086 mg/kg/day and the Cancer Slope Factor (CSF) value for a carcinogenic effect of 2.2\(\times 10^{-6}\)-7.8\(\times 10^{-6}\) mg/m\(^3\) which is converted to 0.1-0.34 mg/kg/day\(^{(5)}\).

Exposure to benzene which can be tolerated by the European Chemicals Agency (ECHA) is 1 ppm or converted to 3.25 mg/m\(^3\)\(^{(6)}\). The National Institute for Occupational Safety & Health states the Recommended Exposure Level (REL) of benzene which can be tolerated at 0.1 ppm or if converted to 0.32 mg/m\(^3\)\(^{(7)}\). Whereas according to the Committee for Hazardous Substances in Germany, benzene exposure can be tolerated at 1.9 mg/m\(^3\)\(^{(8)}\). Indonesia itself regulates the safe limits of benzene exposure concentrations in Permenakertrans No.5/MEN/X/2018 in 2018. The Threshold Limit Value (TLV) of benzene is 0.5 ppm\(^{(9)}\).

Central Java is a province with the third largest population estimate in Indonesia in 2013\(^{(10)}\). Semarang has the highest population growth rate compared to other cities or districts in 2010-2017 by 1.72% caused by the existence of several universities\(^{(11)}\). In 2013, this affects the number of motorized vehicle use in Banyumanik and Tembalang subdistricts which reached 5,707 and 16,221 units\(^{(12)}\). Ministerial Decree Number 1585/K/32/MPE/1999 concerning the gradual elimination of lead (Pb) and substitution with benzene does not reduce the carcinogenic effects of fuel\(^{(13)}\). Public gas stations officers have a high level risk of benzene exposure because they exposed to hazardous chemicals for years of work.

Based on the results of research by Costantini et al. (2003) and Paci et al. (1989) in Agency for Toxic Substances and Disease Registry (2007), shoe factory workers in Italy showed an increased risk of leukemia along with increased benzene exposure. International Agency for Research on Cancer (IARC) and the Environmental Protection Agency (EPA) Weight of Evidence for Carcinogenicity (WOE) in 2005 under U.S. The Environmental Protection Agency classifies benzene in Category 1 (carcinogenic) and CH (carcinogenic to humans)\(^{(14)}\). The risk of cancer or other health problems due to exposure to benzene to humans is clearly dangerous so it is necessary to calculate the safe duration of exposure to workers exposed to benzene in the work environment.

Previous research has not calculated the safe duration of exposure (Safe Dt) using either RfC formula with No Observed Adverse Effect Level (NOAEL) for workers exposed to benzene when working. Public gas stations officers are one of the jobs with a high risk of benzene exposure so that the calculation of Safe Dt is important to reduce the risk of cancer and other health problems due to benzene exposure\(^{(15)}\). Safe Dt to benzene is best calculated using RfC formula with NOAEL adjusting the research data so as not to cause harmful effects on the body\(^{(16)}\). Therefore, the authors calculated Safe Dt to benzene using RfC formula with NOAEL as the safe limit for the duration of benzene exposure for public gas stations officers.

### Material and Method

This research was a descriptive, observational, and cross sectional which aimed to determine safe duration of exposure (Safe Dt) to benzene. The population of this research was 78 officers of the public gas stations around Diponegoro University Semarang. 28 officers were taken as samples taken by purposive sampling technique according to the inclusion criteria of the researchers.

Data were taken in the form of primary data obtained through filling out questionnaires, weighing the body, and measuring benzene intake officers of the public gas stations with personal dust sampler and coconut shell charcoal as well as secondary data such as the number of officers, years of service, type of fuel, work shift schedules, and weight of experimental animals. The variables of this research includes animals weight, BSA experimental animals, officers weight, officers body surface area, officer breathing rate, benzene concentration, Animal Km, Human Km, NOAEL, reference concentration of benzene on the officer, and safe duration of exposure (Safe Dt) to benzene in the air for officers. Analysis of research data to determine safe duration of exposure to benzene was carried out manually.
Findings

A. Characteristics and Bodies Surface Area of Experimental Animal: The toxicity test using animals as a model aims to see the existence reactions in humans against a test substance. The experimental animals used in this research were white mice (Rattus Norvegicus)\(^{20}\).

Table 1: Distribution of Characteristics of White Mice

<table>
<thead>
<tr>
<th>Experimental animal (White rat)</th>
<th>W (kg)</th>
<th>BSA (m(^2))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024050</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
</tr>
</tbody>
</table>

The surface area of white mice is calculated by using the following formula.

\[
BSA = 0.09W^{0.67}
\]

Where,

BSA: Body Surface Area (m\(^2\))

W: Weight (kg)

B. Characteristics, Body Surface Area, and Respiratory Rate of Officers: The samples of this research have characteristics with an average body weight of 58.57 kg and an average length of time working 6.5 hours/day. In this research, the average height used was the average Indonesian male height of 159 cm.

1. Body surface area

\[
BSA = \sqrt[3]{W \cdot h/3600}
\]

Where,

BSA: Body Surface Area (m\(^2\))

W: Weight (kg)

h: Height (cm)

\[
BSA = \sqrt[3]{58.57 \cdot 159/3600} = 1.6 \text{ m}^2
\]

2. Breathing rate

\[
BR = \frac{5.3 \ln W - 6.9}{24}
\]

Where,

BR : Breathing Rate (m\(^3\)/hour)

W : Weight (kg)

\[
BR = \frac{5.3 \ln 58.57 - 6.9}{24} = 0.6 \text{ m}^3/\text{jam}
\]

Table 2: Distribution of Characteristics, Respiratory Rate, and Duration of Work of public gas stations officers around Diponegoro University Semarang

<table>
<thead>
<tr>
<th>Number of sample</th>
<th>W (kg)</th>
<th>h (cm)</th>
<th>BSA (m(^2))</th>
<th>BR (m(^3)/hour)</th>
<th>t (hour/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>58.57</td>
<td>159</td>
<td>1.6</td>
<td>0.6</td>
<td>6.5</td>
</tr>
</tbody>
</table>

C. Benzene Concentration: The average concentration of benzene in exposed air in public gas stations around Diponegoro University Semarang is 0.82 mg/m\(^3\) or 0.25 ppm.

\[
C = 24.45 \times C (\text{mg/m}^3) \div \text{molecular weight}
\]

\[
C = 24.45 \times 0.82 \text{ mg/m}^3 \div 78.11 = 0.25 \text{ ppm (< 0.5 ppm)}
\]

D. Animal Km dan Human Km

1. Animal Km

Animal Km = \(\frac{W_{\text{animal}}}{\text{BSA}_{\text{animal}}}\)

Where,

Animal Km :Km factor in experimental animals

W : Weight (kg)

BSA : Body Surface Area (m\(^2\))

Table 3: Animal Km in White Mice

<table>
<thead>
<tr>
<th>Experimental animal (White mice)</th>
<th>W (kg)</th>
<th>BSA (m(^2))</th>
<th>Animal Km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.814194082</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.814194082</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
<td>5.820914007</td>
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Conted…

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024050</td>
<td>5.8004158</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
<td>5.855576247</td>
</tr>
<tr>
<td>Average</td>
<td>0.1407</td>
<td>0.024165</td>
<td>5.82</td>
</tr>
</tbody>
</table>

**2. Human Km**

\[
\text{Human Km} = \frac{W_{\text{human}}}{\text{BSA}_{\text{human}}}
\]

**Table 4: Human Km of Public Gas Stations Officers around Diponegoro University Semarang**

<table>
<thead>
<tr>
<th>Number of sample</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
<th>Human Km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>58.57</td>
<td>1.6</td>
<td>36.6</td>
</tr>
</tbody>
</table>

**E. No Observed Adverse Effect Level (NOAEL):**

Swaen et al (2010) stated that the calculation of No Observed Adverse Effect Level (NOAEL) benzene was 3.0 mg/m³ or equivalent to 0.022 mg/kg obtained by using the following formula\(^{(21)}\).

\[
\text{NOAEL benzene} = 3.0 \text{mg/m}^3
\]

\[
\text{NOAEL benzene} = \frac{3 \times 0.00013 \times 8}{0.1405} = 0.022 \text{mg/kg}
\]

**F. Inhalation Reference Concentration (RfC):**

Shaw et al. (2007) in the 2013 Industrial Toxicology & Risk Assessment book stated that the calculation of inhalation RfC can use the following formula\(^{(22)}\).

\[
\text{RfC} = \frac{\text{NOAEL}_{\text{animal Km}}}{\text{human Km}}
\]

Where,

Animal Km : Km factor on animal

Human Km : Km factor on human

Inhalation RfC obtained from the NOAEL value, the average Animal Km, and the average Human Km are as follows.

\[
\text{RfC} = \frac{\text{NOAEL}_{\text{animal Km}}}{\text{human Km}} = \frac{0.022}{36.6} = 0.003\text{mg/kg}
\]

**G. Safe Duration of Exposure (Safe Dt) to Benzene:**

Control of non-carcinogenic and carcinogenic risks can be performed by determining the safe limits of exposure to hazardous chemicals for officers, one of which is by determining the duration of safe exposure associated with the duration of work and working period\(^{(23)}\).

\[
\text{Safe Dt} = \frac{\text{RfC} \times W_{b} \times t_{avg}}{C \times BR \times t_{E} \times f_{E}}
\]

Where,

Safe Dt : Safe duration of exposure for officers (years)

RfC : Inhalation Reference Concentration (mg/kg)

Wb : Weight (kg)

t avg : Average of time (day)

C : Konsentrasi di udara (mg/m³)

BR : Breathing Rate (m³/hour)

tE : Duration (hour/day)

fE : Frequency of Exposure (day/year)

\[
\text{Safe Dt} = \frac{0.0003 \times 58.57 \times 30 \times 65}{0.82 \times 0.6 \times 6.5 \times 267,43} = 2.2\text{years}
\]

The average concentration of benzene in the air exposed to samples was 0.82 mg/m³ (0.25 ppm). From the total measurement of benzene concentration, the highest was 2.08 ppm\(^{(1)}\). The average value of this concentration is lower than the TLV, yet the highest concentration value far exceeds the TLV of 0.5 ppm according to Permenakertrans No.5/MEN/X/2018. Toxicity test was carried out by using NOAEL as the determination of the highest dose of toxin without causing an effect. Based on the results of these studies, the benzene NOAEL value of *Rattus norvegicus* was 0.022 mg/kg. This value is in accordance with the results of a research by Swaen et al. (2010) with NOAEL benzene value of 3.0 mg/m³ or equivalent to 0.022 mg/kg\(^{(21)}\). The NOAEL value obtained was smaller than that of the 2005 Agency for Toxic Substances and Disease Registry (ATSDR) of 3 ppm at medium exposure through inhalation\(^{(1)}\).

Based on the results of RfC calculation, NOAEL value, average Animal Km and Human Km was 0.003 mg/kg. The RfC of this research was smaller than the value set by IRIS U.S The EPA in 2003 of 0.03 mg/m³.
(0.0085 mg/kg/hr)

Apart from being smaller than IRIS U.S. EPA, the result of this research was also smaller than the research conducted by Hayat (2013) by 0.0086 mg/kg/day

and research conducted by Salim (2012) by 0.01 mg/kg/hr. Thus, the result of this research was safer for humans.

Based on the results of the calculations, the value of Safe Dt to benzene at the public gas stations around Diponegoro University Semarang was 2.2 years. This is smaller than the average duration of public gas stations officers exposure of 5.5 years. In addition, the Law of the Republic of Indonesia No. 13 of 2003 concerning Labor states that the maximum time limit for hiring employees is 3 years. This indirectly provides protection so that public gas stations officers are not exposed to benzene for much longer.

**Conclusion**

Measurement of the concentration of benzene at public gas stations around Diponegoro University Semarang resulted in an average concentration of 0.25 ppm and the highest concentration of 2.08 ppm. The average value of the concentration is lower than the Threshold Limit Value, yet the highest concentration value far exceeds the Threshold Limit Value of 0.5 ppm according to Permenakertrans No.5/MEN/X/2018. Therefore, there are still efforts need to be taken to control benzene exposure by companies and governments to keep officers healthy.

One of the efforts to control benzene exposure is determining the working period of officers, which refers to the calculation of benzene safe exposure, reduces the concentration of toxins to the safe limits of toxin concentration for officers, and reduces exposure time per day by < 8 hours/day. Calculation Safe Dt to benzene for non-carcinogenic risks to public gas stations officers around Diponegoro University Semarang resulted in 2.2 years. In addition, efforts to control benzene exposure can be performed by providing Personal Protective Equipment (PPE) in the form of half mask respirators with organic vapor cartridges and periodic monitoring of benzene exposure in the work environment.

**Conflict of Interest:** All authors have no conflicts of interest to declare.

**Source of Funding:** This is an article “Determination of Safe Limits Exposure Duration to Benzene at Public Gas Stations around Diponegoro University Semarang” of Occupational Safety and Health Department that was supported by Activity Budget Plans 2019, Faculty of Public Health, Airlangga University.

**Ethical Clearance:** The research was approved by the institutional Ethical Board of the Public Health Faculty, Diponegoro University.

**REFERENCES**


ABSTRACT

**Background:** Urinary tract infection (UTI) is the most common urologic disorder. The normal urine pH is average of 6.2. UTIs or bacteriuria are among the causes shifting the urine pH to word alkalinity.

**Objectives:** Isolation and identification of bacterial uropathogens from alkaline urine and to assess their susceptibility to commonly available antimicrobial agents.

**Patients and Method:** This cross-sectional study was conducted in Baquba for the period from September 2016- November 2017. Patients were attending Baquba Teaching Hospital and Al-Batool Teaching Hospital for Maternity and Children complaining of urinary tract infection. A total of 250 patients were included. The age range was 5-50 years. 218 (87.2%) were female and 32 (12.8%) were males. Mid-stream urine samples were collected in sterile containers. General urine examination including measurement of pH was done. All samples were aseptically cultured on blood and MacConkey agar plates which were incubated at 37 °C for overnight. Identification of bacterial growth was based on cultural, microscopical and biochemical criteria. The Kirby-Bauer disk diffusion technique was used to determine the bacterial susceptibility to Amoxacillin, Gentamycin, Doxycycline, Nalidixic acid, Tobramycin, Azithromycin, Ciprofloxacin, Cefotaxim, Trimethprime-sulfamethoxazol and Phosphomycin antimicrobials according to CLSI, version 2012. The MIC of all bacterial isolates against Ciprofloxacin and Azithromycin was determined according to the CLIC, version 2014. Human privacy was respected by taken participant’s oral consent. Statistical analyses were done using the SPSS, Version 21 and P values were considered significant wherever it is less than 0.05.

**Results:** The results found that the rate of alkaline urine among patients with UTI was 11.9%. It was significantly higher in female compared to males (87.5% vs 12.5%, P = 0.0001), and the majority of patients were in the age group < 20 years. All patients had positive bacterial growth and E. coli was the predominant (28%, P < 0.05), and 45.9% of these isolates were urease producers. Except for Amoxacillin (100% efficacy), all bacterial isolates were completely resistant to Tobramycin, Gentamycin, Nalidixic acid, Cefotaxime and Phosphomycin (0% efficacy), and partially resistant to Ciprofloxacin (71.4% efficacy), Azithromycin (85.7% efficacy) and Doxycycline (57.1% efficacy).

**Conclusion:** Although the rate of alkaline urine is low, but unignorable. Bacterial isolates are generally resistant to most antimicrobials. Thus urine pH should be considered while choosing antimicrobials for treatment of patients with UTIs.

**Keywords:** Alkaline urine, Urine PH, Urease producers

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**Introduction**

Urinary tract infections, with its diverse clinical syndromes and affected host groups, remains one of the most common urologic disorder in both community and hospital patients \(^1, 2, 3\). Factors that affect urine pH include dietary constituents, vomiting, diarrhea, lung disease, hormones, kidney function, and UTIs. It is well
known that UTIs by fastidiously growing urea splitting uropathogens are responsible for the shift of urine pH toward the alkalinity \(^4, 5\). A related consequence is that the formation of various types of kidney stones is strongly influenced by alkaline urinary pH as it enhances the metabolic activity of urease-positive bacteria \(^6, 7\). In this context, it has been documented that when urine pH is greater than 6.5 and the presence of specific aryl metabolites, the siderocalin, a human antimicrobial protein was no longer neutralized the bacterium iron acquisition molecule enterobactin. Instead, enterobactin was able to swipe iron away from siderocalin and promote more bacterial uropathogens growth \(^8\).

In majority of UTIs, empirical antimicrobial treatment is practiced before the laboratory results of urine examination or culture. Several studies had documented that the therapeutic efficacy of antimicrobials was decline or even the cure time (time to negative cultures) was prolonged under alkaline urine \(^9, 10\). It had been reported that the tetracyclines, nitrofurantoin, and many of the \(\beta\)-lactams were exhibited their highest activity under acidic urine pH, conversely, the fluoroquinolones, co-trimoxazole, aminoglycosides, and macrolides all functioned optimally at alkaline pH, while Sulfamethoxazole, oxacillin, amoxicillin and clavulanic acid, vancomycin, imipenem, and clindamycin were largely unaffected by pH, recommending that clinicians should consider the urine pH of their patients when treating UTIs \(^11\). In a similar study, it had been reported that the urine pH values below 6 lead to a reduction of bacterial killing of trimethoprim, fosfomycin, amikacin, colistin and ertapenem against the five bacterial species \(^12\). Although acidification of urine is widely recommended for prevention and treatment of urinary tract infections, it has been found that acidification of urine led to major impairment of antimicrobial activity of fluoroquinolones probably due to reduction of uptake of fluoroquinolones into bacterial cells \(^13\). A further report had documented that in contrast to ciprofloxacin, the potency of delafloxacin was further enhanced in the acidic environment commonly observed in the setting of urinary tract infection \(^14\).

Patients and Method

This cross-sectional study was conducted in Baquba for the period from September 2016- November 2017. Patients were attending Baquba Teaching Hospital and Al-Batool Teaching Hospital for Maternity and Children complaining of signs and symptoms related to urinary tract. The age range of patients was 5-55 years (Mean age ± SD, 21.78 ± 12.39 years). 218 (87.2%) were female and 32 (12.8%) were males. Human privacy was respected by taken participant’s oral consent. Mid-stream urine samples were collected in 20 milliliters sterile containers. General urine examination was done promptly including urine reaction and pH measurement. A total of 2100 urine samples were screened for pH, and of these, 250 had alkaline reaction, all of which were included in this study. The range of pH was 8-11 (Mean ± SD, 8.86 ± 0.50). Thereafter, all samples were aseptically cultured on blood and MacConkey agar plates which were incubated at 37 °C for overnight (18-24 hours). Identification of bacterial growth was based on cultural, microscopic and biochemical criteria. The disk diffusion technique on Mullar-Hinton agar was used to determine the bacterial susceptibility to certain antibiotics and antibacterials according to the CLSI, 2012. The antimicrobial agents include Amoxacillin (25 µg/disc), Gentamycin (10 µg/disc), Ciprofloxacin (5 µg/disc), Tobramycin (10 µg/disc), Azithromycin (30 µg/disc), Cefotaxim (30 µg/disc), Trimethprime-sulfamethoxazol (10 µg/disc) and Phosphomycin (200 µg/disc). The MIC for all bacterial isolates against Ciprofloxacin and Azithromycin was determined on Mullar-Hinton agar according to the CLIC, 2014. Statistical analyses were done using the Statistical Package for Social Science (SPSS), Version 21 and P values were considered significant wherever it is less than 0.05.

Results

The results showed that 11.9% (250/2100) of patients with UTIs had alkaline urine. The age and sex distribution showed that female was significantly higher compared to males (87.5% vs 12.5%). Moreover, the majority of patients were in the age group < 20 years.

### Table 1: Age and sex distribution of patients included in the study

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age (Years)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 20</td>
<td>20-40</td>
</tr>
<tr>
<td>Female</td>
<td>100 (38.9%)</td>
<td>102 (39.7%)</td>
</tr>
<tr>
<td>Male</td>
<td>29 (11.3%)</td>
<td>1 (0.4%)</td>
</tr>
<tr>
<td>Total</td>
<td>129 (50.2%)</td>
<td>103 (40.1%)</td>
</tr>
</tbody>
</table>

Pearson Chi-Square = 24.811, P = 0.0001
A total of 257 bacterial isolates were obtained, 105 (40.85%) were Gram’s positive and 152 (59.14%) were Gram’s negative isolates. These were identified as in table (2). *E. coli* was the predominant bacterial type (28%), followed by *P. mirabilis* (19.8%) and the least one was *Ps. aeruginosa* (5.4%).

Table 2: Bacterial types identified throughout the study

<table>
<thead>
<tr>
<th>Bacterial type</th>
<th>Female (%)</th>
<th>Male (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>62 (27.5)</td>
<td>10 (31.3)</td>
<td>72 (28)</td>
</tr>
<tr>
<td><em>Proteus mirabilis</em></td>
<td>46 (20.4)</td>
<td>5 (15.6)</td>
<td>51 (19.8)</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>20 (8.9)</td>
<td>2 (6.2)</td>
<td>22 (8.6)</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>13 (5.8)</td>
<td>1 (3.1)</td>
<td>14 (5.4)</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>35 (15.5)</td>
<td>7 (21.9)</td>
<td>42 (16.3)</td>
</tr>
<tr>
<td><em>Streptococcus pyogenes</em></td>
<td>35 (15.5)</td>
<td>6 (18.8)</td>
<td>41 (16)</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>14 (6.2)</td>
<td>1 (3.1)</td>
<td>15 (5.8)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>225 (87.54)</td>
<td>32 (12.45)</td>
<td>257 (100)</td>
</tr>
</tbody>
</table>

Chi-Square=73.5 P < 0.05 [S]

The distribution of bacteria isolates according to pregnancy status was shown in table (3) with a significantly higher in the non-pregnant women (72% vs 28%, P < 0.05)

Table 3: Distribution of bacterial isolates according to pregnancy

<table>
<thead>
<tr>
<th>Bacterial type</th>
<th>Pregnant (%)</th>
<th>Non-pregnant (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>20 (31.7)</td>
<td>52 (32.1)</td>
<td>72 (28)</td>
</tr>
<tr>
<td><em>Proteus mirabilis</em></td>
<td>14 (22.2)</td>
<td>37 (22.8)</td>
<td>51 (22.7)</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>2 (3.2)</td>
<td>20 (12.3)</td>
<td>22 (9.8)</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>5 (7.9)</td>
<td>9 (5.5)</td>
<td>14 (6.2)</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>14 (22.2)</td>
<td>28 (17.3)</td>
<td>42 (18.7)</td>
</tr>
<tr>
<td><em>Streptococcus pyogenes</em></td>
<td>8 (12.7)</td>
<td>16 (9.9)</td>
<td>24 (10.6)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>63 (28)</td>
<td>162 (72)</td>
<td>225 (100)</td>
</tr>
</tbody>
</table>

Chi-Square=73.5 P < 0.05 [S]

Regarding certain characteristics of bacteria isolates, the results found that 45.9% and 53.7% were urease and β-lactamase producers respectively. Additionally, 12.5% of these isolates were bacteriocin producers, and 82.9% has the ability of biofilms formation and hemolysin production, table (4).

Table 4: Urease and β- lactamase production rate of bacterial isolates

<table>
<thead>
<tr>
<th>Bacterial type</th>
<th>Urease production</th>
<th>β-lactamase production</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+ve</td>
<td>-ve</td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
<td>2</td>
<td>70</td>
</tr>
<tr>
<td><em>Proteus mirabilis</em></td>
<td>51</td>
<td>0</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>42</td>
<td>0</td>
</tr>
<tr>
<td><em>Streptococcus pyogenes</em></td>
<td>0</td>
<td>41</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>15</td>
<td>0</td>
</tr>
</tbody>
</table>

Total (%): 118 (45.9) 139 (54.1) 257 (100) 138 (53.7) 119 (46.3) 257 (100)
The antimicrobial susceptibility test revealed that all bacterial isolates were completely resistant (0% efficacy) to Tobramycin, Gentamycin, Nalidixic acid, Cefotaxime and Phosphomycin. All isolates were immediately sensitive to Trimethoprim-Sulfamethoxazole (50% efficacy). On the opposite side, all isolates were completely sensitive to Amoxicillin (100% efficacy). For Ciprofloxacin all isolates are sensitive except those of E. coli and Ps. aeruginosa (71.4% efficacy). Similarly, all isolates were sensitive to Azithromycine except those of S. aureus (85.7% efficacy). For Doxycycline, all isolates were sensitive except those of E. coli, S. aureus and Ps. aeruginosa (57.1% efficacy). The MIC of Azithromycin for all bacterial isolates was ranged between (64-1024) µg/ml, while the MIC of Ciprofloxacin for all bacterial isolates were ranged between (4-28) µg/ml.

Discussion

Globally, urinary tract infection is the most common infection in both community and hospital patients (15, 3). Checking urine pH is part of the routine urinalysis, as normally acidic urine is a natural defense barrier against urinary tract infection, beside that the urine pH reflects acid-base balance in the body (16, 4, 17). In the present study the rate of alkaline urine among patients presented with UTI was 11.9%. Although this rate was significantly lower than that of acidic urine; however, it shouldn’t be ignored.

The results also showed that females with alkaline urine were significantly higher compared to males and the majority of patients were in the age group < 20 years. In the context of sex differences, undoubtedly, most of previous studies affirmed that females were predominant (18). This sex difference is related to a anatomical, physiological, and hormonal causes (19, 15). On the other hand, the predominance of children and young adults is not unusual as UTIs in these ages are very common most probably due to low personal hygiene, urine incontinence in some children and retention of urine in the bladder for long time and low mobility especially during school time increases the recurrence of UTIs among children particularly among girls (5.7 times more than boys) (20, 21). The high bacterial isolation rate in females and the predominance of E. coli are actually other predictable outcomes. Interestingly, almost all studies in this context agree that E. coli and other Gram’s negative enterobacteriaceae are the major output (9, 22). The most acceptable explanation, is that the E. coli forming the bulk of enterobacteriaceae in GIT, which is the prime source of these bacteria in UTIs (23, 2).

The significantly higher rate of bacterial isolation in non-pregnant compared to pregnant women was inconsistent with most of previous studies (24, 25). It is extensively documented that symptomatic or asymptomatic bacteriuria, history of previous UTIs, low socioeconomic status and alkaline urine are risk factors for UTI in pregnancy that may elevates the risk of pyelonephritis, premature delivery, and fetal mortality among pregnant women (26, 27, 13). The current result may be due to unevenly distributed study samples as those below 15 years was predominant (all were non-pregnant), and of note, almost each sample yield one bacterial growth.

It is well documented that UTIs by fastidiously growing urea splitting uropathogens shifted urine pH toward the alkalinity; a medium that is further promote growth of uropathogens (13, 5, 8), as well as urolithiasis (28, 6). Moreover, these types of UTIs may be further complicated to alkaline-encrusted pyelitis which may be life-threatening if it is ignored; thus antibiotic therapy plus urease inhibitors perhaps offer the best preventative treatment (5, 29).

Conflict of Interest: There are no Conflict of Interest.

Source of Funding: Self

Ethical Clearance: Committee members are approved to perform a study about “Bacterial uropathogens isolated from alkaline urine and their susceptibility to antimicrobial agents”

REFERENCES


Aerobic and Anaerobic Bacteria in Tonsils of Different Ages with Recurrent Tonsillitis

Gulbahar F. Karim¹, Siham Sh. AL-Salihi², Qanat Mahmood Atya³, Kasim Sakran Abass⁴

¹Department of Basic Nursing Sciences, College of Nursing, University of Kirkuk, Kirkuk, Iraq; ²Medical Laboratory Techniques, Kirkuk Technical College, Foundation of Technical Education, Kirkuk, Iraq; ³Department of Biology, College of Science, University of Tikrit, Tikrit, Iraq; ⁴Department of Pharmacology and Toxicology, College of Pharmacy, University of Kirkuk, Kirkuk, Iraq

ABSTRACT

Background: Tonsillitis is considered one of the most otolaryngological diseases. It might lead to tonsillectomy if not treated properly.

The aims: of the current study is to determine the prevalence of chronic tonsillitis caused by bacterial infection among different age groups of both sexes at Kirkuk City. In addition find out the bacterial load in the tonsillitis cases, as well as their susceptibility pattern to some common antibiotics.

Method: Two hundred and ten throat swabs were taken from patients with signs and symptoms of chronic tonsillitis. The swab samples were cultured on different culture media. The isolates were diagnosed using laboratory methods for identification of bacteria.

The Results: revealed a high prevalence of chronic tonsillitis in Kirkuk city and it was more predominant in female (55.63%). The female to male ratio was 1.2:1. The most affected age group was (1-10) years old, constitute (35%) of all participant. There are 160 samples produce positive bacterial growth. The results showed that Streptococcus pyogenes was the most infectious bacteria associated with chronic tonsillitis which constitute (41.9 %) of bacterial isolates, followed by Staphylococcus aureus (35.6%), Streptococcus parasanginus (7.5%), Streptococcus mitis (6.3%), Streptococcus agalactiae (5.6%), and Streptococcus mutans (3.1%). The results of antibiotic sensitivity test, disc diffusion method revealed that the most isolates under investigation were found to be multidrug resistant. Since all isolates were resistant 100% to Ampicillin, followed by high rate resistant to penicillin (82.58%), with moderate resistance to Erythromycin (59.92%), Amoxicillin-Clavulanic acid (59.68%), and less resistant to Cefotaxime (47.70%), Ceftriaxone (38.08%). However, most of them were highly sensitive to Ciprofloxacin, and Imipenem.

Conclusion: The knowledge about the most likely local infectious microorganisms and their susceptibility to antibiotics can reduce the chance of chronic tonsillitis.

Recommendation: It is recommended to control throat infections and tonsillitis, this required the availability of primary care with adequate dose, and course of appropriate antibiotics treatment, which play important role in the prevention of chronic tonsillitis and its long term squeal.

Keywords: Tonsillitis, Antibiotics, Bacteria, Tonsillectomy, Streptococcus pyogenes.

Introduction

Tonsillitis is the term refer to inflammation of tonsils, which are organs of the immune system, this tissue naturally act as a defense against infection¹. The tonsillitis considers one of the most otolaryngological diseases, which might lead to tonsillectomy operation for many patients². It is usually indicated when there are six
attack or more per year for two successive years. Other indications of tonsillectomy include; obstructive sleep apnea, Quinsy, and suspicion of malignancy. It has the potential when performed for the proper requirement, as infectious indication. The etiological agents of tonsillitis might be viruses, as Epstein-Barr virus, rhinovirus, adenovirus, parainfluenza, influenza type A, and B. Most viruses likely have a role in the development of tonsillitis, crypt obstruction, and secondary bacterial infection. The most prevalent bacteria involved in tonsillitis were *Streptococcus pyogenes* that cause sore throat, *Staphylococcus aureus*, *Haemophilus influenzae*. The less frequent microorganisms encountered were different Staphylococcus species, Streptococcus species, and other oral microflora. Also some species of intestinal bacteria were detected by some investigators which might be attributed to oral fecal contamination. Multidrug resistant emerged among most of these microorganisms, which may be due to injudicious, and over use of antibacterial therapies without following proper antibiotic policy. The aims of the present study is to determine the prevalence of chronic tonsillitis caused by bacterial infection among different age groups of both sexes at Kirkuk City. In addition find out the bacterial species in the tonsillitis cases, as well as their susceptibility pattern to some common antibiotics.

### Patients and Method

Two hundred and ten throat swabs were tacked from patients with signs and symptoms of chronic tonsillitis, who were attending Azadi Teaching Hospital at Kirkuk City during a period of the 1st of January to the end of December, 2017, their genders and ages, were recorded. The tonsillar swab was inserted into tonsils' region for each patient, carefully rotated there, and then withdrawn avoiding contaminated with mouth and transported immediately to laboratory under aseptic condition.

**Bacteriological Study:** The swab samples were cultured on Brain heart infusion broth (transport media), Nutrient agar and MacConkey agar, then incubated at 37°C for 24 hours. Also, they were cultured on chocolate agar then incubated anaerobically in a candle jar at 37°C for 24-48 hours. The growing colonies were further cultured on other media as Mannitol salt agar. The pure colonies were tested with the gram staining, and biochemical tested for identification of bacteria according to Bergey’s manual of determinative bacteriology [8], then the results confirmed by Api, Staph. and Api Strep. System (BioMérieux, France).

**Antibiotic Susceptibility Test:** All the isolated bacterial species were submitted to eight antibiotic discs using the disc diffusion method. The antibiotics including Ampicillin (AM) 30 mg, Penicillin (P) 10mg, Amoxicillin-clavulanic acid (AMC), Cefotaxime (CTX) 30 mg, Ceftriaxone (CRO) mg, Erythromycin (E), 30mg, Ciprofloxacin (CIP) 10mg, and Imipenem (IMP) mg, (Oxoid Company). A single colony was transferred to 5ml nutrient broth then incubated at 37°C for 24hr. The inoculum was adjusted to 0.5 McFarland turbidity standard solution, then spread evenly with sterile swab on the surface of agar. The standard antibiotic discs were placed at some points in the same Petri dishes then they were stand for 45minutes. Later incubated at 37°C for 24hr. The diameter of zones of inhibition were measured and interpreted according to [9].

### The Results and Discussion

Table (1) demonstrates the distribution of tonsillitis according to gender and age groups. It revealed the high rate of chronic tonsillitis in this city. Also it showed that the chronic tonsillitis was more predominant in female with frequency of 89 (55.63%) than male which include only 71(44.38%) of total participants. The male to female ratio was 1: 1.25. Regarding the age, it had been found that the most affected age group was (1-10) years old with the frequency of 56(35%) patients. While the less age group were (41-50) years old.

<table>
<thead>
<tr>
<th>Years</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>1-10</td>
<td>22</td>
<td>13.75</td>
<td>34</td>
</tr>
<tr>
<td>11-20</td>
<td>18</td>
<td>11.25</td>
<td>26</td>
</tr>
<tr>
<td>21-30</td>
<td>15</td>
<td>9.38</td>
<td>19</td>
</tr>
<tr>
<td>31-40</td>
<td>5</td>
<td>3.13</td>
<td>9</td>
</tr>
<tr>
<td>41-50</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>44.38</td>
<td>89</td>
</tr>
</tbody>
</table>

**Table 1: Distribution of tonsillitis with positive bacterial culture according to gender and age groups**
The result of present study was in agreement with Jamal\(^2\) who found in a study on tonsillitis including 200 patients, in which the percentage of females was higher (56.6%) than the males. Also other investigators\(^3\) in Baghdad reported the children under fifteen years were more susceptible to tonsillitis than other ages.

These results might be attributed to increased activity of children at this age group which enhance the exposure to infection than other ages. In addition to contacting children with each other in kinder garden and school beside, intrafameliac transmission of infectious agents that cause the disease.

Table (2) illustrates the frequency and percentages of bacterial species isolated from infected tonsils. From the two hundred and ten throat samples, 160 samples produce positive bacterial growth. Accordingly only these samples included in the study. Out of 160 samples exhibit positive bacterial growth 67(41.9 %) of isolated bacteria were \textit{S. pyogenes}, followed by \textit{S. aureus} 57(35.6%), \textit{S. parasanginus} 12(7.5%), \textit{S. mitis} 10(6.3%), \textit{S. agalactiae} 9(5.6%), and \textit{S. mutans} 5(3.1%). This finding indicated that Lancefield Group A Beta Hemolytic Streptococcus GABHS (\textit{S. pyogenes}) was the most infectious bacterium associated with tonsillitis. These results were in accordance with that conducted by Al-Mousawi\(^11\) who showed that 43.69% of his total isolates were \textit{S. pyogenes} from throat swabs of 250 cases of tonsillitis in Najaf governorate. While the results of current study was higher than other investigator, who were found 37.3% of their total isolates were \textit{S. pyogenes} from throat infection of patients with tonsillitis in Yemen\(^2\). This result might be due to many virulence factors produced by this bacteria, in addition to climate variation. More over easy transmission of these bacteria by droplet spread, thus close contact between children in school or in large families can increase the risk.

\textit{S. aureus} found to be the second most bacteria isolated in the present study. This result was in accordance with that reported by Bakir and Ali [6] who revealed that this bacteria was the most frequent microorganism, which constitute 37.7% of their total isolates from tonsillitis cases. This finding due to the fact that \textit{S. aureus} were posses many virulence factors that attributed to their invasiveness and pathogenicity as well as their resistant to multiple antibiotic agents.

The percentages of \textit{S. parasanginus} and \textit{S. mitis} were (7.5, and 6.3)% respectively. This finding was less than that reported by [13] who diagnosed (34.3 and 11.9) % of their total isolates from children with tonsillitis in Baghdad was \textit{S. parasanginus} and \textit{S. mitis} respectively. The less frequent bacterial species encountered through present research were \textit{S. agalactiae} and \textit{S. mutans} which constitute (5.6 and 3.1) % respectively of total isolates.

These finding were relatively higher than that dictated by other authors who observed only (4.2 and 0.7)% of their isolates were belong to these two species \textit{S. agalactiae} and \textit{S. mutans} respectively. The finding of varies bacterial species with different frequency in this study may be due to the presence of these microorganisms as normal flora in the upper respiratory tract, moreover most of them were opportunistic and can cause disease especially in immune compromised patients.

### Table 2: The frequency and percentages of bacterial isolates of patient with tonsillitis

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{Streptococcus pyogenes}</td>
<td>67</td>
<td>41.9</td>
</tr>
<tr>
<td>\textit{Staphylococcus aureus }</td>
<td>57</td>
<td>35.6</td>
</tr>
<tr>
<td>\textit{Streptococcus parasanginus}</td>
<td>12</td>
<td>7.5</td>
</tr>
<tr>
<td>\textit{Streptococcus mitis}</td>
<td>10</td>
<td>6.3</td>
</tr>
<tr>
<td>\textit{Streptococcus agalactiae}</td>
<td>9</td>
<td>5.6</td>
</tr>
<tr>
<td>\textit{Streptococcus mutans}</td>
<td>5</td>
<td>3.1</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100</td>
</tr>
</tbody>
</table>

Table (3) demonstrates the results of antibiotic sensitivity (disk diffusion method. It showed the most isolates under investigation were found to be multidrug resistant because they were resistant to more than three antibiotics. All isolates were resistant 100% to Ampicillin, followed by high rate resistant to Penicillin with moderate resistant rate to Erythromycin and less resistant to Amoxicillin-Clavulanic acid, Cefotaxime, and Ceftriaxone. Furthermore, there are some resistant isolates were emerged to the other aminopenicillin as Amoxicillin despite its combination with inhibitor agent called clavulanic acid which increase its activity. These results were consistent with previous study conducted by Bakir and Ali\(^6\) who showed that the most Gram positive bacterial isolates from tonsillitis cases were highly resistant to Penicillin, and Ampicillin, more over most of these bacteria were \(\beta\)-lactamase producers. These results revealed the that the bacterial isolates under investigation were confer resistant to \(\beta\)-lactam (\(\beta\)-lactam) antibiotics which include Penicillin, Ampicillin, Amoxicillin, Cefotaxim, and ceftriaxone.
This finding might be due to the production of β-lactamase enzymes which hydrolyze β-lactam ring of β-lactam antibiotics. In contrast, other investigators reported that there were no β-lactamase enzymes had been produced by their isolates which include 67 bacteria belong to β-hemolytic group C and F streptococci from patients with acute pharyngitis at Hilla city. They suggested the resistant of their isolated bacteria to antibiotics attributed to other causes as Alteration of β-lactam target enzymes, especially penicillin binding proteins. Moreover, penicillin less effective in eradicating GABHS which found to be the most frequent bacteria in the current study because Penicillin have the capacity to eradicate the normal oropharyngeal flora, especially α-hemolytic Streptococci which provide an ecological barrier to GABHS infection by producing bacteriocin.

Concerning the moderate resistant of the studied isolates to Erythromycin in the present study, it might be due to irregular and overuse of this drug without performed routine culture and sensitivity of microbes to the drug. This might lead to genetic mutation and acquire resistant gens to antibiotic. Other researchers investigated the molecular screening of erythromycin gene of seven strains of S. pyogenes. They improved all isolates did not contain the resistant genes, so they concluded that the resistant to erythromycin could be due to other causes as structural modification of erythromycin by glycosylation, phosphorelation, or lacton ring cleavage by erythromycin esterase.

There are many mechanisms by which bacteria confer resistance to the antibiotic agents including intrinsic impermeability, as well as acquired resistance as mutations, plasmids, and transposons. Furthermore, the tonsils with chronic inflammation, and adenoid contain more scar tissues following each infection. In turn causing an impairment of antibiotic penetrating into the core and become more resistant to antibiotic therapies.

Regarding the Ciprofloxacin and Imipenem, most isolates were found to be sensitive to these drugs with resistant rate of (2.49 and 2.92) % respectively. This finding was in agreement with other researchers who found the most effective antibiotics, and less resistant against his isolates from tonsillitis cases were Ciprofloxacin and Imipenem with resistant of (14.9 and 17.5) % respectively. Hence they could be used as drugs of choice for treating tonsillitis.

It have been concluded that the disease was predominates among female, and (1-10) years old age group. The major pathogenic bacteria was S. pyogenes. Furthermore Most isolates were multidrug resistant. Most of isolates under investigation were sensitive to Ciprofloxacin and Imipenem. Hence, the knowledge about the most likely local infectious microorganisms and their susceptibility to antibiotics can reduce the chance of recurrent tonsillitis and its complications. It is recommended to control throat infections and tonsillitis, this required the availability of primary care with adequate dose, and course of appropriate antibiotics treatment, which play important role in the prevention of chronic tonsillitis and its long term sequel.

**Conclusion**

The chance of chronic tonsillitis can be reduced by increase the knowledge about the most likely local infectious microorganisms and their susceptibility to antibiotics.
Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: Not required.

References


3. Sadoh WE, Sadoh AE, Oladipo AO, Okunola OO. Bacterial isolates of Tonsillitis and Pharyngitis in a Paediatric casualty setting. Journal of Biomedical Sciences. 2008. 7 Nos.1 & 2:


Efficacy of the Health Belief Model in Enhancing the Oral Health of Female Middle School Students

Halah Kamal Ismael1, Aysin Kamal Mohammed Noori2
1MSc (C), 2Instructor, Department of Community Health Nursing, College of Nursing, University of Baghdad

ABSTRACT
This study aimed to (1) examine the effect of the Health Belief Model-based intervention (HBM) in enhancing the oral health of students, identify the association between students’ age, family’s socioeconomic status (SES), and their oral health. A randomized controlled trial (RCT) was used to guide this study. The study included a systematic random sample of 140 female students who were randomly assigned into two groups; 70 students for the study group and 70 students for the control group. These students were recruited from two middle schools for girls in Al-Karkh side in Baghdad City. The study instrument includes the sociodemographic of age, parents’ level of education, household’s occupation, family’s monthly income, and student’s birth order. Also, it includes the oral health belief questionnaire (OHBQ). Students in the study group only received the HBM-based health education. Data were analyzed using the statistical measures of frequency, percent, Mean, standard deviation, repeated measures ANOVA, and Pearson’s correlation.

The study results displayed that the HBM-based intervention positively influenced students’ Perceived Susceptibility of contracting oral disease, Perceived Barriers of adhering to oral health practices, Self-Efficacy of adhering to oral health practices, Perceived Benefits of adhering to oral health practices, and the Perceived Severity of contracting oral disease.

The student researcher concluded that the HBM-intervention significantly made the students perceive a lesser chance of contracting oral disease, enabled the students to overcome the barriers to adhere to oral health practices, enabled them to increase their self-confidence of adhering to oral health practices, made them sensitize the potential benefits of adhering to oral health practices, and made them sensitize the potential seriousness of not adhering to oral health practices.

Keywords: Health Belief Model; Oral Health

Introduction
Dental decay and periodontal inflammation are the most widespread Oral health problem. Quality of life deterioration is the consequences of the oral disease. About 35% of the world are suffering from dental problems. The World Health Organization (WHO) considered oral health as a part of community health in all human life. The WHO suggests that oral disease, if left unsolved, can have a great effect on the quality of life (1). The education about oral health is considered the cornerstone of the dental hygiene. According to the American Dental Hygienists’ Association (ADHA); oral hygienists have “a primary role in promoting the wellbeing of individuals and the public by engaging in health promotion/disease prevention activities” (2).

Causality between oral care and another systematic health problem such as respiratory disease, atherosclerotic vascular disease, diabetes, pregnancy-related complications, renal disease, and osteoporosis still unclear. Diabetes has a true bidirectional relationship with periodontal disease. A strong statistical evidence shows that treating one condition impacts positively on the other (3).
Applying of Health belief model to the oral health condition it is really crucial. It will change the health belief concerning oral cavity and eventually systemic health and lifestyle and oral health in particular. Individual health practices such as oral self-care are based on personal choices. The guiding principles found in the models of healthy behaviors provide useful ways to the oral health care practitioner in enhancing effective individual client behaviors (4).

Health-related behaviors can effectively be modified by the using of health belief model by targeting various model’s key aspects of the constructs (Kallio, 2013). Decreasing perceived barriers while increasing perceived benefits is considered an way for interventions that may alter the health-promoting behavior and cost-benefit analysis by providing data about the efficacy of various behaviors to eliminate the risk of disease, knowing a major perceived barriers, giving engaging incentives to “health-promoting behaviors”, and attending a social support or another resources to enhance health-promoting behaviors (5).

In this study, it is important to determine whether the health belief model is effective to improve the oral health of female middle school students at Al-Karkh Side, so eventually, to applicate the educational program in the health care centers as a primary prevention teaching program. This study aims to determine the effect of the HBM-based health education in enhancing the oral health of students.

Method

Design of the Study: A randomized control trail design was used in the present study with the application of a pretest, posttest I, and posttest II approach for the study group and control group. Study group and control group were pretested on December 3rd, 2018. The posttest I was conducted on January 17th, 2019. The posttest II was conducted on February 12th, 2019.

Study Instrument: The data for this study were collected using questionnaire which consisted of three parts (a) socio-demographic characteristics (father education, mother education, household’s monthly income), birth order, grade, and parents brushing habits.

The Oral Hygiene Beliefs Questionnaire

Perceived Susceptibility Scale: The first construct is perceived susceptibility was used to measure the likelihood of getting oral disease including teeth decay, and periodontal disease. This scale is a 5-point Likert type scale that is composed of three items. These items were measured on a 5-point Likert scale. Responses on this scale range from 1 (Strongly disagree) to 5 (Strongly agree). The total scores range from 3 to 15, with a higher score indicating higher perceived susceptibility of contracting oral disease

Perceived Severity Scale: The perceived severity scale was used to measure one’s belief about the seriousness of contracting oral disease or leaving it untreated. This scale is a 5-point Likert type scale that is composed of four items. These items were measured on a 5-point Likert scale. Responses on this scale range from 1 (strongly disagree) to 5 (strongly agree). The total scores range from 4 to 20, with a higher score indicating higher perceived severity of the oral disease

Perceived Barriers Scale: The perceived barriers scale was used to measure one’s possible obstacles to making oral examination. This scale is a 5-point Likert type scale that is composed of three items. These items were measured on a 5-point Likert scale. Responses on this scale range from 1 (strongly disagree) to 5 (strongly agree). The total scores range from 3 to 15, with a higher score indicating higher perceived barriers to making oral examination.

Perceived Benefits Scale: The perceived benefits scale was used to measure an individual’s assessment of the value or efficacy of oral hygiene. This scale is a 5-point Likert type scale that is composed of three items. These items were measured on a 5-point Likert scale. Responses on this scale range from 1 (strongly disagree) to 5 (strongly agree). The total scores range from 3 to 15, with a higher score indicating higher perceived benefits to making the oral examination.

Self-Efficacy Scale: The Self-Efficacy scale was used to measure an individual’s confidence of performing oral examination. This scale is a 5-point Likert type scale that is composed of six items. These items were measured on a 5-point Likert scale. Responses on this scale range from 1 (strongly disagree) to 5 (strongly agree). The total scores range from 6 to 30, with a higher score indicating higher self-efficacy of performing oral examination.

Data were analyzed using the statistical package for social science (SPSS) for windows Version 24 (Chicago, IL).
Results

Table 1: Participants' Sociodemographic Characteristics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Study (N = 70)</th>
<th></th>
<th>Control (N = 70)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td><strong>Age</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>7</td>
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<td>5</td>
<td>7.1</td>
</tr>
<tr>
<td>13</td>
<td>39</td>
<td>55.7</td>
<td>13</td>
<td>18.6</td>
</tr>
<tr>
<td>14</td>
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</tr>
<tr>
<td>15</td>
<td>1</td>
<td>1.4</td>
<td>28</td>
<td>40.0</td>
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<tr>
<td><strong>Mean (SD)</strong></td>
<td>13.25 ± .65</td>
<td></td>
<td>14.07 ± .93</td>
<td></td>
</tr>
<tr>
<td><strong>BMI:</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Underweight</td>
<td>8</td>
<td>11.4</td>
<td>10</td>
<td>14.3</td>
</tr>
<tr>
<td>Normal range</td>
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<td>65.7</td>
<td>39</td>
<td>55.7</td>
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<tr>
<td>Overweight</td>
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<td>12.9</td>
<td>15</td>
<td>21.4</td>
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<td>Class I Obesity</td>
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<td>10.0</td>
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<td>8.6</td>
</tr>
<tr>
<td><strong>Mean (SD)</strong></td>
<td>23.64 ± 4.16</td>
<td></td>
<td>23.82 ± 3.92</td>
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<tr>
<td><strong>Socioeconomic Class</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Lower class</td>
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<td>0.0</td>
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<tr>
<td>Upper lower class</td>
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<td>14.3</td>
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<td>14.3</td>
</tr>
<tr>
<td>Lower middle class</td>
<td>23</td>
<td>32.9</td>
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<tr>
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<td>Upper class</td>
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<td>1.4</td>
<td>5</td>
<td>7.1</td>
</tr>
</tbody>
</table>

The age mean for participants in the study group is 13.25 ± .65; more than a half age 13-years-old (n = 39; 55.7%), followed by those who age 14-years-old (n = 23; 32.9%), those who age 12-years-old (n = 7; 10.0%), and one who age 15-years-old (n = 1; 1.4%). For the control group, the age mean is 14.07 ± .93; two-fifth age 15-years-old (n = 28; 40.0%), followed by those who age 14-years-old (n = 24; 34.3%), those who age 13-years-old (n = 13; 18.6%), and one who ages 15-years-old (n = 5; 7.1%).

Concerning the BMI, the BMI mean for participants in the study group is 23.64 ± 4.16; most are of normal range (n = 46; 65.7%), followed by those who are overweight (n = 9; 12.9%), those who are underweight (n = 8; 11.4%), and those who have class I obesity (n = 7; 10.0%).

For the control group, the BMI mean is 23.82 ± 3.92; more than a half are of normal range (n = 39; 55.7%), followed by those who are overweight (n = 15; 21.4%), those who are underweight (n = 10; 14.3%), and those who have class I obesity (n = 6; 8.6%).

Lastly, a half of families in the study group are of the upper middle socioeconomic class (n = 35; 50.0%), followed by those who are of the lower middle class (n = 23; 32.9%), those who are of the upper lower class (n = 10; 14.3%), one who is each of lower class and upper class (n = 1; 1.4%).

For the control group, more than a half of families are of the upper middle socioeconomic class (n = 38; 54.3%), followed by those who are of the lower middle class (n = 17; 24.3%), those who are of the upper lower class (n = 10; 14.3%), and one those is each of lower class and upper class (n = 5; 7.1%).
Table 2: Tests of Within-Subjects Effects for the students’ perceived susceptibility

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
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</thead>
<tbody>
<tr>
<td>Susc. (Study)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>1373.610</td>
<td>2</td>
<td>686.805</td>
<td>75.921</td>
<td>.000</td>
<td>.524</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>1373.610</td>
<td>1.615</td>
<td>850.294</td>
<td>75.921</td>
<td>.000</td>
<td>.524</td>
</tr>
<tr>
<td>Huynh-Feldt</td>
<td>1373.610</td>
<td>1.648</td>
<td>833.262</td>
<td>75.921</td>
<td>.000</td>
<td>.524</td>
</tr>
<tr>
<td>Lower-bound</td>
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<td>1.000</td>
<td>1373.610</td>
<td>75.921</td>
<td>.000</td>
<td>.524</td>
</tr>
<tr>
<td></td>
<td>Greenhouse-Geisser</td>
<td>1248.390</td>
<td>111.466</td>
<td>11.200</td>
<td>.000</td>
<td>.524</td>
</tr>
<tr>
<td></td>
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<td>1248.390</td>
<td>113.745</td>
<td>10.975</td>
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<td>.524</td>
</tr>
<tr>
<td></td>
<td>Lower-bound</td>
<td>1248.390</td>
<td>69.000</td>
<td>18.093</td>
<td>.000</td>
<td>.524</td>
</tr>
</tbody>
</table>

There was a (a priori p = 0.01) significant difference (F (1.615, 111.466) = 75.921, p = 0.01) in the students’ perceived susceptibility over time for participants in the study group. The omnibus effect (measure of association) for this analysis is .524, which indicates that approximately 52% of the total variance in the students’ perceived susceptibility values is accounted for by the variance in the administered intervention.

For the control group, there was no significant difference (F (1.113, 76.803) = .299, p = 0.004) in the students’ perceived susceptibility over time. The omnibus effect (measure of association) for this analysis is .004, which indicates that approximately .04% of the total variance in the students’ perceived susceptibility values is accounted for by the chance.

Table 3: Tests of Within-Subjects Effects for the students’ perceived barriers

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
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<td></td>
<td></td>
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<tr>
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<td>.589</td>
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<tr>
<td>Greenhouse-Geisser</td>
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<td>.589</td>
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<tr>
<td>Huynh-Feldt</td>
<td>441.867</td>
<td>1.897</td>
<td>232.988</td>
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<td>.000</td>
<td>.589</td>
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<tr>
<td>Lower-bound</td>
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<td>1.000</td>
<td>441.867</td>
<td>98.947</td>
<td>.000</td>
<td>.589</td>
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<tr>
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<td>127.508</td>
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<td>.000</td>
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<tr>
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<td>.000</td>
<td>.589</td>
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<tr>
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<td>4.466</td>
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<td>.589</td>
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<tr>
<td>Perceived Barriers (Control)</td>
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<tr>
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<tr>
<td>Huynh-Feldt</td>
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<td>.010</td>
<td>1.000</td>
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<tr>
<td>Lower-bound</td>
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<td>.010</td>
<td>1.000</td>
<td>.321</td>
<td>.014</td>
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</tbody>
</table>
There was a (a priori p = 0.01) significant difference (F (1.848, 127.508) = 98.947, p = 0.01) in the students’ Perceived Barriers of adhering to oral health practices over time for participants in the study group. The omnibus effect (measure of association) for this analysis is .589, which indicates that approximately 58% of the total variance in the students’ Perceived Barriers of adhering to oral health practices values is accounted for by the variance in the administered intervention.

For the control group, there was no significant difference in the students’ Perceived Barriers over time. The omnibus effect (measure of association) for this analysis is .014, which indicates that approximately 0.1% of the total variance in the students’ Perceived Barriers of adhering to oral health practices values is accounted for by the chance.

Table 4: Tests of Within-Subjects Effects for the Self-Efficacy for adhering to oral health

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
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<tr>
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<td></td>
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<tr>
<td>Sphericity Assumed</td>
<td>1524.200</td>
<td>2</td>
<td>762.100</td>
<td>82.391</td>
<td>.000</td>
<td>.544</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>1524.200</td>
<td>1.184</td>
<td>1287.731</td>
<td>82.391</td>
<td>.000</td>
<td>.544</td>
</tr>
<tr>
<td>Huynh-Feldt</td>
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<td>1278.420</td>
<td>82.391</td>
<td>.000</td>
<td>.544</td>
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<tr>
<td>Lower-bound</td>
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<td>1.000</td>
<td>1524.200</td>
<td>82.391</td>
<td>.000</td>
<td>.544</td>
</tr>
<tr>
<td>Error (SE Study)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>1276.467</td>
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<td>9.250</td>
<td>4.302</td>
<td>.015</td>
<td>.059</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>1276.467</td>
<td>81.671</td>
<td>132.769</td>
<td>4.302</td>
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<td>.059</td>
</tr>
<tr>
<td>Huynh-Feldt</td>
<td>1276.467</td>
<td>82.265</td>
<td>132.652</td>
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<tr>
<td>Lower-bound</td>
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<td>18.500</td>
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<tr>
<td>Sphericity Assumed</td>
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<td>2</td>
<td>67.733</td>
<td>4.302</td>
<td>.015</td>
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<tr>
<td>Greenhouse-Geisser</td>
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<td>1.020</td>
<td>132.769</td>
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<td>.041</td>
<td>.059</td>
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<tr>
<td>Huynh-Feldt</td>
<td>135.467</td>
<td>1.021</td>
<td>132.652</td>
<td>4.302</td>
<td>.041</td>
<td>.059</td>
</tr>
<tr>
<td>Lower-bound</td>
<td>135.467</td>
<td>1.000</td>
<td>135.467</td>
<td>4.302</td>
<td>.042</td>
<td>.059</td>
</tr>
<tr>
<td>Error (SE Control)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
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<td>138</td>
<td>15.743</td>
<td>4.302</td>
<td>.042</td>
<td>.059</td>
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<tr>
<td>Greenhouse-Geisser</td>
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<td>70.402</td>
<td>30.859</td>
<td>4.302</td>
<td>.042</td>
<td>.059</td>
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<tr>
<td>Huynh-Feldt</td>
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<td>30.832</td>
<td></td>
<td></td>
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<tr>
<td>Lower-bound</td>
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<td>69.000</td>
<td>31.486</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

There was a (a priori p = 0.01) significant difference (F (1.184, 81.671) = 82.391, p = 0.01) in the Self-Efficacy for adhering to oral health over time for participants in the study group. The omnibus effect (measure of association) for this analysis is .544, which indicates that approximately 54% of the total variance in the Self-Efficacy for adhering to oral health values is accounted for by the variance in the administered intervention.

For the control group, there was a (a priori p = 0.01) significant difference (F (1.020, 70.402) = 4.302, p = 0.05) in the Self-Efficacy for adhering to oral health over time. The omnibus effect for this analysis is .059, which indicates that approximately 5% of the total variance in the Self-Efficacy for adhering to oral health values is accounted for by the chance.
Discussion

This randomized controlled trial aimed to positively change female students’ health beliefs related to oral health using the Health Belief Model.

There was a statistically significant difference in the values of the students’ perceived susceptibility of contracting oral disease over time for participants in the study group.

This indicates the positive effect of the HBM-based intervention in making students recognize the likelihood of their contacting oral disease in case of neglecting their oral health practices.

There was a significant difference in the students’ Perceived Barriers of adhering to oral health practices over time for participants in the study group.

This indicates that the HBM-based intervention positively affected students in overcoming barriers to oral health practices. Students’ Perceived Barriers to adhere to oral health practices in the study group. There was a significant difference in the Self-Efficacy for adhering to oral health over time for participants in the study group.

This reflects that the HBM-based intervention enabled students to consolidate their self-confidence in sticking to a healthy behavior (adhering to oral health practices).

Conclusions

The HBM-intervention significantly made the students perceive a lesser chance of contracting oral disease).

The HBM-intervention significantly enabled the students to overcome the barriers to adhere to oral health practices.

The HBM-intervention significantly enabled the students to increase their self-confidence of adhering to oral health practices.

Recommendations

There is a need to replicate a similar study on impovred community segments.

It is vital to coordinate with the media with the goal of raising the publics’ awareness of the potential seriousness of not adhering to oral health practices and the potential benefits of adhering to oral health practices.

Conflict of Interest: The researchers report no conflict of interest.

Source of Funding: This study did not receive any funding from any agency.

Ethical Clearance: A permission to conduct this study was obtained from the ethical committee in the College of Nursing, University of Baghdad.

REFERENCES


The Effect of Selection on Some of the Basic Determinants of Learning Some of the Basic Skills of Football

Hamid Abdul Shaheed Hadi1, Hayder Jaber Mousa1, Ali Hameed Ali1, Hayder Naji Habash Alshawi2
1Directorate General of Najaf Education, Ministry of Education, Iraq; 2Department of Physical Education and Sports Sciences, Faculty of Education for Girls, University of Kufa, Iraq

ABSTRACT

Throughout the selection process to proceed properly, it is necessary to use the tests and measurement because it is the best way to recognize the capabilities of beginners and their potential and predetermine to reach a fundamental point is to improve the learning of some skills to football. Some physical characteristics if these specifications are available, some basic skills can be learned in a better way, that based on the recommendations that emphasize the use of appropriate age, physical specifications and appropriate physical attributes, and make it the basic to answer the following question: Will learning be better? If these physical specifications and physical attributes are available in advance. This research aims to identify some of the basic determinants (physical measurements) of the students of Faculty of Physical Education and Sports Sciences at the University of Kufa for the academic year 2018-2019, and to identify the effect of selection on the basis of some basic determinants in learning some of the basic skills of football, the researchers used the experimental method to suit the nature of the Mash. The students of the second stage in the Faculty of Physical Education and Sports Sciences at the University of Kufa for the academic year (2018 - 2019), the number of (34) students, was based on physical indicators of the analysis of the global study of “Riyadh Khalil” the total length and length of the legs, The chest width and skills were handling, rolling and scoring, and an exploratory experiment was conducted to identify the factors and constraints that researchers could face when carrying out the basic experiment.

Keywords: Selection, Basic Determinants, Basic Skills, Football.

Introduction

For the selection process to proceed properly, it is necessary to use the tests and measurement because it is the best way to recognize the abilities of beginners and their potential and predetermine to reach a fundamental point is to improve the learning of some skills to football. To let the individual gain that access to the optimal performance, this requires the availability of some physical specifications of each game and the availability of some physical qualities and if these specifications can be learned some of the basic skills of football better, and in connection with previous studies, researchers considered the study of this subject. Based on recommendations that confirm the use of appropriate age and physical specifications and appropriate physical attributes promised by the rule to answer the next question? ...

Will learning be better if these physical specifications and physical attributes are available in advance?

The objective of the research is to identify some basic determinants (physical measurements and physical and skill traits) for the students of the Faculty of Physical Education and Sports Sciences at the University of Kufa for the academic year 2018-2019, and to identify the effect of selection on some basic determinants in learning some basic skills of football. The importance of research is to try to establish basic determinants for the selection of youth and to teach them the basic skills of football.

DOI Number: 10.5958/0976-5506.2019.02576.2
Practical Part

Field Research Procedures: The researchers used the experimental method to suit the nature of the problem on the students of the second stage in the Faculty of Physical Education and Sports Sciences at the University of Kufa for the academic year (2018 - 2019), the number of (34) students,

Tests:

First: Identify the physical, physical and skill indicators of the study: After the researchers learned a lot of research and studies that are looking at the identification of physical, physical and skill indicators were based on physical indicators of the analysis of the global study of “Riad Khalil” as these indicators are the most comprehensive factors and got the best predictions and above, as follows:

1. Overall length and length of the two legs.
2. The circumference of the leg.

The researchers chose these indicators based on the recommendation he made at the end of his research to adopt these indicators in the selection of football players.

Then the physical tests were selected which obtained the best predictions in the thesis itself and as follows:

1. Wide jump of stability.
   - Purpose of the test: Measure the explosive force of the two men.
   - Tools: flat ground, tape measure.
2. The test of sitting from immobility during (10 seconds):³
   - Purpose of the test: Measure the speed characteristic of the muscles of the abdomen.
   - Tools: Stopwatch, a colleague to install the two legs.
   - Registration: Records the number of times during (10 seconds).
3. Test side step during (20 seconds):⁴
   - Purpose of the test: Measurement of agility.
   - Tools: volleyball court, stopwatch.
   - Registration: Calculates the number of times that the two lines are touched by hand (20 seconds).
4. Test run 20 m of stand :⁵
   - Purpose of the test: measuring the transition speed.
   - Tools: Stopwatch, straight route, set from start and end to 20m, whistle, tape measure.
   - Registration: records the time when the specified distance was finished.
5. Touching the ground and the wall sequentially during (20 seconds):⁶
   - Purpose of the test: Measurement of dynamic flexibility (bending the spine and the length and rotation).
   - Tools: Stopwatch, smooth wall, chalk.
   - Registration: The number of touches (times) made by the student on the two marks during (20 seconds).

Physical Indicators:

1. Total length:¹
2. Measurement of the length of the man:

3. Leg circumference: Wrap a horizontal measuring tape, so that it is perpendicular to the longitudinal axis of the leg and read the measurement to the nearest cm.

4. Chest width: The two ends of the palometer are placed on the lateral extension of the mid-thoracic point on both sides of the chest and measured to the nearest cm.
Technical Tests

1. Handling test:7 (Handling a small target 12 m).
   - **Objective of the test:** measuring the accuracy of handling.
   - **Tools used:** 5 footballs, a small target of 110 x 63 cm, measuring tape and Burke.
   - **Test procedures:** draw a line for the beginning length (1 m) and a distance of 12 m for the small target, and put balls fixed on the starting line.
   - **Performance description:** The student stands behind the starting line facing the small goal, and begins when giving the signal handling ball bearings towards the goal to enter him, and given to each student five consecutive attempts.
   - **Registration:** The grade is calculated by the total scores obtained by the student from handling the five balls as follows.
     1. Two steps for each correct attempt enter the small target.
     2. One degree if the ball is level-based or the beam has not entered the target.
     3. Zero if the ball is out of the small goal.

2. Rolling test:
   - **Name of test:** rolling the ball in (zigzag).8
   - **Objective of the test:** measuring the ability of the player to control the ball while running between the characters.
   - **Tools used:** (10) Personals, Soccer, Stopwatch.
   - **Characterization of the test:** 10 persons are placed in a straight line, the distance between each person and another (2) m and the distance between the starting line and the first person (2) m.
   - **Method of performance:** The tester person stands 11 meters away from the target and when the start signal is given, then the tester person scoring.
   - **Registration:** The tester person is given 3 attempts for the preferred foot as points are recorded according to the location.

3. Test scoring:9
   - **Name of test:** scoring on a goal divided by squares at (11) m.
   - **Test Objective:** Measure scoring accuracy.
   - **Tools used:** tape measure, football, goal divided by ropes on nine sections, Burke to draw the penalty point.

   **Exploration Experience:** A pilot experiment was conducted on 14/10/2018 on a sample of (20) female students with the basic determinants chosen deliberately. The specific physical measurements were conducted at 9:00 am. Physical tests were conducted on 15/10/2018. On 16/10/2018, the specific tests were conducted to avoid fatigue and boredom and the accompanying negative aspects. The exploratory experiment “is a pilot study carried out by the researcher on a small sample that carries the same sample characteristics in all respects to carry out part of the work with a view to selecting suitable ones And curricula.”

   **The scientific foundations of the tests:** For the purpose of ascertaining the scientific basis of the tests, the credibility and objectivity of these tests were relied on during their application. For the purpose of knowing the stability of the physical and skill tests, 20 students with determinants were selected in a deliberate manner and five days later, And the skill using the simple correlation coefficient (Pearson) as shown in Table (1).

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Study variables</th>
<th>Physical and skill tests</th>
<th>Measuring unit</th>
<th>Stability coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Explosive power</td>
<td>Jump wide of constancy</td>
<td>meter</td>
<td>0.88</td>
</tr>
<tr>
<td>2.</td>
<td>The power of speed</td>
<td>Sit down from supine during 10 second</td>
<td>The number of times</td>
<td>0.736</td>
</tr>
<tr>
<td>3.</td>
<td>Transition speed</td>
<td>Run 20 m from the stand</td>
<td>second</td>
<td>0.859</td>
</tr>
<tr>
<td>4.</td>
<td>Fitness</td>
<td>Side step through 20 second</td>
<td>The number of times</td>
<td>0.740</td>
</tr>
<tr>
<td>5.</td>
<td>Flexibility</td>
<td>Touch the ground and wall sequentially</td>
<td>The number of times</td>
<td>0.892</td>
</tr>
<tr>
<td>6.</td>
<td>Handling</td>
<td>Accuracy of handling performance</td>
<td>Degree</td>
<td>0.701</td>
</tr>
<tr>
<td>7.</td>
<td>Rolling</td>
<td>The accuracy of the rolling performance</td>
<td>Degree</td>
<td>0.865</td>
</tr>
<tr>
<td>8.</td>
<td>Scoring</td>
<td>Accuracy of scoring performance</td>
<td>Degree</td>
<td>0.923</td>
</tr>
</tbody>
</table>
Pre Tests: Pre tests were conducted at 9 am on 28/10/2018 for the variables of the technical study (handling, rolling and scoring). The work required to have a team specialized in football game. The stadium was well prepared with the availability of tools and supplies.

Application of the Curriculum: The curriculum was adopted in the curriculum of the football lesson as a comprehensive containing the basic skills of the whole football, it meets the purpose for the students of the second phase, and was agreed in advance with the Department of the Department, and the curriculum was implemented by the teacher material and the team and the assistant in the presence of researchers on a continuous basis. The teacher used the lesson in a typical way, taking into consideration all the steps of the lesson from the preparatory, main, educational, and practical sections. The lesson time was 60 minutes. The work lasted two months at 3 units per week. The duration of the lesson was 60 minutes divided according to the special division of the lesson.

Posttests: After the completion of the curriculum, the post-tests were conducted on 29/12/2018. All the necessary requirements were prepared, and in the same circumstances as the pre-test, and the students themselves, the technical variables were measured (handling, rolling and scoring)

Statistical Means: The researchers used the Social Science Statistical Courier (SPSS)

Results and Discussion

This axis included displaying the results of the statistics after processing them statistically and in line with the goals.

View, analyze, and discuss the results of the skill tests for the sample of the research.

Table 2: Show the mean, standard deviation, and the t-value calculated between the pre-and post-test in learning the football skills of the students

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Skills</th>
<th>Measuring Unit</th>
<th>Pre-Test C</th>
<th>A</th>
<th>Post-Test C</th>
<th>A</th>
<th>Impact’s Size</th>
<th>Value (t)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Handling</td>
<td>Degree</td>
<td>4.45</td>
<td>1.01</td>
<td>8.73</td>
<td>0.78</td>
<td>0.62</td>
<td>17.74</td>
<td>Moral</td>
</tr>
<tr>
<td>2.</td>
<td>Scoring</td>
<td>Degree</td>
<td>5.52</td>
<td>0.75</td>
<td>9.13</td>
<td>0.91</td>
<td>0.59</td>
<td>15.97</td>
<td>Moral</td>
</tr>
<tr>
<td>3.</td>
<td>Rolling</td>
<td>Second</td>
<td>35.29</td>
<td>3.64</td>
<td>26.55</td>
<td>3.83</td>
<td>0.61</td>
<td>17.01</td>
<td>Moral</td>
</tr>
</tbody>
</table>

The researchers attributed this to the effectiveness of the curriculum applied to the members of the research sample where the curriculum contains a set of exercises and selected and selected accurately to suit the skills studied, as well as the process of physical selection and physical measurements have had the greatest impact in speeding up the learning process. And others that "learning does not happen simply by repeating the movements and mathematical skills of the players, but must be based on the training of scientific basis for the advancement of the level of their abilities and skills to the best"11

It is known that the progress and acquisition of skillful performance is achieved through organized practice. This is confirmed by Mohamed Abdul Ghani,“Progress in movement or skill is achieved through practice and repetition and avoid mistakes, and this is through the practical performance of the learner under the guidance of the teacher or teacher and this in itself is one of the main steps Used in the teaching of motor skills «12

In the review of the previous table we find that there is progress in the level of performance of the skills studied and the researchers believe that the good interaction of the sample of research and selection through scientific foundations has contributed significantly to learning these skills and interaction and seriousness and the rush in the application of the curriculum has a significant impact and positive in the learning process that “The process of acquisition and attenuation and the stabilization of mathematical skills during skill numbers This process requires a positive mathematical contribution to the implementation of the specified objectives”13

Conclusions

The researchers concluded that young players could be selected according to basic criteria to help them learn the basic skills of football. In addition, there is a positive
impact of physical measurements in learning some of the basic skills of football, and that there is a clear impact of physical qualities in learning some of the basic skills of football. Students of the College of Physical Education and Sports Science can learn football skills even in the absence of physical and physical characteristics, and that the selection made according to some of the determinants is appropriate for learning the research skills and speed of student learning.

**Ethical Clearance:** Taken from Najaf Education Directorate/IRAQ

**Source of Funding:** Self

**Conflict of Interest:** None

**REFERENCES**


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The Method of Learning in Order to be Able to Follow the Cognitive Method (Independence Versus Dependence on the Cognitive Field) and its Impact on Some Basic Skills in the Fencing of Students

Hamid Abdul Shaheed Hadi1, Ali Mahdi Ali Almadhloom2, Zaid Sami yasir1, Hayder Naji Habash Alshawi3

1Ministry of Education, Najaf Education Directorate, Iraq; 2Ministry of Education, Basra Education Directorate, Iraq; 3Department of Physical Education and Sports Sciences, Faculty of Education for Girls, University of Kufa, Iraq

ABSTRACT

The research problem focused on the weakness of learners in the performance of basic skills in dueling, which must be learned by students and suitable for each skill and then move to the other skill, and the reason for not being able to double the learning process that reaches the learner to certain limits of learning skills, Lack of time to address the learning disability, or lack of learning method, so researchers considered the problem by using the learning method to be able to learn to reach the best results and to reach the learner to a certain stage of good performance. The objectives of the research were to classify the students according to the criterion of independence versus dependence on the cognitive field, and to develop a learning method in order to be able to adapt to the cognitive method (independence versus cognitive dependence) in learning some basic skills in student dueling, The Effectiveness of the Learning Method In order to be able to learn according to the cognitive method (independence versus dependence on the cognitive field) to learn some of the basic skills of students’ fencing, K) used in the search rely on the scale (Ola Asaad Aldiri, 2011). The researchers concluded that the measure of independence versus reliance on the cognitive field used by the researcher in the sample of the research sample is capable of classifying the students as independent and dependent on The educational curriculum in the learning method for the sake of mastery is effective in learning the members of the research sample of some basic skills in the dueling of the students. The learning method in the learning method for mastery has had an effect in the group The researchers recommended that the independence scale should be used against dependence when it is necessary to classify the samples into an independent group and others based on the cognitive field, because it is capable of classification, and to emphasize the use of the learning method for students. When learning basic skills in fencing.

Keywords: Learning for mastery, Cognitive Style, Basic Skills, Fencing

Introduction

The research problem focused on the weakness of learners in the performance of basic skills in dueling, which must be learned by students and suitable for each skill and then move to the other skill, and the reason for not being able to double the learning process that reaches the learner to certain limits of learning skills, Lack of time to address the learning disability, or lack of learning method, so researchers considered the problem by using the learning method to be able to learn to reach the best results and to reach the learner to a certain stage of good performance.1

The objectives of the research were to classify the students according to the criterion of independence versus dependence on the cognitive field, and to develop a learning method in order to be able to adapt to the cognitive method (independence versus cognitive dependence) in learning some basic skills in student
dueling. The effectiveness of the learning method in order to be able according to the cognitive method (independence versus dependence on the cognitive field) to learn some basic skills in fencing for students.2

**Practical Part**

**Procedures Research’s Field:** The researchers used the experimental method to suit the nature of the problem on the students of the third stage in the College of Physical Education and Sports Sciences at the University of Kufa for the academic year (2018 - 2019) and the number of students (34).

**The Tests:** Determine the validity of the scale (independence versus dependence on the cognitive field) used in the search:

The researchers examined the sources and previous studies that dealt with the subject of measuring independence versus dependence on the cognitive field. They adopted the (Ola Asaad Aldiri, 2011) scale for independence versus dependence on the cognitive field. This measure deals with the study of the personality of the individual and the knowledge of individual differences among individuals in the field of eating Information and dealing with different situations. In order to identify the validity of the scale, it was presented to a group of experts and specialists (15) experts to show the validity and suitability of the members of the research sample, and after collecting questionnaires distributed to experts and specialists and unloading The value of the square (kai square) was greater than the tabular value of (3.84) at the degree of freedom (1) and the level of significance (0.05). This measure consists of three sections which are as follows:3

**Section I:** It is for training and does not count its degree in the assessment of the examinee, and consists of seven paragraphs easy.

**Section II:** consists of nine paragraphs of gradual difficulty.

**Section III:** It also consists of nine paragraphs of gradual difficulty and this section is equivalent to the second section of the test.

Each paragraph in the three sections is a complex or complex form that contains a simple form. The researcher is asked to discover and set its limits on the last page of the test. The test organization ensures that the examinee cannot see the simple form, in addition to the complex or complex form it contains one for each of the three test sections a specific time, two minutes for the first section, five minutes for the second section, in addition to five minutes for the third section.

**Defining offensive skills in dueling and measuring methods:** The researchers presented a range of offensive skills to the experts in the sport of fencing to determine the most important tests suitable for the variables of the study, and identified the important offensive skills of the game (direct attack, direct attack, change in direction, the circular attack) in the duel, and the method of assessing the performance of offensive skills in duel was done by three arbitrators who evaluate the performance according to the form prepared for this purpose with the division of class by skill sections.

**The scientific foundations of the tests:** For the purpose of identifying the scientific bases of the validity, reliability and consistency of the tests established and their relevance to the individual of the research sample, the researchers sought to adopt these principles in the process of applying the tests.

**Believable Test:** The believable test means that “believable test measures what is being for its measured.”4 In order to obtain the honesty coefficient for the tests used, the authentic honesty (sincerity of the arbitrators) was used by presenting the tests to a group of experts and specialists. The scale and skill tests for the duel were presented to the experts. The validity of the tests and the virtual scale were proven after the experts agreed that they would achieve the purpose for which they were developed and their suitability for the age group under consideration.

**Stability Tests:** The researchers established the stability coefficient of the scale and the technical tests under study in the test method and the re-tests on a sample of (8) students, after (14) days for the scale, and four days for the technical tests were re-tests on the students themselves.

**Preparation of the Curriculum:** The researchers presented a number of scientific references and related researches, including interviews with experts and specialists(Matrod, 1997), 5 and in order to achieve the objectives of the research, they developed a learning method in order to be able to master the experimental groups. The unit is distributed as follows:
First: The preparatory section and duration (15) minutes and includes:

a. Introduction and warm-up: the students are stopped in a uniform format and taking the absence and the preparation of tools for the success of the educational unit and give general exercises for all members of the body and duration (5) minutes.

b. Special warm-up: The exercises are taught with the skills studied and the parts and muscles working to perform this skill and duration (10) minutes.

Second: The main section and duration (25) minutes and divided into two parts:

a. Theoretical section: The skill is explained by the teacher and then the skill is presented to illustrate the correct performance and duration of the skill (10).

b. Application section: The performance of the given skill assigned to each unit is applied and applied according to the number of repetitions assigned to each skill with guidance and correction of errors by the teacher and his duration (15).

Third: Closing section and duration (5) minutes:

In which a small game is given to serve the main section or to give relaxation and relaxation exercises, giving some guidance to the students and then ending the educational unit and performing a greeting and walking quietly.

The material teacher implemented the experimental curriculum under the supervision of the researchers, as the two groups (independent, accredited) studied the method of learning for mastery.

Time and sections of the unit: The program was divided into 15 units per unit (45) minutes, with two units per week. The program took (8) weeks, equivalent to 30 units for the experimental research groups. The total duration of the educational program (1350) Minute (22.5) hours, bringing the time of the educational program for each group (675) minutes.

(15 minutes), the main section (25) minutes (10 minutes) for the theoretical part, (15) minutes for the applied part, and the final section (5) minutes. The total time of the preparatory section was (450) minutes and (33.33%) of the total time of the lesson and the two groups.

The main part of the educational program was (750) minutes and (55.55%), which includes the educational part and the applied part. The total time for the final part of the educational unit was (150) minutes and (11.11%) of the total program time.

Main experience:

Pre-tests: The pre-test of the sample was conducted at 9:00 am, and all the variables in terms of time, tools and devices, as well as the auxiliary team, were set to be applied during the post-test. The tests were conducted on the playground of the College of Physical Education and Sports Sciences. The researchers, with the help of the auxiliary team, applied the tests according to a predetermined sequence. The skills (direct straight attack, phase change, round attack) of the two research groups were tested and after completion the totals were rotated on the three test stations.

Application of the curriculum: The educational curriculum was applied to the members of the research sample by two teaching units per week for each group. The educational curriculum was applied to the skills of direct attack, change of direction, circular attack, and five learning units for each skill. And a test to determine the student learning ratio for the skill. There were three levels of the study sample (good, medium, weak), as in Table (1).

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Group</th>
<th>Skills</th>
<th>Levels</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Good</td>
<td>Average</td>
<td>Weak</td>
</tr>
<tr>
<td>1</td>
<td>Independent</td>
<td>13</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Accredited</td>
<td>15</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Two Groups</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Shows the levels of the two groups (independent) and (accredited) according to the method of learning in order to be able to skills (direct straight attack, attack change direction, circular attack)
The researchers (weak and middle-level students) reported that they were making an effort to learn the skill better, and that it was done outside of the teaching unit, using a holistic method of learning for learning (learning through homework). Or additional applications related to concepts or objectives in which they have not reached the appropriate level of competence “.7

The remaining modules were completed. The researchers conducted the end of module (5) test for each skill to determine the skill learning level (Direct attack along, trend change, circular attack). The researchers observed that all the students of the sample reached the percentage of ability of more than (85%) with a difference in grades.

Post-tests: After the completion of the curriculum, the post-test was conducted for the sample of the research. The researchers conducted the post-test on some of the skills of the research duel, namely (direct straight attack, attack change direction, circular attack) in the playground of the College of Physical Education and Sports Science. The experiments were performed with a Canon camera, and the researchers were keen to have the conditions similar to the tribal test in terms of location and conditions, the presence of the same helper team, and the use of the same steps that were applied in the to the pre-test.

Statistical Means: The researchers used the Social Science Statistical Courier (SPSS).

Results and Discussion

This axis included displaying the results of the statistics after processing them statistically and in line with the goals.

View, analyze and discuss the results of the skill tests for the members of the research sample

Table 2: Show the mean, standard deviation, and the t-value calculated between the pre-and post-tests in learning skills by fencing students

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Skills</th>
<th>Unit</th>
<th>Pre-test Mean</th>
<th>SD</th>
<th>Post-test Mean</th>
<th>SD</th>
<th>(t) Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Direct straight attack Degree</td>
<td>4.54</td>
<td>1.01</td>
<td></td>
<td>8.73</td>
<td>0.78</td>
<td>5.74</td>
<td>Moral</td>
</tr>
<tr>
<td>2.</td>
<td>A change in trend attack Degree</td>
<td>5.52</td>
<td>0.75</td>
<td></td>
<td>8.13</td>
<td>0.91</td>
<td>6.97</td>
<td>Moral</td>
</tr>
<tr>
<td>3.</td>
<td>A circular attack Second</td>
<td>5.29</td>
<td>1.64</td>
<td></td>
<td>7.55</td>
<td>1.83</td>
<td>5.01</td>
<td>Moral</td>
</tr>
</tbody>
</table>

In Table 2, the results showed that there were significant differences between the pre-test and the post-test and the post-test in the technical variables under study. The researchers attributed this to the effectiveness of the educational curriculum applied to the two samples of the research where the curriculum contains a set of exercises that were selected and selected accurately in order to fit the studied skills as well as the nature of the age group of the sample. Qassem Lazzam and others states that “learning does not happen simply by repeating the movements and skills of athletes by the players, but the training must be based on the basis of scientific codified to advance the level of their abilities and skills towards the Hassan”.

Ghazi Saleh Hamoud believes. These are the ages to play between their peers while relying on the multiplicity of training and practice on the basic skills of the duel and the general rules of the rules of the game. The trainer must make skills training based on the existence of a purpose or goal to be achieved or automatic access by performing the exercises correctly and serious.

Conclusions

Through the results obtained by the researcher concluded the following:

1. The measure of independence versus reliance on the cognitive field used by the researcher on the members of the research sample is capable of classifying the students as independent and dependent on the cognitive field.

2. The educational method of learning in order to be able to be able to be positive in learning the
members of the research sample of some of the basic skills of dueling students.

3. The learning method of learning for empowerment has had an impact on the group of independent individuals rather than on the cognitive group.

**Ethical Clearance:** Taken from Najaf Education Directorate, Iraq

**Source of Funding:** Self

**Conflict of Interest:** None

**REFERENCES**


7. Al-Mashhad RAA. The Impact of the Plan and PDEODE Strategies in Developing Awareness of Cognitive Processes and Reducing Psychological Pollution Among Students of the Faculty of Physical Education and Sports Sciences. 2018;928–35.

The Development of Nursing Intervention Based on Indonesian Nursing Intervention Standard on Infarction Stroke in Hospital

Hani Riska Ariyanti¹, Nursalam Nursalam², Slamet Riyadi Yuwono³
¹Magister Student, ²Professor, Faculty of Nursing, Universitas Airlangga, Surabaya, 60115, Indonesia; ³Lecturer, Politeknik Kesehatan Kemenkes, Surabaya, 60282, Indonesia

ABSTRACT

Introduction: Infarction stroke is the most common stroke affecting millions of people worldwide, most patients die or are permanently disabled, so proper planning is needed. Nursing intervention on the clinical pathway is a planning guideline in giving nursing care to patients.

Objective: This study aimed to develop a nursing intervention based on Indonesian nursing intervention standards on the clinical pathway of infarction stroke.

Method: The design in this study is research and development (R&D) with a descriptive approach. The sampling technique used a purposive sampling technique by setting inclusion and exclusion criteria. The sample in this study was a clinical pathway client for stroke infarction and medical records of clients with stroke infarction with 122 medical records. The research instrument used an observation sheet. The data in this study were analysed using univariate analysis.

Results: The results showed that most nursing interventions based on the Indonesian nursing intervention standard on the clinical pathway of infarction stroke (93%) were mobilization support (I.05173) with nursing actions including monitoring heart frequency and blood pressure before starting mobilization, monitoring the general condition while doing mobilization and encourage simple mobilization.

Conclusion: Nursing interventions developed in infarction stroke client’s clinical pathway instruments are prepared based on the Indonesian nursing intervention standards, including mobilization support, fall prevention, communication promotion: speech deficits and management of increased intracranial pressure. Nursing interventions developed on clinical pathways must be evidence-based so that they can improve the quality of nursing care given to patients.

Keyword: nursing intervention, clinical pathway, infarction stroke.

Introduction

Clinical Pathway is an integrated service planning concept that summarizes each step given to clients based on service standards, nursing care standards and other evidence-based health care service standards with measurable results and within a certain period¹. The clinical pathway is a reflection of the interdisciplinary team including medical staff, nursing staff, and other health personnel in the form of service standards from each of these professions². Hospitals are usually lacking in providing comprehensive and evidence-based services regarding care for clients due to different patient responses³.

Infarction stroke is the most common stroke affecting millions of people worldwide, most patients die or are permanently disabled⁴and most are expensive and restricted in applicability. Lying flat ‘head down’ positioning of AIS patients has been shown to increase by as much as 20%, mean cerebral blood flow velocities (CBFV. Stroke is a large global and public epidemic of concern for health services because mortality rates are known to vary greatly between countries and
geographical regions. Stroke is a disorder of blood flow to the brain which causes cell death. Infarction stroke occurs when the blood supply to the brain decreases significantly or is closed due to the formation of clots in the arteries to cause a decrease or cessation of blood flow to the brain that often occurs in the carotid artery or caused by blood clots that form in an area the body, often forming in the heart and then flowing through the arteries until the clot is trapped in smaller blood vessels causing obstruction of blood flow.

Clinical pathways are most suitable for disease or clinical conditions that require a multidisciplinary approach and predictable clinical course (in at least 70% of cases). The implementation of clinical pathways is multidisciplinary in terms of doctors/dentists, nurses, physiotherapists, nutritionists/dietitians, pharmacists, and others. Nurses must be included in the development, intervention, and evaluation on an ongoing basis and have an important role in all aspects, especially in determining diagnosis and nursing intervention. Enforcement of nursing interventions in care planning is one of the competencies of nurses who are the entry points for formulating nursing care. Nursing interventions must be accurately stated to achieve positive and specific patient outcomes.

The effort that can be done is to develop nursing interventions based on the Indonesian Nursing Intervention Standard on the clinical pathway of infarction stroke clients. The Indonesian Nursing Intervention Standard is a standard of nursing intervention issued by the Indonesian National Nurses Association (INNA) to standardize nursing interventions in Indonesia to create uniformity of terminology to describe the scope of interventions carried out by nurses and increasingly show nursing contributions in health services. The development of nursing interventions based on Indonesian Nursing Intervention Standards on the infarction stroke clinical pathway client is a discovery that has never been studied before.

This study aimed to develop a nursing intervention based on Indonesian nursing intervention standards on the clinical pathway of infarction stroke.

**Method**

The design in this study is research and development (R&D) with a descriptive approach. The sample in this study was a clinical pathway client for infarction stroke and medical records of clients with infarction stroke with 122 medical records. The sampling technique used a purposive sampling technique by setting inclusion and exclusion criteria. The research instrument used an observation sheet. The data in this study were analysed using univariate analysis.

**Results**

The study was conducted from March 28, 2019, to April 31, 2019, at the hospital. During the period of data retrieval, there were 122 medical records and clinical pathway clients for infarction stroke with medical record search results as follows.

<table>
<thead>
<tr>
<th>Table 1: Recapitulation of Medical Records of Infarction Stroke Clients in June 2018 to November 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Month</td>
</tr>
<tr>
<td>June 2018</td>
</tr>
<tr>
<td>July 2018</td>
</tr>
<tr>
<td>August 2018</td>
</tr>
<tr>
<td>September 2018</td>
</tr>
<tr>
<td>October 2018</td>
</tr>
<tr>
<td>November 2018</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Table 1 showed the recapitulation of medical records of infarction stroke clients in June 2018 to November 2018 as many as 122 medical records, at most (30%) medical records in October 2018.

<table>
<thead>
<tr>
<th>Table 2: Characteristics of Nursing Intervention for Infarction Stroke Based on Medical Record Search</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Intervention</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>Mobilization support (I.05173)</td>
</tr>
<tr>
<td>Fall prevention (I.14540)</td>
</tr>
<tr>
<td>Promotion of communication: speak deficit (I.13492)</td>
</tr>
<tr>
<td>Management of intracranial enhancements (I.06194)</td>
</tr>
</tbody>
</table>
Table 2 showed that the most (93%) nursing diagnosis of infarction stroke clients were mobilization support (I.05173). The type of nursing intervention is main and the category is physiological.

<table>
<thead>
<tr>
<th>Nursing Intervention</th>
<th>Nursing Actions</th>
<th>∑</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilization support (I.05173)</td>
<td>Monitor heart frequency and blood pressure before starting mobilization</td>
<td>114</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Monitor general conditions during mobilization</td>
<td>114</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Involve the family to help patients improve movement</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Encourage simple mobilization</td>
<td>114</td>
<td>100</td>
</tr>
<tr>
<td>Fall prevention (I.14540)</td>
<td>Identify risk factors for falls</td>
<td>39</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Calculate the fall risk assessment score</td>
<td>39</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Install the bed handrail</td>
<td>39</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Encourage calling a nurse if you need help moving</td>
<td>39</td>
<td>100</td>
</tr>
<tr>
<td>Promotion of communication: speak deficit</td>
<td>Monitor verbal communication skills</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>(I.13492)</td>
<td>Use alternative communication methods (e.g writing, blinking eyes, hand signals)</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Encourage speaking slowly</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Collaboration: Refer to speech therapy</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Management of intracranial enhancements</td>
<td>Monitor signs of symptoms of increased intracranial pressure</td>
<td>4</td>
<td>67</td>
</tr>
<tr>
<td>(I.06194)</td>
<td>Give the semi-fowler position</td>
<td>4</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>Collaboration with the medical team: administration of anti-hypertensive drugs</td>
<td>5</td>
<td>83</td>
</tr>
</tbody>
</table>

Table 3 showed that nursing actions for mobilization support nursing interventions (I.05173), namely all respondents (100%) monitored heart frequency and blood pressure before starting mobilization, monitored general conditions during mobilization and recommended simple mobilization. Nursing actions for preventive nursing interventions (I.14540), namely all respondents (100%) taking measures to identify falling risk factors, calculating falling risk assessment scores, installing bed handrails and suggest calling nurses if they need help moving. Nursing actions for communication promotion nursing interventions: speech deficits (I.13492), that is, some respondents (21%) took action using alternative communication methods (e.g writing, blinking eyes, hand signals). Nursing actions for nursing management of intracranial enhancing management (I.06194), namely most respondents (83%) took collaborative actions with the medical team: administration of anti-hypertensive drugs and anti thrombolytics.

**Discussion**

Nursing interventions in clinical pathways for infarction stroke clients include mobilization support (I.05173), fall prevention (I.14540), communication promotion: speech deficits (I.13492) and management of increased intracranial pressure (I.06194). Clinical pathways carried out by nurses lead to increased efficiency and allow for standardization of care, increased utilization of nursing resources, and high stakeholder satisfaction whereas physicians weaned salbutamol frequency for the control group patients as per standard care. The primary outcome was LOS in hours. Secondary outcomes included number of salbutamol treatments administered, ICU transfers, unplanned medical visits postdischarge, and stakeholders’ pathway satisfaction. Research staff, investigators, and statisticians were blinded to group assignment, except for research assistants enrolling participants. Qualitative interviews were done to assess acceptability of intervention by physicians, nurses, residents, and patients. RESULTS We recruited 113 participants (mean age 4.9 years, 62% boys. Nursing interventions are written in the clinical pathway instrument to be used as guidelines in carrying out nursing care so that it requires conformity and accuracy in composing or choosing a diagnosis and nursing intervention. If the nurse chooses a diagnosis
and improper nursing interventions will result in the continuity of nursing care and multi-profession coordination.

Indonesian nursing intervention standard is a nursing intervention standard issued by the Indonesian National Nurses Association (INNA) to standardize nursing interventions in Indonesia to create uniformity of terminology to describe the scope of interventions carried out by nurses and increasingly show nursing contributions in health services.

According to Theofanidis and Gibbon (2016) in an evidence-based clinical review stating that stroke is a condition where the brain part is suddenly badly damaged by a disruption of the blood supply. As a result of this disorder, it will cause loss of function for certain parts of the brain such as hemiplegia, weakness, perceptual dysfunction, visual impairment and or speech. Nursing interventions in stroke patients include continuity management, treatment of pressure areas, swallowing management, and early mobilization. Other important nursing interventions include prevention of pulmonary thromboembolism and early antiplatelet therapy.

Disorders of physical mobility in infarction stroke clients are very common. Assessment of the body’s ability to assess exercise needs. Exercise can improve functional capacity, ability to carry out activities of daily living, and quality of life to reduce cardiovascular risk. Physical mobility support in stroke patients should emphasize low to moderate intensity exercise activities, muscle strengthening activities, reduction of sedentary behavior and risk management for secondary stroke prevention. Some infarction stroke clients experience weakness in the extremities, which inhibits physical mobilization.

The risk of falls is also common in clients with stroke infarction. Systematic reviews have shown that falling risk factors for hospitalization are gait instability, restless confusion, urinary incontinence, history of falls and psychotropic treatment. For older patients in hospital rehabilitation settings, risk factors include floor carpeting, vertigo, confusion, cognitive impairment, stroke, sleep disorders, anticonvulsants, tranquilizers, antihypertensive drugs, falls before and need transfer assistance. Nurses are important professionals who help minimize complications arising from falls by identifying risks early on, planning and implementing prevention strategies. The implementation of a continuous fall assessment on fall prevention is an early nursing intervention to avoid falling events and complications.

Effective communication between health care staff and patients is an important aspect of maintaining patient safety. In the context of stroke rehabilitation specifically, staff must be competent to enable people with verbal communication disorders to convey their daily needs and desires and support them to understand and participate in decision making, which aims to enhance the participation of aphasic patients, has been shown to improve conversation partner knowledge and skills. However, there is a lack of evidence for transfer of SC training to practice in post-acute rehabilitation settings. Aims: We aim to develop an understanding of causal mechanisms implicated in the transfer of SC training by examining the nature of the setting, staff perspectives, and the situated character of the action. Methods and Procedures: Twenty-eight staff from a multidisciplinary team were trained in SC. We collected detailed and varied data, including staff experiences of SC training and implementation, and video data of routine practice. Using a critical realist approach, we develop explanatory mechanisms for barriers to and enablers of transfer. Eleven team members (nursing, therapy, and assistant staff).

During the acute stroke phase, the prevention of increased intracranial pressure is very important. Increased post stroke intracranial pressure in patients with infarction stroke is an important part of acute stroke therapy and can save lives. Intracranial pressure can usually be observed for the first four days after infarction. Nursing care in the management of increased intracranial pressure includes perspective assessment and data integration, ventilation monitoring and hemodynamic functions, and appropriate patient position. Nursing interventions include neurological monitoring, ventilator support, fluid, and electrolyte maintenance, appropriate temperature management and surgical intervention if needed. Nurses must collaborate with inter professional teams to carry out actions based on evidence-based guidelines.

The clinical pathway aims to improve the organization and efficient patient services based on evidence and guidelines. A clinical pathway is an integrated multi-profession planning guideline including nurses. Nursing interventions are written in the clinical pathway instrument to be used as guidelines in carrying...
out nursing care so that it requires conformity and accuracy in preparing or choosing nursing interventions. If the nurse chooses improper nursing interventions, it will result in the continuity of nursing care and multi-profession coordination.

Conclusion

Nursing interventions developed must be evidence-based so that they can be used as standard nursing care and improve the quality of care given to patients. Nursing interventions developed in infarction stroke client’s clinical pathway instruments are prepared based on the Indonesian Nursing Intervention Standards, including mobilization support, fall prevention, communication promotion; speech deficits and management of increased intracranial pressure Nursing actions from each nursing intervention are included in the infarction stroke client’s clinical pathway instrument so that continuity of nursing care can run well.

Ethical Clearance: Ethical approval was obtained from the hospital research ethics committee with no. 893.3/0122/438.6.7/2019

Source of Funding: This study was self-funded.

Conflict of Interest: None.

REFERENCES


Relationship between Mental Workload and Fatigue of Motorcycle Rider among East Java Student

Hendrati LY¹, Martini S¹, Lestari K. S.²
¹Department of Epidemiology, ²Department of Environment Health, Public Health Faculty, Universitas Airlangga, Indonesia

ABSTRACT

Fatigue is a decreased body condition due to physical and psychological burden. Fatigue affects the ability to ride a motorcycle. One of them is affected by workload. Aims of this study to analysis correlation between fatigue state and workload on senior high school students that use motorcycle. A cross-sectional study was conducted. Data collected from population in east java Island Indonesia. Population of study are student from senior high school. Sample size of this study was 453 student who ride motorcycle. Questioner to measurement of fatigue use Subjective Self Rating Test from Industrial Fatigue Research Comittee (IFRC). Questionare to assess mental workload used National Agency and Space Administration Task Load Index (NASA-TLX). The results showed that the characteristics of respondents in this study were mostly female (57.6%) and aged 17-19 years old. Most of respondents had mental workload were middle (52.5%). Overall, Effort, Mental Demand, Temporal Demand acquired the highest workload scores while physical demand recovered lowest workload score. The overall fatigue level showed that 62.9% of students who ride motorcycle felt fatigue as middle and 32% as high. Subjectively activity fatigue felt by most respondents (99.8%). Frequency of fatigue that felt respondents is rare. Mental demand has a negative correlation with fatigue. Physical Demand has a negative correlation with activity and mental fatigue. Temporal Demand has a negative relationship with activity fatigue. Own Performance has a negative relationship with fatigue. Effort has a negative relationship with fatigue. Frustration on level and fatigue obtained a significant positive correlation. Schools consider conditions that cause frustration to students so that the risk of fatigue can be reduced.

Keywords: Workload, frustration on level, Sex, prevalence of fatigue

Introduction

Fatigues are condition. Fatigue is a condition of decreased energy so that it does not have the will and ability to do activities. Fatigue is one of the indicators of physical quality. Analysis by Armstrong et al (1) in his study found a phenomenon of 66% of people driving vehicles tired or sleepy and 2.4% of participants who experienced fatigue having a history of traffic accidents.

The study of Engberg, et al found that the proportion of fatigue in the population of women aged 25-45 years is 10.8 % while in men in the same age group is 9.7% (2). Women have a higher incidence of fatigue than men. Fatigue that occurs in motorcycle riders can cause loss of concentration while driving. Motorcycle riders who experience sleepiness 5.9 times experience traffic accidents (3). Fatigue is a risk for a significant incidence of motorcycle accidents Fatigue is a condition that can be physical fatigue and mental fatigue that can be triggered by stress, medication, overwork, or mental and physical illness. Sleep quality, decreased quality of life, stress are significantly associated with fatigue and residual fatigue. Short sleep, depressed mood, length of work associated with residual fatigue (4).

Muscle fatigue is a loss of muscle strength (muscle contractility) reversibly during work. Fatigue is a condition that can be caused due to neurological and
non-neurological factors. Neurolgic factors that cause fatigue include central fatigue (mental fatigue), mental disorders (mental disorder), disorders of the central nervous system (organic Central Nervous System). Non-neurological factors include heart problems, pulmonary disorders, blood disorders, metabolic diseases and chronic fatigue syndrome (CFS).

Material and Method

Design of this study is crosssectional. Method of data collection to get information was obtained through a survey. Participants of this study was student of senior high school that chosen considering with criteria was motorcycle driver. The sample selection is based on multistage random sampling. The first stage is the determination of the location of the school based on the selection of the city with the highest accident rate. The second step is to determine the school based on cluster random. The third step is to determine students through simple random sampling. Questioner instrument that use this study. Questioner distributed to student after obtaining head of school to conduct the study. Before the participant answers the questionnaire, the overall project goals and objectives of the survey were explained to student and head of school. Four hundred fifty three of six hundred eleven copy were filled. Collected data at 2017. The level of workload of students who drive two-wheeled vehicles based on the calculation of the NASA TLX method. Fatigue measurement of respondents in this research used Subjective Self Rating Test from Industrial Fatigue Research Commite (IFRC). The sample of the study were student who used motorbikes aged 17-19 years. The mental workload data was analyzed by summing all mental workloads value divided by fifteen before being grouped. Data on mental workload are grouped into three. High group if the value of mental workload is more than 75%, medium if 50% -75% and mild if less 50%. Severe group if the value of fatigue is more than 90%, medium if 61% -90%, mild if 31-60% and no fatigue if less 30%. Descriptive statistics was Correlation analysis was performed using spearman non parametric analysis. A significance level of 0.05 was used for all statistical analysis.

Result and Discussion

Characteristic of Respondents: Respondents in this study were senior high school. The range age was 17-19 years old and average was 17 (± 0.32) years old. Most of the gender of the respondents are female (57.6%). Respondent experience workload are middle (52.5%). The results of the research conducted by Barret (2018) show that women’s feedback fatigue is higher in prevalence than men.

Fatigue Status: Most respondents experience fatigue. The prevalence of fatigue obtained from the results of the study was 99.8%. The proportion of students who experienced severe fatigue found in the study was 4.2%. Fatigue item include are activity, mental and physical fatigue. Most fatigue that felt responden is actifity fatigue. Activity fatigue felt by respondents 99.8%, as for other, mental fatigue (99.3%), physical fatigue (98.9%). The frequency of activity, mental and physical fatigue experienced by respondents is rare. Descriptif analysis showed in table 1.

<table>
<thead>
<tr>
<th>Fatigue item</th>
<th>Mean</th>
<th>Mode</th>
<th>Standar Deviasi</th>
<th>Minimal</th>
<th>Maximal</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF</td>
<td>29.68</td>
<td>30</td>
<td>5.29</td>
<td>10</td>
<td>47</td>
</tr>
<tr>
<td>MF</td>
<td>28.23</td>
<td>30</td>
<td>5.45</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td>PF</td>
<td>26.60</td>
<td>26</td>
<td>5.70</td>
<td>10</td>
<td>48</td>
</tr>
</tbody>
</table>

AF: Activity Fatigue; MF: Mental fatigue; PF: Physical fatigue

According to Tien’s study, academic stress has an effect on the severity of fatigue. An education system that requires students to interact with the internet so students use time to seek knowledge for academic demands through the internet. The study by Chatharine and Lamyae said that internet-addicted students experience higher fatigue than students without internet addiction. An education system that requires students to interact with the internet so students use time to seek knowledge for academic demands through the internet. The study by Chatharine and Lamyae said that internet-addicted students experience higher fatigue than students without internet addiction.
Activity Fatigue Status: There were ten item to measure activity fatigue in the Subjective Self Rating Test questionare. Sleepy, want to lie down and tired of the whole body aimed the highest activity fatigue scores while standing unstable obtained the lowest activity fatigue scores. Respondents that felt Heavy feeling on the head (92.8%) that most of frequency headache was rare (55.6%). Respondents that felt tired of talking (96.2%) that most frequency were rare (57.8%). Respondents that felt weight on feet (86.0%) that most frequency felt weight on feet were rare (48.3%). Yawning felt by respondent (95.5%) that most frequency felt yawning were often (41.9%). Respondents felt distracted mind (92.3%) that most frequency o sense distracted mind were rare (46.6%). Sleepy symptons felt by respondents (98.9%) that most frequency were often (44.6%). Respondents (88.1%) felt burden on the eyes that most frequency felt burden on the eyes were rare (41.7%). Awkward and rigid movements felt by respondents (81.1%) that most frequency were rare (37.5%). Most frequency of respondents (69.4%) felt standing unstable that most frequency were always never (36.4%). Want to lie down symptom felt by respondents (96.8%) that most frequency were rare (39.5%). Presentation of each item shown in table 2.

<table>
<thead>
<tr>
<th>Activity fatigue item</th>
<th>Yes</th>
<th>%</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy feeling on the head</td>
<td>412</td>
<td>92.8</td>
<td>32</td>
<td>7.2</td>
</tr>
<tr>
<td>Tired of the whole body</td>
<td>427</td>
<td>96.2</td>
<td>17</td>
<td>3.8</td>
</tr>
<tr>
<td>Weight on feet</td>
<td>382</td>
<td>86.0</td>
<td>62</td>
<td>14.0</td>
</tr>
<tr>
<td>Yawning</td>
<td>424</td>
<td>95.5</td>
<td>20</td>
<td>4.5</td>
</tr>
<tr>
<td>Distracted mind</td>
<td>410</td>
<td>92.3</td>
<td>34</td>
<td>7.7</td>
</tr>
<tr>
<td>Sleepy</td>
<td>439</td>
<td>98.9</td>
<td>5</td>
<td>1.1</td>
</tr>
<tr>
<td>burden on the eyes</td>
<td>391</td>
<td>88.1</td>
<td>53</td>
<td>11.9</td>
</tr>
<tr>
<td>Awkward and rigid movements</td>
<td>360</td>
<td>81.1</td>
<td>84</td>
<td>18.9</td>
</tr>
<tr>
<td>Standing unstable</td>
<td>308</td>
<td>69.4</td>
<td>136</td>
<td>30.6</td>
</tr>
<tr>
<td>Want to lie down</td>
<td>430</td>
<td>96.8</td>
<td>14</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Mental Fatigue Status: Mental fatigue included in the Subjective Self Rating Test questionare are ten item. Presentation of each item shown in table 3. Trust condition, not concentrating and feeling anxious accessed highest mental fatigue scores while not diligent in work received the lowest mental fatigue scores. Hard to think Tired of talking felt by respondents that most of frequency were rare (45%). Nervous was felt by 85.4% of respondents that the highest frequency is rare (52.3%) Not concentrating felt by most respondent were rare (65.3%). Most frequency of the respondents that sense difficult to focus were rare (57.2%). Easy to forget symptoms felt by respondents that most frequency were rare (51.9%). Most of respondents that felt not trust were rare (44.2%). Feeling anxious felt by most of respondents were rare (56.3%). Difficult to control attitude felt by respondents (85.6%) that Most frequency of respondents that felt difficult to control attitude were always never (46.8%). Not diligent in work symptom felt by respondents (82.9%) that most frequency were rare (46.6%).

<table>
<thead>
<tr>
<th>Mental fatigue item</th>
<th>Yes</th>
<th>%</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard to think</td>
<td>403</td>
<td>90.8</td>
<td>41</td>
<td>9.2</td>
</tr>
<tr>
<td>Tired of talking</td>
<td>379</td>
<td>85.4</td>
<td>65</td>
<td>14.6</td>
</tr>
<tr>
<td>Nervous</td>
<td>394</td>
<td>88.7</td>
<td>50</td>
<td>11.3</td>
</tr>
<tr>
<td>Not concentrating</td>
<td>417</td>
<td>93.9</td>
<td>27</td>
<td>6.1</td>
</tr>
<tr>
<td>Difficult to focus</td>
<td>396</td>
<td>89.2</td>
<td>48</td>
<td>10.8</td>
</tr>
</tbody>
</table>
Physical Fatigue Status: Physical fatigue experienced by respondents is explained in 10 questions. Tables 4 express the various conditions that describe physical fatigue. Physical symptoms of fatigue felt by most students were dyspnea (99.1%). Respondents that felt headache were 94.8% that most of frequency headache was rare (48.8%). Stiff on the shoulder felt most frequency was rare (39.1%). Most frequency respondents that felt back pain were rare (47.2%). Dyspnea felt by most of respondents were never (39.7%). Most frequency of the respondents that sense thirsty were often (44.6%). Hoarseness symptoms felt by respondents that most frequency were rare (43.7%). Most of respondents that felt dizziness were rare (43.9%). Eyelid spasme felt by most of respondents were rare (42.2%). Most frequency of respondents that felt tremor on the limbs were always never (32.9%). Unhealthy symptom felt by most respondents were rare (56.3%).

### Table 4: Condition of Physical fatigue by Senior High School Students

<table>
<thead>
<tr>
<th>Condition</th>
<th>Yes Freq.</th>
<th>%</th>
<th>No Freq.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>437</td>
<td>94.8</td>
<td>24</td>
<td>5.2</td>
</tr>
<tr>
<td>Stiff on the shoulder</td>
<td>452</td>
<td>98.0</td>
<td>9</td>
<td>2.0</td>
</tr>
<tr>
<td>Back pain</td>
<td>454</td>
<td>98.4</td>
<td>7</td>
<td>1.5</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>457</td>
<td>99.1</td>
<td>4</td>
<td>0.9</td>
</tr>
<tr>
<td>Thirsty</td>
<td>381</td>
<td>82.6</td>
<td>80</td>
<td>17.4</td>
</tr>
<tr>
<td>Hoarseness</td>
<td>447</td>
<td>96.9</td>
<td>14</td>
<td>3.0</td>
</tr>
<tr>
<td>Dizziness</td>
<td>449</td>
<td>97.3</td>
<td>12</td>
<td>6.7</td>
</tr>
<tr>
<td>Eyelid spasme</td>
<td>454</td>
<td>98.4</td>
<td>7</td>
<td>1.5</td>
</tr>
<tr>
<td>Tremor on the limbs</td>
<td>446</td>
<td>96.7</td>
<td>15</td>
<td>3.3</td>
</tr>
<tr>
<td>Unhealty</td>
<td>449</td>
<td>97.3</td>
<td>12</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Mental Workload Status: Respondents who are young people are faced with social problems and the demands of their lives. Teenagers are a stable period. Table 5 show about description analysis mental workload.

### Table 5: Descriptive statistics of mental workload fatigue

<table>
<thead>
<tr>
<th>Workload item</th>
<th>Mean</th>
<th>Mode</th>
<th>SD</th>
<th>Minimal</th>
<th>Maximal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort</td>
<td>3.17</td>
<td>3</td>
<td>1.34</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Mental Demand</td>
<td>2.69</td>
<td>3</td>
<td>1.33</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Temporal Demand</td>
<td>2.61</td>
<td>2</td>
<td>1.26</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Own Performance</td>
<td>2.54</td>
<td>3</td>
<td>1.32</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Frustration on Level</td>
<td>2.16</td>
<td>3</td>
<td>1.58</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Physical Demand</td>
<td>1.84</td>
<td>2</td>
<td>1.36</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>
Correlation between mental workload and physical fatigue status: Some workload item shown in table 6.

<table>
<thead>
<tr>
<th>Workload Item</th>
<th>Fatigue item</th>
<th>Activity fatigue</th>
<th>Mental fatigue</th>
<th>Physical fatigue</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD</td>
<td>Corelattion Coefficient</td>
<td>-0.107*</td>
<td>-0.073</td>
<td>-0.014</td>
</tr>
<tr>
<td>PD</td>
<td>Corelattion Coefficient</td>
<td>-0.021</td>
<td>-0.037</td>
<td>0.033</td>
</tr>
<tr>
<td>TD</td>
<td>Corelattion Coefficient</td>
<td>-0.039</td>
<td>0.007</td>
<td>0.060</td>
</tr>
<tr>
<td>OP</td>
<td>Corelattion Coefficient</td>
<td>-0.203**</td>
<td>-0.137**</td>
<td>-0.097*</td>
</tr>
<tr>
<td>E</td>
<td>Corelattion Coefficient</td>
<td>-0.214**</td>
<td>-0.229**</td>
<td>-0.187**</td>
</tr>
<tr>
<td>FL</td>
<td>Corelattion Coefficient</td>
<td>0.266*</td>
<td>0.234**</td>
<td>0.194**</td>
</tr>
</tbody>
</table>

MD: Mental Demand; PD: Physical Demand; TD: Temporal Demand; OP: Own Performance; E: Effort; FL: Frustation on Level

*Correlation is significant with α =0.05 level (2 tailed)

**Correlation is significant with α =0.01 level (2 tailed)

Student activities include learning that requires remembering, counting and looking for subject matter. Student activities include learning that requires remembering, counting and looking for subject matter. This activity is getting easier, so the activity fatigue gets lower.

Students in this survey felt that the more satisfied the completion of school assignments, the lower activity fatigue. Low performing students are students who experience more fatigue (16). Low performing students are students who experience more fatigue.

School assignments given to students include group and individual assignments, if students have succeeded in working will give satisfaction to the students themselves.

Efforts that have been made in completing the tasks that lead to good performance, According to the results of this study indicate that significantly increasing efforts will decrease the activity fatigue.

This study show that between frustation on level and mental fatigue have corelltion. According to Williamson et al, mental health is associated with fatigue (9). Study in University of Montreal shows that 72.7% stress caused by workload (8). Stress is part of a condition that determines a person’s level of frustration related to fatigue. The study conducted by Annupama et al stated that there is a correlation between stress and fatigue in students (7). Feel safety is a part of determining the level of frustration. There is a relationship of feel safety with mental workload. Mental burden is related to the process of attention and effort (15). Social interaction is related to feel safety that related to the level of frustration. The study conducted by Michiyo et al showed that students with low social interactions tended to increase depression scores (19). Studies in Pakistan which are the results of a survey show financial responsibility is a cause of frustration (13).

Conclusion

The mental workload is related to fatigue. Mental demand has a negative correlation with fatigue. Physical Demand has a negative correlation with activity and mental fatigue. Temporal Demand has a negative relationship with activity fatigue. Own Performance has a negative relationship with fatigue. Effort has a negative relationship with fatigue. Frustation on level and fatigue obtained a significant positive correlation.

Conflict of Interest: In carrying out this research, researchers do not have conflict of interest with research informants and between participants

Source of Funding: This research was conducted with self funds

Ethical Clearance: This research was conducted on the awareness of respondents as volunteers in filling out the questionnaire. Before the study, respondents were given an explanation and signed informed consent.
REFERENCE


Single Nucleotide Polymorphisms in IL-10-1082 A\G Gene and Association with HCMV Infection in Abortion

Hiba A. Hatem Mayyada F. Darweesh

Department of Biology, Faculty of Sciences, University of Kufa, Iraq.

ABSTRACT

Recurrent spontaneous abortion (RSA) affects approximately 1-5% of pregnancies, about third of cases were unknown cause. The production of cytokines can be influenced by genetic polymorphisms and lead to high or low levels of cytokines that subsequently play an important role in establishing a successful pregnancy. So, the present study aimed to determine whether polymorphism in IL-10-1082A/G is associated with the incidence of abortion in AL-Najaf city. Case-control study was performed to 80 patients and 40 healthy individual as control, 30 patients infected with Cytomegalovirus. Blood samples were collected from all participant. Blood used in detection IL-10-1082A/G polymorphism by amplification refractory mutation system (ARMS-PCR) Technique. IL-10 serum level were measured by enzyme-linked immunosorbent assay test(ELISA). The result explain that the age group (20-29) and at three time of recurrent abortion was more infected with CMV.SNP in IL-10-1082A/G were AA (60%), AG (27.5%) and GG (12.5%) in patients as compared to control (15%), (30%) and (55%) respectively. AA genotype associated with low serum level of IL10 (2.5 pg/ml) while GA and GG genotype associated with high serum level (5pg/ml and 12. 3 pg/ml) respectively. This result shown that IL-10 level is significantly decrease in aborted patients than control, and AA genotype is risk factor for abortion. Conclusion: The polymorphism in IL-10 at position (1082A/G) has association with abortion at AA genotype, GG consider as protective factor. decrease IL-10 levels in aborted women if CMV infected or non-infected.

Keyword: IL-10, polymorphism, ARMS, abortion, HCMV.

Introduction

Recurrent pregnancy loss(RPL), meaning as two or more consecutive pregnancy losses before the 20th week of gestation from the last menstrual period, represent one of the most distressing problem in obstetrics occurs in approximately 1-5% of women at reproductive age. Many factors may be consider a causes for RPL as genetic error, anatomic abnormalities, hormonal abnormalities, infection such as HCMV, immunologic factors or systemic disease, and about 40% of the cause is unknown. SNP is a variation in a single nucleotide that occurs at a specific position in the genome in less than 1% of the population. Several cytokine gene polymorphisms have been reported to affect gene transcription and influence serum cytokine production and play key roles in the susceptibility, development, and severity of diseases such as thalassemia, Asthma and abortion. Interleukin-10 is an important immune suppressive and anti-inflammatory molecule that inhibits T cell proliferation and suppresses selectively Th1-mediated cellular responses. In the pregnancy women IL-10 levels increase markedly in placenta tissue during early pregnancy and remain elevated well into the third trimester, decreased production of IL-10 contributes to poor placental development process, blocking angiogenesis and impairing vascular development, ultimately resulting in abortion. IL -10 gene polymorphisms have been reported to influence the level of cytokine production and implicated in abortion pathogenesis. Human cytomegalovirus is the most common pathogen in uterus during pregnancy, which may lead to some serious results such as miscarriage, stillbirth, fetus developmental retardation.
Materials and Method

Patients and Control Group: This study was in agreement with declaration of Helsinki guidelines which approved by Al-Zahra Teaching Hospital and Health ministry of Iraq Ethical committee and verbal acceptance was obtained from all participants before taken sample.

Case control study was conducted on 80 aborted women attending to Al- Zahra Teaching Hospital in AL- Najaf province during period from august till December 2018. The patients were divided into two groups according to their infected with Human Cytomegalovirus and non-infected, in addition to 40 apparently healthy women as control group,. clinical examinations were done for each subjects and the information was recorded in a data sheet. Blood samples were collected for estimation CMV (IgG, IgMbysight–USA kit) and detection IL-10 serum level (Elabscience- USA kit) by sandwich ELISA system (Biotech-USA)and PCR amplification for IL10A/G polymorphism as following.

DNAisolation and PCR: Genomic DNA was extracted from fresh peripheral blood using a commercially available kit applying Genomic DNA kit System (Favogen- china) then stored at -20°C till use. SNPs IL-10-1082G/A amplification refractory mutation system (ARMS-PCR)in two reaction employing one common forward and two reverse primers F-5’-AGCAACACTCCTCGTCGCAAC-3’, R1 5’-CCTATCCCTACTTCCCCC-3 and R2 5’-CCTATCCCTACTTCCCCT3’ with an amplicon size of 179 bp. The reaction mix was done in 20µl volumes include 5µl of template DNA, PCR Premix kit (i-Taq) 5 µl, Primers (foreword2.5 µland reverse2.5µl) and Nuclease free water 5µl (Applied PCR system, USA). and PCR conditions were initial denaturation at 94°C for 5 min, followed by denaturation at 94°C for 30s,while annealing applied (58,60,62,64°C)to obtain most clear picture which were at 62°C for 1 min and 1 min of extension at 72°C, with a final extension of 7 min at 72°C. The result of PCR products were resolved by electrophoresis on agarose gel stained with 3.5µl (0.5% concentration) from ethidium bromide,therun lasted for 65 volt for 75 minute. The gel was then photographed on UV light (320nm) and scored for the presence or absence of an alleles specific band.

Statistical Analysis: Data were expressed as mean and standard deviation. The significantly of IL10 serum levels in patients and controls using student t-test. Allele frequencies were estimated using the gene-counting method. Differences of genotype and allele frequencies between aborted and control groups were also analyzed using the 2 test. Pearson coefficient and odds ratios (ORs) for the risk of abortion and their 95% condense intervals (CIs) were calculated using logistic regression analysis. All statistical analyses were performed by Microsoft excel and the Graph Pad software (prism version 6). The difference was considered significant, if p < 0.05.

Results

1. Family history on abortion women: The current study showed that the percentage of aborted ladies had a positive family history of abortion was appeared 54 % of patients as fig (1-A).

2. Cytomegalovirus (CMV) in aborted women: Out of 80 aborted patients there were 30 (37.5%) sera confirmed positive for anti- HCMV-antibodies. The remaining 50 (62.5%) were sero-negative. From 30 seropositive patients only 20 (66.7 %) were positive toward IgG and 2 (6.6%) positive for IgM and 8 (26.7) were positive for both IgG and IgM as in fig (1-B).

3. Molecular study

Distribution of IL-101082G/A genepolymorphism in aborted patients and healthy control: The results revealed that AA homozygous genotype was 60% in the abortion women and 15% in the controls that was statically significant whereas homozygous genotype GG represent 12.5% in aborted and 55%in controls as shown in Fig. 2 and Table 1.

The result revealed that “A” allele have higher prevalent in the abortion women with percentage (73.75%) in compared to controls (30%) Fig 3.

![Fig. 1: Distribution of aborted patients according to A- family history B- HCMV infection](image)
Table 1: Frequency and distribution of IL-10 “-1082 G/A” genotype and allele frequencies in aborted women and controls

<table>
<thead>
<tr>
<th>Allele</th>
<th>Cases (n = 40)</th>
<th>Control (n = 40)</th>
<th>Odd ratio (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GG</td>
<td>5(12.5%)</td>
<td>22(55%)</td>
<td>0.1169 (0.03793 - 0.3602)</td>
<td>&lt; 0.0001***</td>
</tr>
<tr>
<td>GA</td>
<td>11(27.5%)</td>
<td>12(30%)</td>
<td>0.8851 (0.3358 - 2.333)</td>
<td>0.5000 N.S</td>
</tr>
<tr>
<td>AA</td>
<td>24(60%)</td>
<td>6(15%)</td>
<td>8.500 (2.903 - 24.89)</td>
<td>&lt; 0.0001***</td>
</tr>
<tr>
<td>G allele</td>
<td>21(26.25%)</td>
<td>56(70%)</td>
<td>0.1525 (0.07647 - 0.3043)</td>
<td>&lt; 0.0001***</td>
</tr>
<tr>
<td>A allele</td>
<td>59(73.75%)</td>
<td>24(30%)</td>
<td>3.222 (1.541 - 6.739)</td>
<td>0.0015**</td>
</tr>
</tbody>
</table>

N.S: no significant, CI: P(<0.05).

Fig. 2: Ethidium bromide-stained agarose gel of PCR amplified 179 bp of IL10-1082G/A gene. Show: DNA molecular size marker (100bp Ladder), bands 1,3,5,7,9,11 and 13 for A allele, while 2,4,6,8,10 and 12 for G allele, so bands 1,2 represent AA genotype while 7,8 for AG genotype, finally 9,10 for GG genotype.

Fig. 3: Case-Control comparison in relative frequency of three genotype IL-10 1082G/A gene

4. Immunological study

a. Concentration of IL-10 in serum: The present study indicated that a significant decrease in serum level of IL-10 in patients, mean was 6.48pg/ml in compares to control group (13.32pg/ml) Fig.4.
b. Correlation between IL-10 polymorphisms and its production in abortion women: The results showed that IL-10 serum levels were significantly lower ($p < 0.05$) in the abortion women with genotype AA about 2.5 pg/mL while, the GA and GG mean levels were (5 and 12.3) pg/mL, respectively (Fig. 5).

c. IL-10 serum level in CMV infected and non-infected patients: It is clear that IL-10 has been decreased in both abortion infected with CMV or non-infected patients in compared with healthy, as show in fig (6).
Discussion

Family History on Abortion Women: Many of the recent studies of abortion confirmed that abortion associated with mother family history and regarded as one of risk factor. Generally, large percentage of women having a family history in their mother threatening them in risk of pregnancy loss. Among females, experience of an abortion within a current relationship was associated with increased risk for various forms of sexual dysfunction, and found that abortion history from mother a great risk. The important risk factor for having adverse effects on pregnancy, as the chronic disease, social, and the mother history of abortion.

Cytomegalovirus (CMV) in Aborted Women: Human cytomegalovirus is an important etiological agent of intrauterine infection, which may lead to some serious results in pregnant women such as miscarriage, cerebellar malformation and fetus development retardation. In Karbala/Iraq, Abbas revealed that the main cause of infectious agent (TORCH) that caused abortion in pregnant women was CMV, high prevalence of CMV IgG among aborted women 96% while IgM was 7%. Al-musawi indicated the presence of CMV IgG (93.9%) and IgM (5.29%) antibodies in high rate among pregnant women in the Baghdad city and is likely to be transmitted from mother to fetus in the uterus through the umbilical act as source of infection and cause spontaneous abortion. CMV had wide spread in pregnant women and cause abortion to them.

Distribution of IL-10-1082G/A genotypes and alleles among patients and control groups: The present study revealed that the A allele and AA genotype in aborted patients significantly associated with abortion. In contrast, the “G” allele, GG genotype has a rather preventive role. This indicate that the “G” allele may be protective factor. The research shown a possible association with spontaneous abortions and IL-10 polymorphism and explain that genotype AA and allele increased frequencies in abortion. In North Indian, Parveen showed a significant association of A allele women with recurrent pregnancy loss. Ameta-analysis study in 635 women with spontaneous abortions, revealed a statistically significant association of A allele with spontaneous abortions. Bohiltea demonstrated a strong association for -1082G/A IL-10 polymorphism in 69 women of the Romanian population with recurrent spontaneous abortion. The substitution of A allele in place of G allele at -1082 position reduced the production of IL-10, thereby dampening the maternal immune response, enhancing fetal tissue damage and thus resulting in spontaneous abortion.

IL-10 concentration in serum of aborted women: IL-10 production was significantly lower in patients with recurrent miscarriage as compared with normal pregnancy. Abdulgany and Bakir shown that decrease serum level of IL-10 in patients of RSA in contrast with healthy control. IL-10 has its role in the preservation of pregnancy until the completion of gestation. A higher levels of IL-10 production in human placental tissue during early pregnancy play important role in maintenance of normal pregnancy. Women with decreased production of IL-10 contributes to poor placental developmental process with an increased rate of spontaneous abortions.

IL-10 serum level in aborted women infected and non-infected with CMV compared with control: Interleukin IL-10 plays an important role in the prevention of spontaneous abortion. Serum levels of IL-10 were significantly lower in the aborted CMV patient groups compared to controls. Interleukin10 producing CD3+/CD8+ T-cell counts against infection of CMV were significantly lower in women with RSA. In spontaneous aborted women due to CMV and according to Mosman the level of IL-10 was lower in patients than in control. A significant lower in IL-10 expression in activated peripheral blood cells in recurrent abortion women due to infectious agents as compared with control group.

Conflict of Interest: There are no conflict interest.

Source of Funding: The authors declare that they have no competing interests.

Ethical Clearance: All authors are in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5).

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Molecular Study of *Echinococcus Granulosus* in Misan Province, South of Iraq

Hussain A. Mhouse Alsaady¹, Hussein Ali Naeem Al-Quzweeni²

¹Biology Department, College of science, University of Misan, Maysan, Iraq

ABSTRACT

Cystic Echinococcosis (CE) has serious impacts on human health and his animals. It is leading to a significant public health and socio-economic problems in different parts of the world. This study includes a molecular characterization of *Echinococcus granulosus* in definitive and intermediate hosts including humans in Misan province, south of Iraq. The present study includes survey for CE during the period from December 2017 to October 2018. A 3287 cases were examined 922 sheep, 405 buffalo, 2 camel, 983 cow, and 150 goats from central slaughterhouse of Al-Amarah city (capital of Misan province) and 819 human from Al-Sader Teaching Hospital and Al-Zahrawi Surgical Hospital, the adult worms were obtained from 2 stray dogs. The genetic characterization of the *E. granulosus* complex in human and livestock population was described for the first time in Misan province by using polymerase chain reaction (PCR) and DNA sequencing technology of mitochondrial gene Cox1. The results showed a high prevalence 72.72% of the sheep strain (G1) had been infected all hosts, where 13.63% was recorded as buffalo strain (G3) in sheep and cow hydatid cyst and 4.54% as SB041 strain was recorded in sheep, also 9.09% G1BC genotype was recorded in sheep and buffalo. These records are the first data for the genetic diversity of *Echinococcus granulosus* in Misan province, south of Iraq.

Keywords: Molecular Study, Cox1, Echinococcus granulosus, Misan, Iraq.

Introduction

Cystic Echinococcosis (CE) or hydatidosis caused by the larval stage of a zoonotic tapeworm *Echinococcus granulosus* which is endemic in the most regions of the world[1][2][3]. The adult worm is living in the small intestine of canids members as definitive host, mostly dogs and wolves[3][4][5]. The herbivores are infected with *E. granulosus* when grazing the contaminated herbage with the canids feces contains *E. granulosus* eggs[6]. However, humans can be accidentally infected by swallowing eggs with contaminated food, water and directly when contacted with infected dog[7]. In livestock, the infection with *E. granulosus* caused a considerable economic loss in milk and meat production, edible organs and decreased in fecundity[8][9]. The high infection rates and the global distribution of (CE) is return to the wide range species of infected intermediate hosts[1][8]. However, the infection rate of human is related with the infection rate of domestic animals specially dogs and sheep[10][11]. More than one global study reported that *E. granulosus* had variable strains in different regions of the world[12][13], which had different routes in epidemiology, pathology, control, and prevention[14][17].

Today, there are ten distinct strains or genotypes identification as G1 - G10. These genotypes are associated with distinct intermediate hosts like sheep, Buffalo, horses, cattle, camels, pigs, cervids, goats, and others[15][12][16]. In Iraq, hydatid cyst is one of the most endemic diseases in both humans and animals, which caused some significant human problems in health and economic activities[17][18][7].

Materials and Method

Sample Collection: The HC specimens were collected during the period from December 2017 to October 2018; from slaughtered livestock animals (sheep, buffalo and
cow) from central slaughterhouse of Amara city in Misan province (31°51'49.0”N 47°08'51.1”E) where human’s HC obtained from patients whom underwent to surgery in Al-sader Teaching Hospital and Al-Zahrawi Surgical Hospital. While the adult worms were obtained from stray dogs. The Protoscoleces and the germinal layers were isolated from each cyst then washed with PBS in prepared to DNA extraction. The specimens were preserved in labeled tubes with 70% ethanol and stored in deep freeze (-20°C) until used for DNA extraction.

**DNA extraction:** The DNA were extracted according manufacturer’s instructions of DNA extraction kit (gSYNC™ DNA Extraction Kit, geneaid, Korea). The purified DNA samples were frozen at -20°C until used in the polymerase chain reaction (PCR) technique.

**PCR amplification and gel electrophoresis:** The mitochondrial DNA target sequences for Cox1 gene were amplified by PCR with using the following protocol: PCR was carried out for the purified DNA samples with PCR preMix (BioNeer, Korea) in a 50μl final volume of reaction. Two conserved primers, JB3 (Forward): '5- TTT TTT TTT CAT CCT GAG GTT TAT-3' and JB4.5 (Reverse): '5-TAA AGA AAG AAC ATA ATG AAA ATG-3' [19], were used for amplify the mtDNA region consistent to partial Cox1 gene. The Cox1amplification began with an initial denaturation at 94°C for 5 minutes, 40 cycles of 94°C for 45 seconds, 51°C for 35 seconds, and 72°C for 45 seconds, followed by a final extension at 72°C for 10 minutes. The amplification products were resolved by electrophoresis in a 1% agarose gel using TBE buffer 1X (at 65 V for 1 h.) A 100bp ladder (Bioneer, Korea) was included as molecular size marker. Gels were visualized by staining with ethidium bromide solution (0.5 µg/ml) and banding patterns were photographed over UV light using Gel documentation [28].

**Sequencing:** The PCR amplified Cox1 gene specimens were automatically sequenced with using Applied Biosystem (genide, Korea) then compared with retrievable reference sequences of E. granulosus strains of GenBank in order to infer the micro variants. Homologue sequences were retrieved from GenBank representative of genetic variability circulating in the E. granulosus complex were included with all specimens and analyzed to obtain the phylogenetic tree by using MEGA X software.

**Results**

The results of PCR Amplicons electrophoresis with 1% agarose gel which visualized by ethidium bromide stain showed that PCR products sizes were 446bp (Figure 1).

![Figure 1: Electrophoreses pattern of PCR product for Cox1 gene 446bp, 1% Agarose, 65 V, 60min, M: DNA marker ladder 100bp.](image)

The results of Cox1 gene sequences for 29 isolates of E. granulosus were analyzed for detecting sequence variations with Cox1 reference sequences in GenBank databases and by using molecular analysis programs like MEGA the current study detected that E. granulosus had variant strains like sheep strain (G1), buffalo strain (G3), G1BC genotype and SB041 strain (Table, 1). Sheep strain (G1) consisted about 72.72% (16/22) of sequenced isolates, buffalo strain (G3) was recorded in 13.63% (3/22) of isolates, G1BC genotype was showed in about 9.09% (2/22) in sheep and buffalo isolates and only 4.45% (1/22) of isolates was matched with strain SB041 as showed by phylogenetic tree (Figure 2).

**Table 1: The distribution of E. granulosus strains**

<table>
<thead>
<tr>
<th>Strains (accession No.)</th>
<th>No. of isolate</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1 (NC 008075.1)</td>
<td>16</td>
<td>72.72</td>
</tr>
<tr>
<td>G3 (M84663.1)</td>
<td>3</td>
<td>13.63</td>
</tr>
<tr>
<td>G1BC (EURLP[20])</td>
<td>2</td>
<td>9.09</td>
</tr>
<tr>
<td>SB041 (HF947592.1)</td>
<td>1</td>
<td>4.54</td>
</tr>
</tbody>
</table>
Hence the results showed that the sheep strain (G1) is the predominant strain among other strains of *E. granulosus*.

**Figure 2: The Evolutionary relationships of *E. granulosus***

The evolutionary history was inferred using the UPGMA method. The optimal tree with the sum of branch length = 0.46113100 is shown. The tree is drawn to scale, with branch lengths in the same units as those of the evolutionary distances used to infer the phylogenetic tree. The evolutionary distances were computed using the Maximum Composite Likelihood method and are in the units of the number of base substitutions per site. This analysis involved 32 nucleotide sequences. Codon positions included were 1st+2nd+3rd+Noncoding. All ambiguous positions were removed for each sequence pair (pairwise deletion option). There were a total of 380 positions in the final dataset. Evolutionary analyses were conducted in MEGA X.

**Discussion**

In Iraq few studies were conducted in molecular field, some studies agreed with our findings in different species host, like Hama *et al.* (2015); Hassan *et al.* (2016) and Hassan *et al.* (2017)[21][22][23]. PCR and gene sequencing techniques were applied for investigating of some isolate of *E. granulosus* collected from human and some livestock animals this technique are used for the first time for *E. granulosus* strain identification in Misan province, for that the current study considered as the first databases of molecular characterization for *E. granulosus* in Misan.

The present study showed that sheep strain (G1) is the dominant strain (72.72%) of *E. granulosus*, this finding was agreement with some previous studies from different regions of the world that mentioned the (G1) was cosmopolitan strain[24][7]. G1 strain was distributed as: sheep (66.66%), buffalo (75%), cow (75%), human (100%) and Dog (100%), this results agreement with relatively high infection rate 2.16% and high fertility 65.00% of sheep hydatid cysts.

This domination of G1 was reported by other studies in some areas of Iraq such as: Baraak (2014) in human from different provinces of Iraq[25], the sheep strain (G1) reported as the most prevalent strain in Kirkuk, Iraqi Kurdistan and Kirkuk - Sulaimania respectively [22][23][7]. The results confirm previous evidences from molecular
genotyping surveys described high prevalence for sheep strain (G1) in Iraq.

The buffalo strain G3 was recorded in this study with low frequency 13.63% since it has been observed in E. granulosus specimens distributed between sheep (22.22%) and cow (25%) of hydatid cysts, this genotype was detected previously in some regions of Iraq like in Al-Qadisiyah province it recorded by Fadhil and A’aiz (2016) also G3 recorded in Kirkuk province and Sulaimania province by Hammad et al. (2018). The G1BC was recorded in 9.09% of E. granulosus specimens, this genotype recorded in sheep (11.11%) and buffalo (25%) of hydatid cysts. This genotype was identified according to EURLP method. The morphological parameters of G1BC was significantly different with other genotypes. The buffalo hydatid cyst with this genotype was the only fertile buffalo’s HC sample, where buffalo HC with G1 was sterile this may indicate that buffalo of Misan region is not suitable host for G1. This is the first record for G1BC genotype in Iraq. Only one (4.54%) of E. granulosus specimens was recorded as SB041 strain recorded by Beato et al. (2013) this genotype recorded in sheep (11.11%) hydatid cyst. The variations of morphological features of SB041 when compared with G1 and bosting with gene sequencing results and result of analysis with phylogetic tree (Figure 2) exhibited that our isolate (S.17) is likely to be SB041.

The phylogenetic analysis for mitochondrial Cox1 by the evolutionary history (Neighbor-Joining method) (Figure 2) showed that the majority of E. granulosus samples in various hosts aligned with G1 genotype. It also showed the origin similarity of some E. granulosus samples and strains (s.14-s.46, s.17-SB041) and (G2-G3-s.59, G6-G7).

Conclusion

Genotypes of E. granulosus circulating in Iraqi intermediated and definitive hosts were here updated: G1 was found to be the most dominant genotype in all examined hosts, G3 was also recorded for first time in Misan province.

Acknowledgements

We would like to thank to Dr. Saad Ramdan hamed and Dr. Salam Hasn lafta Al-Kaaby for their assistance in sample collection in the central slaughterhouses of Amara city. To the staff of Al-Sadder Teaching Hospital, Especially Dr. Hussein Sadam. To Shaima R. Banoo for her assistance, and Finally, to M.Sc. Hussein Humedy Chlib Al-Kaaby for his help.

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Conflict of Interest: There are no conflicts of interest

Ethical Clearance: Permission to conduct this study was issued by the Health institutional and the various slaughterhouse authorities. Sample collection from the slaughterhouses was carried out by a veterinary public health technician, and from patients was carried out by a health technician.

REFERENCES


The Human Arthropathy Inflammatory and Immune Herd Plots

Ibrahim M S Shnawa¹, Baha H H Alamidie²

¹Department of Biotechnology, College of Biotechnology, University of Qasim, Qasim, Babylon, Iraq;
²College of Dentistry, University of Babylon, Babylon, Iraq

ABSTRACT

The herd responses [HR] of human arthropathy patients were being assessed. Arthropathies can broadly be subdivided into; immune mediated and non-immune mediated. The immune mediated were of rheumatic and rheumatoid types. HR responses were of three main basic fractions. The low, the moderate and the high responders for the inflammatory, natural cellular immune and rheumatic herd responses. The nature of the inflammatory herd plot [Erythrocyte sedimentation rates] was of skewed plot type. While the natural cellular immune and the rheumatic response plots were of normal Gaussian distribution plot types. It is to be noted that these immune herd plots are being a novel finding in arthropathy patients.

Keywords: Arthropathy, Cellular, herd, immune, Rheumatic, Rheumatoid.

Introduction

A joint is an area of human body where two different bones meet. It functions to move the body parts connected its bones. Arthropathies are a group of human joint disorders featured by inflammatory, normal or overreacted immune responses. There are over-hundred types of human arthropathies. The main manifestation of these disease conditions are; joint pain, stiffness, swelling and tenderness. Their most common types are; osteoarthritis, rheumatic, rheumatoid and septic [1-5]. The aim of the present work was to report on the inflammatory and herd immunity plots for the arthropathy patients.

Materials and Method

Blood samples were collected [6] from the brachial vein of 60 arthropathy patients referred by the rheumatologists to microbiology laboratory, Department of basic sciences, College of dentistry, University of Babylon and microbiology laboratory, Department of Biotechnology, College of Biotechnology, University of Qassim as a test group and 10 apparently normal subjects as a control during the year 2018. The collected samples were divided into two portions one with anticoagulant for erythrocyte sedimentation rate [7], total leukocyte counts [7] and the other portion without anticoagulant for saving sera to investigate; acute Protein [6], ASOT, Rheumatoid factor [6] and serum uric acid [8]. Raw data were made in continuous class intervals to build up herd plots [9].

Results

I. Herd Responses: The nature of the human herd responses for the human arthropathy patients were found to be of three main responder types, as low medium and high. These herd response fraction types were noted in the inflammatory, the immune and the rheumatic responses, Table 1.

Table 1: Human arthropathy herd responder types*

<table>
<thead>
<tr>
<th>Response nature</th>
<th>Units</th>
<th>Low*</th>
<th>Moderate*</th>
<th>High*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammatory-ESR</td>
<td>Mm/hrs</td>
<td>20-39</td>
<td>60-99</td>
<td>100-140</td>
</tr>
<tr>
<td>Inflammatory-Serum uric acid</td>
<td>Mg/dl</td>
<td>5-6.9</td>
<td>7-7.9</td>
<td>8-9.9</td>
</tr>
<tr>
<td>Natural cellular immune response</td>
<td>Cell/ml</td>
<td>4000-6900</td>
<td>7000-9000</td>
<td>11000-15000</td>
</tr>
<tr>
<td>Rheumatic response ASOT</td>
<td>Todd units/ml</td>
<td>300-399</td>
<td>400-599</td>
<td>600-1600</td>
</tr>
</tbody>
</table>

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II. Herd Immunity: These arthropathy test patients were broadly divided into immune mediated and non-immune mediated types groups I to V, Table 2. The dual use of total leukocyte count, acute phase protein, rheumatoid factor and the anti-streptolysin O as a diagnostic battery and as herd immunity probes in arthropathy patients was proved to be valid for the immune mediated types group III and IV, Table 2.

Table 2: The Immune profiles of Arthropathy Patients

<table>
<thead>
<tr>
<th>Patients code</th>
<th>Patients numbers</th>
<th>CRP</th>
<th>RF</th>
<th>ASO titre, Todd U/ml.</th>
<th>WBCS count cell/ml.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>23</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>8000-14,500</td>
</tr>
<tr>
<td>II</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8000-11,000</td>
</tr>
<tr>
<td>III</td>
<td>12</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>8000-14,500</td>
</tr>
<tr>
<td>IV</td>
<td>9</td>
<td>+</td>
<td>-</td>
<td>[1+]</td>
<td>400-1600</td>
</tr>
<tr>
<td>V</td>
<td>5</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>8000=10,000</td>
</tr>
</tbody>
</table>

III. Herd Inflammatory Plots: The outstanding sign of the inflammatory responses is ESR. The ESR values of the test patients were ranging from 20 to 140. The herd plot of these inflammatory responses was of skewed plot type, Figure 1. While the uric acid herd serum values were ranging from 5 to 9, and the herd plot was of normal Gaussian distribution curve, Figure 2.

IV. Herd Immunity Plots

*Natural Cellular Immune herd Plot*: The nonspecific cellular immune responses of the herd is represented by the total leukocyte counts of the arthropathy patients was ranging between 8000-14,500 cell/ml. for both sexes. The herd plot was of normal Gaussian distribution curve type, Figure 3.

*Rheumatic herd Plot*: The ASO titre represents the rheumatic response in arthropathy patient herd. The ASO titer was ranged from 300-1600 Todd U/ml. The herd plot type was of normal Gaussian distribution curve type, Figure 4.

Figure 1: Inflammatory herd plot in arthropathy patients

Figure 2: Herd plot of serum uric acid in arthropathy patients

Figure 3: Herd plot of natural cellular immune response in arthropathy patients

Figure 4: Herd plot of rheumatic response in arthropathy patients
Discussion

Herd is a group of human individuals live at certain ecologic niche and showing mutual interplay with its biotic a abiotic components. Herd immunity is a collective rather than confined term to the common sense of immunity\(^\text{[10,11]}\). In the mere immunologic sense; carriers, past -infected, past -vaccinee and pre-immunity are the major elements of herd immunity\(^\text{[12]}\). The individuals forming the human herd expressed three responder types towards infection, vaccine and inflammation. Herd responses and herd immune probes, Table 3, have been found operative in; Typhoid, tonsillitis, periodontitis\(^\text{[10,13-15]}\).

<table>
<thead>
<tr>
<th>Plot Nature</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmonella typhi antibody</td>
<td>10</td>
</tr>
<tr>
<td>St.pyogenes antibody, cryoglobulin</td>
<td>13</td>
</tr>
<tr>
<td>C3 and C4</td>
<td>14</td>
</tr>
<tr>
<td>Periodontitis cryoglobulin</td>
<td>15</td>
</tr>
<tr>
<td>Rheumatic antibody, Natural immune cellular</td>
<td>This study</td>
</tr>
</tbody>
</table>

In the present communication herd immunity plots are being reported in arthropathy patients using leukocyte counts, and ASOT as well as erythrocyte sedimentation and serum uric acid as probes. They were proved to be valid probes for herd immunity of arthropathy patients, Tables 1-3.

Molecular mimicry between Streptococcus pyogenes antigens and synovial antigens induce an autoimmune rheumatic arthropathy \(^\text{[16]}\). Positive acute phase protein response, positive rheumatoid factor, high erythrocyte sedimentation rates and high total leukocyte counts may indicate acute rheumatoid arthropathy\(^\text{[17,18]}\).

Conclusion

Three herd responder types were evident among arthropathy patients. Three Gaussian distribution and one skewed plot types were determined. Leukocyte count and antistreptolysin O and rheumatoid factor were found good probes for the immune mediate arthropathy. The adopted diagnostic battery seemed to be valid for the test patients. Herd immunity plots seemed to be a novel finding in arthropathy patients.

Acknowledgment

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Conflict of Interest: Non-conflict

Source of Funding: Self

Ethical Clearance: The research project is formally registered in both affiliated departments. Clinical samples were taken from the patients with complete their own satisfaction.

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Congenital Lobar Emphysema—A Case Series for 2 Years

Ibrahim Shuker Mahmood1, Fawzi Salih Shihab2, Ahmad Mahmood Mohammed1

1Tikrit Teaching Hospital, Tikrit City; 2Tikrit College of Medicine, Tikrit University

Abstract

Background: Congenital lobar emphysema (CLE), a rare variety of congenital malformation of lung characterized by over distension of a lobe of a lung due to partial obstruction of the bronchus, can be a diagnostic and therapeutic challenge for the treating pediatrician.

Aim: To study the way of presentation, diagnosis, management and prognosis of CLE and comparing our results with other studies done in other centers.

Method: A case series of ten patients with CLE. All of our patients were managed in the department of pediatric surgery center at AL-KHANSAA hospital in Mosul city between January 2016 to January 2018.

Results: We have found that the right upper lobe is more affected than the left upper lobe and more than one lobe can be affected. The surgical treatment lobectomy of the affected lobe. The mortality rate was high in patients having congenital heart diseases and those with late presentation and complication. Ten patients, five male and five females, their ages ranged from 7 days to 6 months.

Conclusion: CLE is a rare congenital anomaly, most of our patients are infant less than 6 months old and most of them presented with respiratory distress, recurrent chest infection and some of them presented with pneumothorax.

Keywords: congenital lobar emphysema, respiratory distress, lobectomy, pneumothorax.

Introduction

CLE is a respiratory disorder of varying degree of severity which allows air to enter the lungs but not escape. (1) CLE is a rare condition, which is found in the neonatal period. (2)

Normally male babies are affected more often than females. CLE is usually unilateral affecting the left upper lobe followed by the right middle and right upper lobes. (3-6) Involvement of more than one lobe is rare. Similarly involvement of lower lobe is also extremely rare. (2) The current theory, which suggests inadequate cartilaginous support of the bronchus was first proposed by Gross and Lewis (7), and is most favored. (8) Polyalveolar lobe (an estimated three to five fold increase in number of alveoli for the whole lobe), is described by Hislop and Ried, in one of the recently described pathological entities that can give rise to CLE. (2, 7)

Aim of the Study: Prospective study on the way of presentation, diagnosis, management and prognosis of CLE and comparing our results with other studies done in other centers.

Patients and Method

From January 2016 to January 2018, ten cases with CLE admitted to the pediatric surgery center in AL-Khanssa teaching hospital. The cases were managed by different surgeons in the center. The medical records of these patients were registrated for age at presentation, sex, presenting symptoms, investigations, treatment and outcome. Most patients discharged from hospital in 7-8 post-operative days. We follow up the patient each 2 week for 3 months and then each month for other 3 month by physical examination and chest x-ray if indicated. Only two patients came regularly for follow up, the other four seen irregularly.

Results

Ten patients (5 males and 5 females) were included in this study. The age distribution of our patients range from 7 days to 6 months three patients at the neonatal age group and seven patients at infantile age group. Four (40%) patients were presented with RUL only while two (20%) patients lobe affect are RUL with RML. Two
(20%) patients lobe affect is LUL. One (10%) patient presented with RML and one (10%) patient presented RLL. The body weight ranged between 3Kg for the youngest 7 days female and 5.5 Kg for the oldest 6 months male. Two patients have associated congenital heart disease (ventricular septal defect).

All patients have dyspnoea, tachypnoea, and intercostals recession, some have attacks of cyanosis and wheezing. Deviation of the trachea, and mediastinum away from the affected side, hyperresonance on percussion and severely diminished air entry on the affected side were found in all patients.

In eight patients, the chest radiographs demonstrate over distention of the affected lobe. Within radiolucent zone, there are faint bronchovascular markings. (Figure 1 & 2)

CT scan in those five patients shows a hyperlucent, hyper expanded lobe with middle substernal lobe herniation and compression of the remaining lung. Mediastinum is significantly shifted away from the side of the abnormal lobe.
All the six patients have excellent prognosis and full expansion in affect side, except one patient died post-operative from heart failure due to congenital heart disease (VSD).

Surgical emphysema presented in one patient treated conservatively and the patient became well. Pulmonary edema in patient with congenital heart disease (VSD) and with heart failure. The patient died in the third postoperative day. Fever and atelectasis in two patients and treated conservatively.

In our study (3) patients died, (2) patients died pre-operatively, in intensive care unit, one of them with (VSD) and other one with late presented with pneumothorax. The third patients, have (VSD) operated upon but the patient died post-operatively due to the development of pulmonary edema and heart failure.

Discussion

In our study we reported ten cases of CLE from January 2003-January 2006 in Mosul province. Nuchtern and Harberg during a 10-year-period performed 1051 thoracic surgical operations, 22 (2.1 %) of them were for congenital lung cysts, and of these only 6 (0.6%) were for CLE. (10) Wesley et al over a 10-year-period reviewed 22 patients with congenital lung cysts, (3) of them were for CLE. (11)

Over period of ten years from 1990-2000, 12 children with congenital cystic disease of the lung were treated at Al-Qatif Center Hospital, Al-Qatif, kingdom of Saudi Arabia (KSA). Six of them had CLE. (12) In our study, all patients are full term infant and premature infant is not recorded as the same as in the other study show the CLE is characteristically found in the term infant, but acquired lobar emphysema is common among preterm. (13-15)

In our study we have three patients in the neonatal age group (30%) and seven patients in the infantile age group (70%). But in other study show: 33% of cases of CLE presented at birth and 50% are diagnosed at the age of one month. Presentation after 6 months is uncommon only 5% of the cases. (16, 17)

The age in our patients range from 7 days to 6 months (mean = 2.9 months). This may be due to progressive over distention of lobe after which birth is the main pathogenesis of CLE. (18, 19)

Histological examination showed large markedly over distended alveolar spaces without tissue destruction consistent with CLE. (12) The causes of CLE often cannot be identified, the airway may be obstructed or the infant’s lung may not have developed properly. (20) In our study, we reported only one case with positive family history which might reflect underlying genetic etiology. CLE has also been described in association with maternal chorioamnionitis and CMV pneumonitis. (21, 22)

Our study, is differ from other studies regarding the lobes affected.

The most common lobe affected is RUL about 40%, while in other study over period of ten years, from 1990 to the 2000 at AL-Qatif Central Hospital in Saudi Arabia six patients had CLE all of them the lobe affected is LUL. (12) CLE is usually unilateral disease affecting the left upper lobe followed by the right middle and right upper lobe and rarely lower lobes. (3-6) while in our study the lobe affected is RUL followed by (RUL & RML) and LUL, then RML and RLL. Involvement of more than one lobe is rare. Similarly involvement of lower lobes is also extremely rare. (2, 4) But in our study more than one lobe are affected 20% and lower lobe infected is 10%. Most babies with CLE presented with repeated attacks of cough, breathlessness, failure to thrive and refused feeding. (23) But in our study, most our patients with normal body weight as shown in table no.3 because most of our patients are very young and have early presentation and management.

CLE is frequently associated with congenital heart disease which should be looked for during the evaluation.
of these patients. In our study there are two patients 20% with congenital heart disease (VSD) diagnosis by echo-cardiogram. In other studies approximately 10%-12% of patients with CLE have congenital heart disease. In our study, the patients presented with acute respiratory distress soon after birth are four patients (40%), patients presented with recurrent attacks of chest infection are also four patients (40%) and patients presented with recurrent attacks of chest infection complicated by pneumothorax (complicated CLE) are two patients (20%). This finding is nearly similar to the other studies. The majority of patients with CLE presented early with acute neonatal respiratory distress, a small group of them may be asymptomatic or presented at a later age with recurrent chest infection. 

In all our patients on examination show ipsilateral hyperresonance on percussion and diminished or absent breathing sound in the affected side. The maximal cardiac dullness is shifted away from the side of the lesion. A proximately half of infant with CLE have varying degree of respiratory distress, and other have minimal symptoms until they develop an intercurrent respiratory tract infection. Most patients not diagnosed until they developed sever dyspnea when they are between 1 and 4 months of age, even though they had some respiratory difficulty earlier. 

In our study all our patients chest radiogram was done. The chest radiogram was diagnostic and five from our 10 patients CT scan was done to confirm diagnosis and excluded others causes of lobar emphysema. CT scan of the chest may be valuable in locating extrinsic etiological factors such as bronchogenic cyst, which must be considered whenever CLE is diagnosed.

The surgical treatment of CLE is total lobectomy which must be performed early, overcome the potentially life threatening acute respiratory distress and reduce the possibility of subsequent complication. AL-Bassam et al managed five children out of 37 with CLE conservatively and all did well with no surgical intervention.

We found surgical resection to be both safe and effective in the management of CLE. Total lobectomy is well tolerated in infants and children as growth and expansion of the remaining lung tissue is known to occur in children up to the age 5 years with subsequent total lung volume and function ultimately returning to normal.

In our study six patients have lobectomy of the affected lobe and all six patients became well and with excellent result post-operatively except one patient, died post operatively because the patient have congenital heart disease (VSD) and developed pulmonary edema and heart failure, the patient died in the third post-operative day. So the surgical treatment (total lobectomy) is the best treatment of CLE. In our study five patients from six patients lobectomy were done with excellent prognosis, but from four patients who were not operated two of them died preoperative and the other two have history of recurrent attacks of chest infection and failure to thrive.

In our study, the mortality rate high in patient with CHD, late presentation with complicated CLE (pneumothorax) and when more than one lobe is affected.

Conclusion

CLE typically affects young infant less than 6 months of age. The most common lobe affected with CLE are RUL then LUL. High mortality rate most commonly occurs in those with late in presentation, patients with congenital heart disease and when more than one lobe is affected. Treatment of CLE is surgical resection (total lobectomy). CLE has good prognosis after lobectomy in patient without other condition.

Ethical Clearance: Taken from Tikrit University College of Medicine committee

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES


The Carotid Intima-Media Thickness in Workers with High and Low Exposure to Air Pollution

Isabella Laleno1, Muhammad Aminuddin1
1Department of Cardiology and Vascular Medicine, Faculty of Medicine Universitas Airlangga, Dr. Soetomo Teaching Hospital, Surabaya 60285, Indonesia

ABSTRACT

Background: The exposure to chronic air pollution is associated with cardiovascular morbidity and mortality through atherosclerosis acceleration and progression. Carotid intima-media thickness (CIMT) is an important subclinical sign of atherosclerosis.

Objective: To analyze the difference of CIMT between chemical industry workers with high and low exposure to air pollution.

Method: There were 66 male subjects who consisted of 33 chemical industry workers in the production division and other 33 non-industry workers who have worked for more than 1 year. The subjects underwent the examination of CIMT in left and right carotid artery.

Results: The mean of left CIMT test was 0.97 ± 0.08 mm in industry workers and 0.75 ± 0.15 mm in office workers. The mean of left CIMT test was 1.01 ± 0.09 mm in industry workers and 0.72 ± 0.10 mm in office workers. On the other hand, the mean of left and right CIMT test was 0.99 ± 0.07 mm in industry workers and 0.74 ± 0.11 mm in office workers. The difference analysis of left CIMT between two groups was examined by using unpaired t-test. There was no significant difference of CIMT value between subjects who worked in industry and office (p < 0.05; 9% CI 0.16 – 0.28). On the other hand, the difference analysis between left CIMT and the mean of left and right CIMT was measured by Mann-Whitney test. The results showed that there was a significant difference between two groups (p < 0.05).

Conclusion: There was no significant difference between subjects with high and low exposure to air pollution (p < 0.05).

Keywords: air pollution, subclinical atherosclerosis, carotid intima-media thickness (CIMT), cardiovascular

Introduction

Air pollution can cause human health problems (1). The association between the high level of air pollution and human health have been known since more than a decade ago. Several epidemiological studies support this association and indicate significant increased morbidity and mortality because of air pollution worldwide (2).

Air pollution consists of heterogeneous mixtures of various substances such as ozone (O3), carbon monoxide (CO), sulfur dioxide (SO2), nitrogen oxides (NOx), liquids, and particulate matter (PM). Various epidemiological data suggest that air pollution, especially PM, as the main risk factor causing serious health problems in humans. The PM consists of solid and liquid components from combustion of motor vehicles, road dust, forest burning, wind-borne soil, and volcanic emissions (3). PM which has aerodynamic diameter of <10 μm (or known as PM10) can enter directly into the lungs. On the other hand, PM with aerodynamic size of <2.5 μm (PM2.5) and <0.1 μm (PM0.1) can be inhaled to
the deepest part of the lungs, deposited in the alveoli, into the pulmonary circulation and possibly into the circulation systemic. The harmful effects of PM on the cardiovascular system have been established by various epidemiological and observational studies (4).

The rapid development of industrialization and urbanization in the last three decades has resulted in various adverse impacts on the environment, both in developing and developed countries in the world. In the world, especially in the United States and European countries, industrial environmental pollution is a controversial topic (5). Emissions to the atmosphere from various chemical industries, such as ammonia industry, urea industry and nitric acid industry including sulfur dioxide (SOx), nitrogen oxides (NOx), carbon oxides (COx), hydrogen sulfide, hydrogen cyanide, volatile organic compounds (VOC), NH3 and suspended particulate matter (SPM) which are the sources of air pollution (6).

Cardiovascular disease, until recently, has been a major cause of morbidity and mortality in developed and developing countries, and atherosclerosis is the underlying primary pathological mechanism. Atherosclerosis is a long-term process involving various mechanisms in it including lipid peroxidation and inflammation affecting the coronary vessel wall. Air pollution can contribute to an increased risk of cardiovascular events through initiation and promotion of atherosclerotic progression (1). Air pollution can trigger atherosclerosis in peripheral blood vessels, coronary arteries, and aorta. The mechanism by which PM causes atherosclerosis can not be determined. However, there are two hypotheses that have been proposed and have been tested experimentally. The first hypothesis is that the inhaled particles can trigger an inflammatory response in the lungs, which then releases various inflammatory and protrombotic cytokines into the systemic circulation (3). The other hypothesis stated that rapidly inhaled PM that can translocation into circulation, with potential effects directly on homeostasis and cardiovascular integrity. The data of experimental study showed that the mechanism of air pollution role on various cardiovascular cases including ischemia, endothelial dysfunction, activation of fibrinolysis system, and possible effects on destabilization of atherosclerotic plaque (7).

Carotid Intima-Media Thickness (CIMT) is a technique of measuring subclinical atherosclerosis progression that has been validated through various clinical trials. CIMT can assess non-invasive atherosclerosis by using ultrasound imaging directly, with high resolution, and with an automated data processing system (8). The quantitative measurement of CIMT correlates with all major risk factors of atherosclerosis and cardiovascular clinical cases. In the last two decades, CIMT has been widely used to estimate the risk of cardiovascular cases, such as acute myocardial infarction, stroke, and sudden cardiac death. The relationship between air pollution and CIMT as a sub-clinical atherosclerotic marker was first reported by Kunzli, et al. in 2005. Two cross sectional population-based studies that were Nixdorf Recall Study in German and Multi Ethnic Study of Atherosclerosis in United States also reported the association between air pollution exposure and CIMT change (7).

The researchers are intended to evaluate the carotid intima-media thickness in chemical industry workers in East Java that were highly exposed to air pollution compared to the workers with low exposure to air pollution.

**Method**

**Sample:** There were 66 male subjects that consisted of 33 chemical industry workers and the other 33 office workers. The subjects fulfilled the inclusion criteria including chemical industry workers and office workers who worked for more than 1 year, willing to join the research, and signed informed consent. The data was collected by using consecutive sampling method. The research was conducted on October-December 2013 in private hospital that manages safety and health at particular chemical industry in East Java (9).

This study was observational analytic study with cross sectional approach. The study protocol was approved by the Ethical Commission in Dr. Soetomo General Hospital Surabaya. The data analysis was examined by using unpaired t-test and Mann-Whitney test. The difference was considered significant if the value of \( p < 0.05 \). All the data analysis was processed by using SPSS software version 20 (10).

**Result**

The result of CIMT measurement used in this research is the measurement of thickness of intima - the posterior wall media (far wall) of right and left carotid artery, and the right and left combined mean
Table 1: The characteristics of carotid intima-media thickness of the research subjects

<table>
<thead>
<tr>
<th>Industry (Mean ± SD)</th>
<th>Office (Mean ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left CIMT (mm)</td>
<td>0.97 ± 0.08</td>
</tr>
<tr>
<td>Right CIMT (mm)</td>
<td>1.01 ± 0.09</td>
</tr>
<tr>
<td>Total CIMT (mm)</td>
<td>0.99 ± 0.07</td>
</tr>
</tbody>
</table>

Note: SD = Standard Deviation; CIMT = Carotid Intima-Media Thickness; mm = milimeter

After the normality test performed in the left CIMT, it was found that the value had normal data distribution; therefore, the left CIMT difference analysis between the two groups used unpaired T test (Independent T test). There was a significant difference between industry workers (0.97 ± 0.08 mm) and office workers (0.75 ± 0.15 mm) with the significance value of \( p < 0.05 \); 95% CI 0.16 – 0.28

The results of right carotid artery measurements obtained mean CIMT of 1.01 ± 0.09 mm in industry workers, and 0.72 ± 0.10 mm in office workers. After the normality test, it obtained abnormal value distribution. The analysis of differences in the right carotid intima media thickness between the two groups was performed using non parametric test of Mann Whitney. Mann Whitney test results showed a significant difference between industry workers and office workers with a significance value of \( p < 0.05 \).

Table 2: The difference of CIMT value in two groups

<table>
<thead>
<tr>
<th>CIMT</th>
<th>N</th>
<th>Mean ± SD*</th>
<th>Median* (max – min)</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left (^{x})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>33</td>
<td>0.97 ± 0.08</td>
<td>0.96 (0.82 – 1.23)</td>
<td>0.000</td>
<td>0.16 – 0.28</td>
</tr>
<tr>
<td>Office</td>
<td>33</td>
<td>0.75 ± 0.15</td>
<td>0.73 (0.48 – 1.23)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right (^{y})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>33</td>
<td>1.01 ± 0.09</td>
<td>0.99 (0.85 – 1.32)</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td>33</td>
<td>0.72 ± 0.10</td>
<td>0.70 (0.56 – 0.97)</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Total (^{y})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>33</td>
<td>0.99 ± 0.07</td>
<td>0.99 (0.84 – 1.16)</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td>33</td>
<td>0.74 ± 0.11</td>
<td>0.71 (0.53 – 1.10)</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

Note: CIMT = Carotid Intima-Media Thickness; SD = Standard Deviation; max = maximum; min = minimum; \(^{x}\) = unpaired t test; \(^{y}\) = Mann Whitney test; 95% CI = 95% Confidence Interval; * = measurement in millimeters.

Discussion

A cohort study of young adults without cardiovascular disease showed that individuals exposed to higher pollutant exposure experienced faster progression of carotid intima-media thickness (CIMT). Air quality improvements are also associated with changes in CIMT progression in which decreased PM\(_{2.5}\) levels also indicates a slower CIMT progression. These findings suggest that long-term exposure to higher pollutants can accelerate the pathology of blood vessels \(^{(1)}\).

This study shows that the average intima-media thickness in industry workers was 1.01 ± 0.09 mm for right carotid artery, 0.97 ± 0.08 mm for left carotid artery, and 0.99 ± 0.07 mm for the combined average of both carotid arteries. It can be concluded that industry workers had abnormal CIMT value (normal value of 0.9 mm). On the other hand, the average intima-media thickness in industry workers was 0.72 ± 0.10 mm for right carotid artery, 0.75 ± 0.15 mm for left carotid artery, and 0.74 ± 0.11 mm for the combined average of both carotid arteries. It can be concluded that office workers had normal CIMT value (normal value of 0.9 mm). It means there was a significant difference in average value \( p < 0.05 \).

Industry workers experience direct contact with chemicals, and are in production sites where chemical pollutants are formed, whereas office workers never experience direct contact with polluting chemicals, and are located at a distance of 2 km from the production site \(^{(5)}\). These results are in accordance with with previous cross sectional and cohort studies indicating that the
closer the distance to high pollutant levels will lead to significant increases in CIMT values (11).

The relationship between air pollution and CIMT as a sub-clinical atherosclerotic marker was first reported by Mitchell, et al. (2019). The study observed the association between air pollution and atherosclerotic progression in humans. This study shows that closer distance to congestion sources and higher PM2.5 levels were associated with higher IMT progression in 1,483 adults in Los Angeles, USA. A cross-sectional analysis in adults showed that long-term PM2.5 concentrations greater than 10 mg/m3 were associated with a larger CIMT of 1% - 10%. Adar et al., investigated the progression of carotid intima media thickness and long-term PM exposure (12). Among the 5362 participants involved in the MESA (Multi-Ethnic Study of Atherosclerosis) with an average annual CIMT progression of 14 mm/year, increased PM2.5 levels of 2.5 mg/m3 during the follow-up period (2.5 years), it was associated with CIMT progression of 5.0 mm/year (95% CI, 2.6 - 7.4 mm/year) higher than those living in the same metropolitan area. This study reported that the association between exposure to air pollution and atherosclerosis in human was signed by CIMT changes (13).

Moreover, the association between long-term carbon black exposure in people living close to the main road with CIMT in elderly showed increased black carbon levels of 0.26 μg/m3 in a year was associated with increased CIMT of 1.1% (95% CI: 0.4, 1.7%). Rivera, et al. conducted a cross-sectional study using 2780 REGICOR participants, showing the long-term exposure of NOx for the 5th and 95th percentiles (25 μg/m3), traffic intensity (15,000 vehicles/day), and traffic loads at 100 m (7.2 million vehicles/m/day) corresponds to a CIMT difference of 0.56%, 2.32%, and 1.91% respectively (14).

The data have not been able to show the association between exposure to pollutants and the carotid intima-media thickness. Nevertheless, with statistically significant differences of the results, it can be assumed that workers who are in long-term direct contact with and exposed to highly concentrated pollutants have significantly abnormal and higher CIMT values than office workers (15). The limitation of this study is that the total of the sample was small; thus, it can not reflect the group population exposed to high and low air pollution levels overall. The researchers also can not directly measure the levels and types of pollutants existed in the workplaces of each group; thus, the high levels of pollutants are only based on the assumption that those who work in factories are exposed to pollutants are chronically higher, otherwise those working in the office are less exposed (4). This does not allow the researchers to be able to determine the association between the pollutant level and the carotid intima-media thickness(15).

In addition, there has been no research that can be used as reference for the carotid artery intima-media thickness in Indonesian who have various ethnics. It is still required better design and research methods as well as larger sample quantities to be able to determine the association between exposure to pollution and the carotid intima-media thickness. Another limitation is that blind was not performed in this study, and CIMT measurements are performed by one person and one measurement only; therefore, they can not be assessed for inter and intra-observer variations (7).

Conclusion

There was a significant difference between subjects with high (industry workers) and low (office workers) exposure to air pollution (p < 0.05). The subjects who were exposed to chronically high air pollution level had higher CIMT value than the subjects exposed to low air pollution level.

Ethical Clearance: This study involves participants in the process using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study is carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice.

Conflict of Interest: There is no report about conflict of interest since this study has been conducted until now.

Source of Funding: All of the research processes is funded by the authors only.

REFERENCES


Using Species-Specific Polymerase Chain Reaction Technique for Detection of Cows, Buffallos, Seeps and Goats Milk and Cheeses in Basra City

Jalal Yaseen Mustafa

College of Veterinary Medicine, University of Basra

ABSTRACT

A polymerase chain reaction (PCR) was applied to identify cows’ sheep’s, goats’ and buffalo’s milk and cheese’s in Basra city by using specific primers targeting to identify the species of animals to detect the cheating in local and imported cheeses and in crude milk as a comparative point to detect accuracy of result come from amplified gene of cheeses. The present study aimed to develop a rapid PCR-based method for the detection of cows’, sheep’s, goats’ and buffalo’ cheese. The current study revealed that there was no cheating in imported cheeses, whereas, reported some cheating in the local cheeses compared with the crude milk as a standard to limited the accuracy of result.

Keywords: Species specific PCR; Cheese promoter, cows, buffalos, milk

Introduction

Cheese is a substance produced from the milk after transmitted from the liquid ship to gelatin or solid by curd the milk and separated the whey then maturation the result to contain the cheese. It is one of the oldest types of processed foods. Cheeses are considered to be food products made from the milk, because they are highly nutritious, tasteful, high-yielding, and high-growth. Species identification in animal products has received great attention in recent years. Particularly, species identification of dairy products has a remarkable importance for several reasons, including frequent human adverse reactions toward some species milk proteins and government regulations.

Some cheeses are manufactured from defined amounts of each type of milk. Thus, authenticity issues in cheese analyses are challenged not only by milk species identification but also by the need for quantitative determination of bovine milk in ovine or other animal cheeses manufactured from raw or processed milk.

However, as the estimated percentage of bovine milk in mixed cheese is strongly affected by the casein content of milks used for cheese manufacture, the results were approximate. On the other hand, methods for milk species quantification based on the whey protein fraction suffer from a shortcoming, as that fraction is more sensitive to heating than the casein fraction. Excessive proteolysis during cheese ripening can also be disadvantageous for quantification.

In recent years, significant attention has been turning towards DNA-based approaches. DNA-based approaches have proven to be reliable, sensitive and fast for many aspects of food authentication, for that the polymerase chain reaction is one of the most common genetic technique used for limited the species origin in food.

Milk from the ruminant healthy mammary glands has a large number of somatic cells, which contain genomic DNA acceptable for PCR amplification. Although it is known that somatic cells found in milk insist during cheese manufacturing and ripeness processes, protocols reporting the isolating of genomic DNA after cheese-laboring and use as a template for PCR amplification are more rare compared with other food model such as meat or fish. For instance, a multiplex PCR have been used to recognize the milk of bovine, caprine and ovine species in cheese products. In addition, convey

Corresponding Author:
Jalal Y. Mustafa
College of Veterinary Medicine, University of Basra
Email: dr.jalalyaseen1982@yahoo.com
an affective PCR-based method for the limited of 1% level of undeclared bovine milk in water buffalo milk, mozzarella cheeses. Maudet, and Teberlet\textsuperscript{14} progressed a PCR-based technique for the detection of bovine milk in caprine cheeses\textsuperscript{15,16,17,18}.

**Materials and Method**

**Selection and Preparation of the Samples:** In the present study, one hundred twenty cheese sample were collected from the marketing cheese as follow. 20 sample from craft (cheddar cheese), 20 sample from Almarai (cream cheese), 20 sample from Kiri, 20 sample from Anchor, and 40 sample from local Basra cheese (20 from Curls cheese/Thefair cheese and 20 from bulk cheese/Arab cheese). Milk sample from four type of animals (Cow, sheep, goat and buffalo) was also collected as a comparative point with cheese. Samples were transported to the laboratory under refrigeration and processed immediately or stored at until used.

**DNA Extraction:** Genomic DNA was extracted from milk or cheese producer not more than two weeks from the prepared by using a Wizard DNA clean up kit (Promega, Madison, WI). Samples (2 ml from the milk) or (2 g from the cheese) were digested in 8.6 ml of extraction buffer, pH 8.0 (10 mM Tris, 150 mM NaCl, 2 mM EDTA, and 1 % SDS), 1 ml of 5 M guanidine hydrochloride and 200 µL of 20 mg ml proteinase K (Boehringer mannheim GmbH, mannheim, Germany). Then, the samples were incubated overnight at 55°C with shaking at 60 rpm and stand to cool at room temperature. Five hundred microliters of chloroform (Sigma-Aldrich) were then added to the lysate. The samples were then centrifuged at 13,000 rpm for 10 min. The clear aqueous supernatant (500 µL) was used to purify the DNA using the Wizard DNA cleanup system kit (Promega) with a vacuum manifold, according to the manufacturer’s instructions. Finally, the DNA was eluted in100 µL of sterile deionized water to know the amount of DNA in sample after extraction making Nano drop and recorded the concentrate of DNA by spectrophotometry at 260 nm and 280 nm.

Table 1: A 12S rRNA gene primers

<table>
<thead>
<tr>
<th>Animal</th>
<th>Primer</th>
<th>Primer sequence (5’ → 3’ end)</th>
<th>Sources</th>
<th>Product size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow</td>
<td>BosD-FW</td>
<td>AATAACTCAACACACAGAATTTCGC</td>
<td>Kotowicz, M. et al, 2007</td>
<td>300 bp</td>
</tr>
<tr>
<td></td>
<td>BosD-RE</td>
<td>CGTGATCCTAATGGTACGAATTA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffalo</td>
<td></td>
<td>ACACGTAGGAGGCTGTATATA</td>
<td>Sanjary, R. A. and Sultan M.A. 2012</td>
<td>520 bp</td>
</tr>
<tr>
<td></td>
<td>M-FW</td>
<td>CTAAGGACAGCCTTACTTTATAAC</td>
<td>Calleja, L. et al, 2005</td>
<td>371 bp</td>
</tr>
<tr>
<td></td>
<td>INV-RE</td>
<td>GTCTCCTTCTCAGGTGTTGAGATTA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheep</td>
<td></td>
<td>CTAGGAGGACCTGTATATAAC</td>
<td>Calleja, L. et al, 2005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GoaD-RE</td>
<td>AGCGGATGCATGATGAAATG</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Typical conditions of PCR amplification

<table>
<thead>
<tr>
<th>Stage</th>
<th>Step</th>
<th>Temp.</th>
<th>Time</th>
<th>No. cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>---</td>
<td>95 °C</td>
<td>3 min</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>95 °C</td>
<td>30 sec</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Anne. Temp.</td>
<td>30 sec</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>72 °C</td>
<td>30 sec</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>---</td>
<td>72 °C</td>
<td>10 min</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>---</td>
<td>20 °C</td>
<td>Hole</td>
<td></td>
</tr>
</tbody>
</table>

Agarose electrophoresis of PCR product: After PCR amplification, electrophoresis was used according to typical conditions and read by a UV transilluminator. Typical conditions used for electrophoresis of DNA was carried out at 70 volt (Vo) for desired periods of time in 1 X Tris acetate ethylene diamine tetra acetic acid [EDTA] (TAE) buffer diluted from a 50 X stock [242 g/L Tris base, 57 mL/L glacial acetic acid, 100 mL/L 0.5 M EDTA, pH 8.0]. Loading dye (bromo phenol blue) was added to

Table 3: Amount of PCR reaction

<table>
<thead>
<tr>
<th>Substance</th>
<th>1 reaction</th>
<th>2 reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master mix</td>
<td>13 ml</td>
<td>26 ml</td>
</tr>
<tr>
<td>Forward primer</td>
<td>0.7 ml</td>
<td>1.4 ml</td>
</tr>
</tbody>
</table>

Conted…
DNA samples (3 µl bromo phenol blue to 10 µl DNA), prior to loading into the wells of 1% (W/V) agarose gels containing ethedium bromide, 4 µl was added to approximately 50 ml of molten agarose.

Results and Discussion

In the current study, 120 cheese sample are tested for detection the cheating of the cheese either from cow sources or other type of animal. The concentration of DNA in the sample after extraction, limited by Nano drop, the result around (1.8-1.9), its normal and very good concentration of DNA between (1.7-2)\(^{19}\).

The result revealed high sensitivity of PCR technic to limited the accuracy of sources of milk type. This finding is in agreement with previous studied\(^{16,20}\). This procedure, followed by a DNA extraction protocol based on a commercial kit, proved to be highly efficient, yielding good quality DNA even when milk samples were submitted to severe heat treatments. The specificity of primer set chosen, greatly influences accurate species identification of PCR\(^{21}\).

The most extended techniques involve PCR amplification of a conserved gene fragment from a group of species by using universal primers, or amplification of DNA with specific primers for identification of a defined target organism\(^{22,23}\).

Figure (1) showing the result of PCR amplified for the cheese samples. This figure showing 300 bp band, this size for cow sources for cheese and milk, this sample for Kiri, Craft, Almari, Anchor and control point (milk from cow), the same sample we cannot see any amplified for primers for sheep, goat and buffalo in figure (2). This result mean the purity of milk used in preparing of cheese in these company. As well as, for a comparative unit, in the figure (1) showing amplification for GoaD primer for the sample from goat milk, the size of band (444 bp), M/INV primer for the sample from sheep milk, the size of band (371 bp) and for milk of buffalo, the PCR amplification band are (520 bp).

Fig. 1: Results of PCR amplification, lanes 1,10 is the ladders, lane 2 for BosD primer for Kiri, lane 3 for BosD primer for Craft, lane 4 BosD primer for Almari, lane 5 BosD primer for Anchor, lanes 6 for BosD primer from cow, lane 7 for GoaD primer from goat, lane 8 for M/INV primer from sheep, lane 9 for primer from buffalo

Fig. 2: Results of PCR amplification, lane 1 is the ladder, lanes 2, 3, 4 for GoaD primers from goat, lanes 5, 6, 7 for M/INV primer from sheep, lane 8, 9, 10 M/INV primer from sheep
Figure (3) showing the result of PCR amplified for the local cheese samples (both Curls cheese/Thefair cheese and bulk cheese/Arab cheese), in this figure showing 300 bp band, and sometime 444 bp, 300 bp for cow sources for cheese, while 444 bp for buffalo, this mean some of this sample are prepared from both cow and buffalo milk, but we cannot see amplified by sheep and goat primers.

This result reported some cheating in the local cheeses when we compared with the crude milk as a standard to limited the accuracy of result.

This result showed some cheating in the local cheeses when we compared with the crude milk as a standard to limited the accuracy of result.

Fig. 3: Results of PCR amplification, lane 1 is the ladder, lane 2 for BosD primer for cow, lane 3 for BosD primer from Curls cheese/Thefair cheese, lane 4 BosD primer from bulk cheese/Arab cheese, lane 5 buffalo primer from Curls cheese/Thefair cheese, lane 6 buffalo primer from bulk cheese/Arab cheese, lanes 7,8 GoaD primers from goat, lanes 9,10 M/INV primer from sheep

The result showing all the sample from Craft cheese, Kiri Cheese, Almarai cheese and Anchor cheese are the sources is cow. This finding showing in the figure (1) which revealed the size of PCR amplification gene (300 bp) and absent any amplify by other primers (sheep, goat and buffalo) in figure (2), this size of PCR amplification in our study is in agreement with previous study24 which used the same primer for detection cow sources of milk cheese compared with goat sources19.

The result showed the sample from local cheese sources is cow some time, whereas, sometime cow and buffalo. This finding showed in the picture (2) which revealed the size of PCR amplification gene some time just (300 bp) and sometime (300 bp and 520 bp), but we cannot see any amplify by other primers (sheep and goat). This size of PCR amplification in present study is in agreement with previous study24, which used the same primer for detection cow sources of milk cheese compared with goat sources19.

This result showed a huge problem because revealed the cheating in the milk which used for prepare the cheese because the absent of censorship which committed the animal breeder to use only one type of milk sources as well as the animal breeder talk about this type of chees are just from cow. The cheating because the high concentration of buffalo milk especially for lipid and the customer wanted cow cheese, for that the animal breeder mixing cow and buffalo milk to decrease the cost of milk preparing, as well as, many of the places of north Basra they have much of buffalo to used sources of milk to prepare the cheese. Bottero3 uses a set of 3 specific primers pairs allowing the detection of cow, goat, and ewe DNA in a single tube. Its advantage over the methods utilizes a single primer pair is the elimination of false negative results.

Once upon a time, tested a pair of primers designed by12 originally progressing for the identification of meat admixture of multiple species. It has been found that high specificity of the detection of bovine milk mixed with the milk of goat could be accomplished only when specific conditions of the test, including the accurate number of PCR cycles3.

In conclusion, the PCR method described hither is a beneficial and straight forward approach to detection low levels of cows’ milk replacement (0.1%) in milks of a higher commercial value. Furthermore, the style offers high sensitivity and specificity, with the best advantage that it can also be utilize in thermally or otherwise processed milk products with prolonged protein denaturation. Therefore, the PCR technique may demonstrate useful method for food inspection services to trace the species origin of milk mixtures or cheese.
products, thereby conserve the traditional manufacturers and consumers against food product adulteration and misrepresentation.

**Conflict of Interest:** This research is a personal non-profit work and there is no conflict of interest.

**Source of Funding:** None.

**Ethical Clearance:** Ethical clearance was obtained from the Faculty Scientific Committee (College of Veterinary Medicine/University of Basra, Iraq) to study of using species-specific polymerase chain reaction technique for detection of cows, buffallos, seeps and goats milk and cheeses in basra city.

**REFERENCES**


The Effectiveness of Chelating Property of Chitosan Nanoparticles on Dentin

Jamal A. Abu Al-timan¹, Hussain F. Al-Huwaizi², Hayder H. Abed³

¹Department of Esthetic and Conservative Dentistry, College of Dentistry, Almustansyria University, Baghdad, Iraq; ²Department of Esthetic and Conservative Dentistry, College of Dentistry, University of Baghdad, Baghdad, Iraq; ³Department of Basic Science, College of Dentistry, Almustansyria University, Baghdad, Iraq

ABSTRAcT

The use of chitosan nanoparticles (CNPs) will improve anti-microbial efficacy, mechanical integrity of diseased dentin matrix and tissue regeneration. Mechanical preparation in root canal treatment leads to the formation of smear layer. The aim of this study was to evaluate the effectiveness of chitosan nanoparticles in combination with Glyde gel in removing of smear layer. Twenty-five extracted maxillary single-rooted premolars were selected, and divided into five groups according to irrigation material used, (GI=Glyde gel, GII=2:1 (Glyde-CNPs) gel, GIII=NaOCl gel 5.25%, GIV=NaOCl gel 2%, GV=Saline only). The teeth were instrumented using ProTaper Next System (X1-X4) when one of five irrigant materials used as a lubricant during instrumentation. A scoring system was used to conduct the SEM assessment in coronal, middle and apical part. The statistical analysis was done with Chi square test at (P<0.05). The smear layer was significantly reduced in all groups except the control and NaOCl groups (P>0.05). Chitosan nanoparticles could enhance the activity of Glyde gel in removing the smear layer.

Keywords: Chitosan, Nanoparticles, SEM, smear layer, chelation.

Introduction

The chemomechanical preparation was the effective procedure to disinfect the root canal system. Bacteria are communities of cells adhered to an organic surface of dentin. The high density of bacterial cells are resistant to antimicrobials and was the main factor responsible for most persistent and chronic bacterial infection. Mechanical preparation leads to formation of smear layer. Which can be removed by using NaOCl and EDTA. NaOCl was one of the most recommended irrigant because of its ability to dissolve tissue and antibacterial activity. However, NaOCl can cause denaturation and dissolution of dentin collagen especially when using in high concentration and for a long periods of time, this may cause damage to ultra structural of dentin. In addition, NaOCl cannot debride root canal biofilm completely alone. It has been shown that irrigation with 17% EDTA has an effect on cleaning canal walls. Moreover, The using of NaOCl and EDTA in combination for effective cleaning and antimicrobial actions are more appreciable than being used alone.

Chelating agent mostly used as a final rinse in root canals, because it well remove the smear layer from root dentin. The smear layer may be solubilized in acids because its composed of very small particles. EDTA reacts with the calcium ions in dentin and forms soluble calcium chelates. However, the structural characteristic of the dentin could be altered by chelating agents which result in a compromised mechanical integrity and a increased potential for bacterial adherence on the collagen. Chitosan nanoparticles (CNPs) are one of the commonly investigated polymeric nanoparticles in endodontics.

Chitosan is a natural polysaccharide that is obtained by deacetylation of chitin, one of the most abundant polysaccharides in nature that forms most of the external skeleton of arthropods such as crabs and shrimps. Chitosan has a covalent immobilization of exposed dentin by its functional phosphate group which could be bind to calcium ions to form surface for crystal nucleation, resulting in the formation of a calcium phosphate layer. The resistance of the dentinal surface could be improved by chitosan treatment against the degradation by collagenase. Furthermore, chitosan has a chelating capacity, biocompatible, and antimicrobial effects against Gr+ve and Gr-ve bacteria as well as fungi.
The current study aims to investigate the ability of CNPs to enhance the ability of EDTA in Glyde gel to remove the smear layer from a root-dentin surface or not.

Materials and Method

Twenty-five extracted single-rooted maxillary premolar teeth were choose in this study. The teeth were cleaned from tissue and debris and stored in saline solution at room temperature. The radiograph from buccolingual and from mesiodistal was taken to verify that the root has a straight, single canal. The teeth, which had a wide or calcified canal, were discarded. The teeth were decoronated of 14mm from the apex. The patency of the canal was obtained by K-file #10 (Dentsply-Sirona, Switzerland). The apices were sealed with light cure flowable composite after inserting #10 inside the canal to prevent the materials from entering the canal. Polyvinylsiloxane (PVS) impression material were used for mounting the roots so that the entire root surface was covered by the impression material. The roots were randomly divided for five group, four experimental (n=5) and one control group. The instrumentation procedures were done by ProTaper Next system (X1-X4) (Dentsply-Sirona, Switzerland). Each group has a different irrigation material (Glyde gel, 2:1 (Glyde: CNPs) gel, NaOCl gel 5.25%, NaOCl gel 2% respectively, and normal saline for control group).

The experimental gel was obtained by adding chitosan nanoparticles to Glyde gel. The chitosan nanoparticles (80-100nm) obtained from Sisco Research Laboratories (SRL, India). This powder was dissolved in 1 V/V% acetic acid solution at a concentration of 0.1 W/V % in stirring machine for 8hs at 55°C. The pH of solution was raised to 5 with 1 mol/L NaOH. The concentration of CNPs was 10mg/ml was used in the experiment. The Glyde gel (Dentsply-Sirona, Switzerland) was used as a base material in this experiment. The chitosan solution (10mg/ml) was added to Glyde gel in concentration of 2:1 (Glyde-chitosan) to not change the flowability of the Glyde gel.

Fourier transform infra red Spectroscopy is a form of vibrational spectroscopy and reflects both molecular structure and molecular environment. FTIR spectroscopy (Alpha A. Bruker) was used to detect that CNP's still active in concentration 2:1 formula in the range from 4000-500 cm⁻¹. (Fig.1) The root canals were enlarged to size 20 with K-file, and the roots were filled with gel material during instrumentation. Instrumentation file (X1) was used to enlarge and shape the canal to working length, and when the file became loss, remove the file and irrigate the canal with 1ml distilled water to wash out the canal.

This procedure was repeated for X2, X3 till the end with X4. At the end of instrumentation, the distilled water inside the canal was suctioned out by the Micro Cannula (Coltene, Switzerland). In Group I, Glyde gel was used as the irrigant with an intermittent wash of distilled water. In Group II, The experimental gel was used while in group III, NaOCl gel 5.25% was used as an irrigant. In Group IV, NaOCl gel 2% was used as an irrigant and lastly in group V, Saline was used as an irrigant at the same procedure mentioned before. A scanning electron microscope (SEM) was used to evaluate the cleanliness of dentin on the instrumented canal wall surface. The roots were removed from impression material and prepared for SEM observation.

Two opposing grooves were done along the lingual and buccal root surface without penetration into the root canals using a diamond disc under water cooling to facilitate the splitting of the roots into halves. The splitting was done by a chisel, rinsed with distilled water and fixed in 4% formalin for 24h. For each tooth the half containing the most visible part of the apex was selected. The dehydration of the specimens was done by 80% alcohol for 15min, 90% alcohol for 15min, and 100% alcohol for 20min. All the specimens were mounted on aluminum stubs, sputter-coated with platinum and observed using a SEM. The images showing the canal wall surface at x5000 magnification was token from the apical, middle, and coronal portion.

The images were examined by two endodontic specialists who assessed the amount of area in each part was covered by a smear layer. The values obtained by one examiner that showed concordance with that from the other examiners and had the lowest amount of discrepancy between these observations were chosen for the statistical analysis. A scores of one to three were ascribed to each sample according to Torabinejad et al., 2003. No smear layer on the surface of the root canal; all tubules were clean and open was scored as one, no smear layer on the surface of root canal but tubules contained debris was scored as two, having smear layer covered the root canal surface and the tubules was scored as three. The statistical differences was done by Chi square test.
Results

FTIR Spectra of chitosan has characteristic band. The spectra showing a peak at 3347Cm⁻¹ indicate symmetric stretching vibration of OH and amine adsorption peak at 3024.51 Cm⁻¹ indicate presence of CH stretch (Fig. 1). The coronal third presented least amount of smear layer (most cleaner area) especially in GI and GII, followed by the middle third and the most amount of smear layer found in the apical part. This mostly seen in all the groups except in GV that used saline, all the three-thirds showed least amount of cleanness.

Figure 1: FTIR test for Chitosan nanoparticles combined with Glyde gel

However, GI and GII presented the least amount of smear layer and debris on the walls of dentin while GIII and GIV (NaOCl 5.25% and NaOCl 2%) presented a smear layer and debris on the walls (especially score II and score III) in all three thirds. In GV, a smear layer mud was seen on the walls of dentin in all thirds because of using saline for irrigation. (Fig. 2)
Discussion

The thickness of smear layer to be in the range of 1-2µm.\(^{(27)}\) The smear layer was more in volume in rotary preparation than in hand instrumentation.\(^{(28)}\) The smear layer may vary from one canal to another depending on the type and nature of dentin, and also the sharpness and geometry of cutting instruments.\(^{(25)}\) The smear layer may prevent the penetration at intra canal irrigants into dentinal tubules harboring microorganisms. However, the smear layer can be colonized by bacteria and protect the biofilms which adhered to dentin walls.

The adaptation of root canal filling materials could be effected by the presence of smear layer and lead to microleakage.\(^{(5,6)}\) On the other hand, if the canals contaminated by bacteria after preparation, the presence of smear layer might be able to prevent bacteria from entering into dentinal tubules.\(^{(29)}\) Nevertheless, smear layer itself contain bacteria and this will be always the primary concern in endodontic treatment. The removal of smear layer was effectively in the coronal and middle part of the canal, but its more difficult in the apical third, because of the size of the canal, taper and diameter, ramifications, deltas, isthmuses and permeability of dentin.\(^{(30)}\) Group II (chitosan plus the Glyde gel) experimental group, presented the least amounts of smear layer among all other groups at all three thirds (coronal, middle and apical) and there was no significant difference between the experimental group and the Glyde gel group. The coronal third presented the most clearness area from smear layer followed by the middle third, and the most amount of smear layer was in the apical part of the canals.

Chitosan nanoparticles are soluble in weak acid solutions and could be also soluble in water. The functional phosphate groups of the chitosan molecule bind to calcium ions on the dentinal surface and this lead to formation of crystal nucleation on the surface.\(^{(31)}\) Chitosan has a very good antibacterial effect against Gram +ve and Gram -ve organisms and fungi, because of its poly cationic nature. The cell wall of the microorganisms was altered by chitosan and subsequent leakage of intracellular constituents. The bacterial adhesion mechanisms also altered by using of chitosan, thereby preventing biofilm formation.\(^{(31)}\) Glyde root canal conditioner is a combination of EDTA
(15%) and carbamide peroxide (10%) used in a calcified areas within the root canal to facilitate the use of file. EDTA has the ability to clean the canal by removing the inorganic material, also has the ability to detach the biofilms adhering to root canal walls.\(^{(32)}\)

The chelation mechanism of chitosan to dentinal structure had a various theories. The first one stated that two or more amino groups of a chain of chitosan bind to the same metal ion, which is called the bridge model theory. The second theory said that only one amino group bind to the metal ion.\(^{(33)}\) Ionic interaction between the metal and the chelating agent occur because the chitosan polymer is composed of chitin which has got nitrogen atoms with free pairs of electrons. The process of formation of complexes between chitosan and metal ions occurs because of ion exchange, adsorption, and chelation. The chemical structure of chitosan, and the type of ions determine the type of interaction which take place.\(^{(34)}\) The negotiation of narrow and curved canals could be facilitated clinically by reduction in the micro hardness of dentin. The reduction in micro hardness facilitates the instrumentation techniques. Micro hardness of dentin will reduced when using the chitosan as an irrigating materials and its effects greater in higher concentration.\(^{(35)}\)

**Conclusion**

The mixture of chitosan nanoparticles and Glyde gel would be beneficial in improving the smear clearing efficacy. The mixture appears promising according to the evaluation as an irrigant material in the apical, middle, and coronal thirds of the root canal.

**Ethical Clearance:** The researchers already have ethical clearance from college of Dentistry, University of Baghdad

**Source of Funding:** Self funding

**Conflict of Interest:** No conflict of interest

**REFERENCES**


The Collaboration of Health Workers in Providing Integrated Antenatal Care at Oepoi Health Center, in East Nusa Tenggara, Indonesia

Jeffrey Jap¹, Stefanus Supriyanto², Nyoman Anita Damayanti³

¹Doctoral Student, Program of Public Health, ²Professor, Department of Health Administration and Policy, ³Lecturer, Department of Health Administration and Policy, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia

ABSTRACT

Background: An annual estimate of 4 million newborns were die in the first week of life worldwide. The high rate of newborn death is showing that the health development has not accomplished (WHO, 2012). According to Health Department in (Saputri, 2013), stated that about 57% newborn death were mainly caused by perinatal disorder and low birth weight. WHO and Unicef (2004) estimated among 20 million newborns, 15.5% baby in the world were born with low birth weight, and 95.6% among them were in developing country. The rate of low birth weight in Indonesia 2013 remained high. East Nusa Tenggara province had more low birth weight (15.6%) than national average (10.2%). Kupang denotes benchmark of East Nusa Tenggara province, had 337 cases of low birth weight, with the highest case came from the area of Manupaten Health Center with 35 cases (12.5%), and the lowest came from Oepoi, 13 cases (1.1%). One of main factors is the collaboration of health worker in integrated Ante Natal Care (ANC).

Aim: This research aimed to describe the collaboration of health worker in integrated ANC in health center.

Method: This research used qualitative method with phenomenon approach. The samples were health worker in Oepoi health center, chosen by means of purposive sampling (7 peoples). Result: There was a good collaboration among health workers in conducting integrated ANC in Oepoi Health Center, Kupang, involving doctor, dentist, midwife, nurse, nutritionist and laboratorian.

Conclusion: The health worker collaboration in integrated ANC has been done well.

Keywords: Health worker collaboration, low birth weight, health center

Introduction

The rate of baby death denotes one of indicator that affecting the aim of government sustainable millennium development program. Annual estimate of 4 million newborn deaths in the first week of life. The high rate of newborn death signifies that the development program in health is not accomplished yet (1). About 57% of newborn death occurred in less than a month old baby, and mainly caused by perinatal disorder and low birth weight (2). A newborn considered low birth weight if the birth weight is less than 2500 gram, disregarding the gestation period. Birth weight denotes the weight of the baby an hour after the labor (3).

Low birth weight remains a certain health problem in some countries, since it is considered as the cause of baby death. According to WHO, approximately 20million babies were born with low birth weight, and 19 million among them were from developing country, with incidence number of 11-31% (4). In developing countries, this condition is worsened by low nutrition intake during pregnancy, which causing micro-nutrients deficiency such as anemia, giving undesirable effect.

Corresponding Author:
Jeffrey Jap
Doctoral Student, Program of Public Health,
Faculty of Public Health, Universitas Airlangga,
Surabaya, Indonesia
Jl. Mulyorejo Surabaya, Indonesia
Email: japjeffrey@yahoo.com
toward the expectant and the newborn (4). WHO and UNICEF (2004) estimated about 20 million babies in worldwide, 15.5% were born with low birth weight, and 95.6% of low birth weight newborn came from the developing countries. The rate of low birth weight in developing countries were 16.5%, double of developed countries, 7% (5).

The comparative of low birth weight cases, according to basic health survey (RISKESDAS) among provinces in Indonesia 2013, remained showing a high trend. Nationally, some provinces had a high cases of low birth weight, compared to the national average (10.2%); namely East Nusa Tenggara (15.5%), Middle Sulawesi (16.8%) and Papua (15.6%). Based on the district report 2011, it was noted that the number of low birth weight were 3484, increased in 2012 (3911), and further increased to 4457 in 2013 (6).

Kupang, denotes a benchmark for East Nusa Tenggara province, had 337 babies with low birth weight. Area of health center with the highest number of low birth weight cases was Manupaten Health Center, with 35 cases (12.5%) and the lowest number of low birth weight cases was Oepoi Health Center, with 13 cases (1.1%). One of main factor that correlated to low birth weight is the health service. An exquisite health service in preventing low birth weight case is necessary, especially in Ante Natal Care (ANC). Health service as the front line in giving health service, have an important role in giving health care toward society (7).

Previous research by Sakai (2016) also stated the effectivity of inter-profession collaboration, with good attitude and assurance of the health workers. Moreover, a favorable team management capability, building a good teamwork to fulfill the goal with well-organized action, that also will motivate to give a health service with more care toward the patient. Furthermore, a good attitude and behavior can build a strong teamwork to fulfill the requirement to give a professional health service, with a better quality (8). A good collaboration between health workers is expected to improve the quality of integrated ANC, that may prevent baby with low birth weight.

Against the foregoing situation, it is necessary to observe the collaborations between health workers in conducting integrated ANC in Oepoi Health Service in Kupang, as the health service with the least cases of low birth weight in East Nusa Tenggara. This study aimed to describe the collaboration between health workers in conducting integrated ANC in Oepoi Health Service in Kupang, East Nusa Tenggara.

Material and Method

This was a qualitative study with phenomenon approach. This study took place in Oepoi Health Center, Kupang, by means of guided interview. The examination of ANC can be evaluated from K4 report, pregnant women register and also direct observation. This study was conducted in March – June 2018, involving all the health workers in Oepoi Health Center as much as 37 peoples (4 general practitioners, 1 dentist, 9 nurses, 9 midwives, 3 pharmacists, 2 public health scholars, 3 nutritionists, 3 sanitarians, and 3 laboratorian). After applied the inclusion criterias which were the health workers who have been working since January 2017; the health workers who are handling ANC in health center; agreed to be the respondents the samples reduced to 7 respondents.

Findings

Geographically, Oepoi belongs to the area of Oebufu District, Sub-district Oebobo, Kupang with an area of 3.5 km². The working area of Oepoi Health Service included 4 sub-district, namely Oebufu, Kayu Putih, Tuak Daun Merah, and Liliba. Meanwhile, the human resources in each work unit in Oepoi Health Service in 2017 are 4 doctors, 1 dentist, 9 nurses, 9 midwives, 3 pharmacists, 2 public health scholars, 3 nutritionists and 3 medical analysts.

Table 1: Health workers distribution based on age

<table>
<thead>
<tr>
<th>Age</th>
<th>N</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-25 y.o.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>26-35 y.o.</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>36-45 y.o.</td>
<td>5</td>
<td>70</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 1 is showing the distribution of health workers based on the age group. Most of the respondents were belong to 36-45 years old group (70%) and the least belong to 26-35 years old group (30%).

The evaluation of integrated ANC by the health workers of Oepoi Health Service Kupang is tabulated.
in Table 2. It was recorded that integrated ANC had been well-conducted, which mean that it was conducted according to the standard operational procedure.

Table 2: Evaluation of health workers collaboration in doing Integrated ANC

<table>
<thead>
<tr>
<th>Collaboration</th>
<th>Health workers (N)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good (≥12)</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>Average (6-11)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Low (&lt;6)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2 is showing that the evaluation of collaboration in integrated ANC showing that all the respondents were doing a good collaboration. The result shows that the collaboration has been done well, thus, the case of low birth weight in Oepoi Health Service is less compared to the other Health Services in Kupang.

Discussion

Collaboration between health worker in conducting integrated ANC: The description of collaboration that was done by the health workers, including doctors, dentist, midwives, nurses, nutritionists, public health scholars and laboratorian will be explained as follows:

1. Doctors’ Collaboration: General practitioners give an excellent service toward the patients, and have a good faith toward the ongoing collaboration. This can be concluded based on the doctors’ statements as follows:

   “I belief that all my colleagues involved in integrated ANC are able to collaborate and cooperate. All of them are giving the best according to their competence, and I belief in that. Therefore, I have no worries regarding other trivial matters.”

   “I give health service not restricted to pregnant women only, but also the family. I also remind them to regularly visit health center for checkup. As the head of this health center, I also acknowledge that health workers in health center have important role in preventing low birth weight.”

   The result of the current evaluation is in accordance to previous study by Agus (2015) which stated that a good quality of health service is necessary, particularly in preventing low birth weight, by giving ANC. Health center, as the front line in giving health services to the society have an important role, including giving ANC to the pregnant women (7).

2. Dentists’ Collaboration: Dentist is also reported giving a good health service. There are two dominant aspects that correspond to the general practitioner did, namely have faith in collaboration and give a full care of treatment to the patients. These are the dentist’s statement:

   “It’s an honor to be able to cooperate with other profession.”

   “We always discuss all the things that we don’t understand”

   “Our duty is to communicate to other team members, so that we can work together, caring the pregnant women. We do our best to prevent oral and dental problems in pregnant women, and immediately treat those who have oral and dental problems.”

   Those statements is correspond to the theory of collaboration, which stated that a collaboration is based on principles of togetherness, equality, responsibility and accountability (9).

3. Midwives’ Collaboration: Midwives also have contributions in this collaboration. The result of observation also proved that midwives gave services better than the others. Their statements as follows:

   “This is a sacred profession, and of course, I belief that inter-profession teamwork may make better integrated ANC, thus, preventing low birth weight.”

   “We cannot work all alone, there are team from the other profession that give us so much help. Without them, I don’t think we can make it happen.”

   This result is in accordance to the statement that a goal can be accomplished faster and better if done in teamwork. In a good teamwork, the team member should be able to cooperate and collaborate to reach the set goal (10).

4. Nurse Collaboration: The observation revealed that the nurses in health center were able to build
a good collaboration. A good attitude and belief as a professional, is an important factor to build a good teamwork. These are the nurses’ statements:

“I have faith in our colleagues, that they are able to complete the task well.”

“In every meeting, I always give my best to keep this team solid.”

According to Smith (2017), collaboration is a process where the doctors, nurses, and other health workers create a plan and work together as colleagues, with each other competencies limitation and give respect to each other involved in giving services toward individual, family, and society (11).

5. Nutritionists’ Collaboration: Nutritionists in health service also doing a good collaboration, by giving deep care toward the patient and also the team, which help make the team become solid. These are the statements of the nutritionists:

“I give support and my best to our colleagues in other profession. When there is pregnant women with nutrition deficiency, I will give food supplement, health education and regular nutrition counseling immediately, until they recovered.”

“We will also educate the family, so that they can help pregnant women in home.”

To build a good collaboration, giving each other support is necessary. Each profession occasionally doing their work separately, this may be an obstacle in collaboration. The willing to share, depend and help each other will eventually improve the collaboration (11).

6. Public Health Scholars’ Collaboration: Public health scholars also did a good job in collaboration, better than the other profession. Public health workers have a good team management, which may encourage the society in health service work area to build a collaboration to prevent any pregnancy disorder, and especially, prevent baby birth with low birth weight. These are the statements of public health workers:

“Aside from this team, we also try to reach ward office to work together in facing public health problem, especially regarding pregnant women.”

“Actually, the key role lays in communication among team member. The more we have intense group discussion and good communication, the less weight we bring, as all of the team member are there to give a hand.”

In collaboration, a good communication is necessary to make the work and message relay ease. Each member should be able to receive and give advices to others. Communication is a key in a collaboration (12).

7. Laboratorian Collaboration: Laboratorian did a good job in collaboration, by giving a better service and care toward the patient. This may be due to their focus more on laboratory.

“Our duties, indeed, in laboratory. All the pregnant women who did check-up will get a good service, and we also discuss with our other-profession colleagues.”

“We convey and discuss the lab test result of the pregnant women, so that we can give the best explanation and advice to prevent painful labor and baby with low birth weight.”

The knowledge from each individual, should be shared to help the others. Therefore, it may help to find a better solution to face a problem together (12).

Conclusions

Based on the observation, it can be concluded that integrated ANC by the health workers in Oepoi Health Center is well-conducted with a good coordination, which make the low number of low birth weight cases in Oepoi Health Center. In order to maintain the good achievement, it is advised to distribute the necessary tools of ANC to the health workers in health center. This collaboration model can be adopted by other health service, although a further research remains

Conflict of Interest: There is no conflict of interest for every author.

Source of Funding: This research funded by self-funded

Ethical Clearance: There are no human participants involved in this research. However the procedure of this research had already gotten ethical approval of Health Research Ethics Committee, Faculty of Public Health, Univeritas Airlangga.
Informed Consent: Informed consent was obtained from all individual participants included in the study.

REFERENCES


The Role of Zinc Sulfate in Reducing Levels of TNF-α, IL-1β and IL-6 in Multi Basiler Leprosy Patients

Joko Kurnianto¹, Moh. Sulchan², Kabulrakhman², Hertanto WS², Suharyo HS², Prasetyowati²
¹Doctoral Program Faculty of Medicine, Diponegoro University, Semarang, Indonesia; ²Faculty of Medicine, Diponegoro University, Semarang Indonesia

ABSTRACT

Background: The role of Zinc as an anti-oxidant and anti-inflammatory has been proven and this substance is relatively cheap and easily obtained by the community. This research aims at analyzing the effect of 40 mg/day of Zinc sulfate for 12 weeks on zinc and pro-inflammatory cytokines TNF-α, IL-1β and IL-6 in MB-type leprosy patients.

Method: The study design used randomized pretest-posttest control group design, the study subjects were MB patients with 121 patients who did not experience leprosy reactions, 31 subjects were analyzed as a supplementation group, and 31 patients as a control group. Measuring serum zinc levels using method Atomic Absorption Spectrophotometer (AAS), the levels of TNF-α, IL-1β and IL-6 using method of ELISA, statistical analysis using independent t-test, paired test, Mann Whitney and Wilcoxon sign rank test.

Results: Zinc sulfate supplementation of 40 mg/day for 12 weeks in MB-type leprosy patients controlling the decrease in zinc levels of 1.22 pg/dL was higher than leprosy patients who did not receive Zinc sulfate supplementation, significantly reducing IL-1β cytokine levels (p: 0.032), but significantly reduced cytokine levels, TNF-α (p: 0.063) and IL-6 (p: 0.389).

Conclusion: Zinc sulfate supplementation of 40 mg/day for 12 weeks in MB type leprosy patients controlled the decrease in serum Zinc levels, and reduced levels of pro-inflammatory cytokines IL-1β.

Keyword: Zinc supplementation, TNF-α, IL-1β, IL-6, MB, leprosy

Introduction

Leprosy is a chronic disease caused by an infection of the bacterium Mycobacterium leprae. This disease is a major cause of deformity and disability among other infectious diseases that cause stigma, psychosocial and economic disorders (¹).

Leprosy is a public health problem in developing countries and is often associated with poverty and often associated with malnutrition. Poor nutritional status can be caused by inadequate food intake both in quantity and quality of food (²). Individuals with leprosy eat vegetables more often and rarely consume animal protein. Most vegetables are not a good source of zinc because of phytate. This substance will bind zinc so that zinc cannot be absorbed by the gastrointestinal tract. Low-protein and rich diets phytate- play a role in the high prevalence of zinc deficiency in developing countries. Zinc deficiency leads to decreased immunity in the form of macrophage cell failure in the process of phagocytosis and decreased T-cell ability for differentiation and proliferation (³).

Several studies on animal experiments and clinical observations in humans, the state of nutrition plays a role in the journey and development of leprosy and among these nutritional elements, zinc is the most important trace element for the growth of thymus organs and lymphoid tissues, which act as organs in differentiation and maturation of cells which is involved in cellular immunity (⁴).

Decreasing the immune system and increasing leprosy infection can be caused by low levels of zinc in the body. Zinc is able to play a role in increasing immune
response nonspecifically and specifically. Macrophage cells that play a role in immune response systems will experience problems in killing intracellular infectious agents, decreasing cytokine production and obstacles in the process of phagocytosis (4).

This research is expected to be useful for programs to improve nutritional status, especially the levels of leprosy patients’ zinc and as an evaluation program for the prevention and management of leprosy reactions.

Method

This research is an experimental study using randomized pre and post test control group design. The study began from grouping leprosy patients based on the diagnosis: leprosy with reaction and leprosy without reaction as the research subject. This study was conducted in 11 Health Center areas in Tegal Regency in January-May 2018. The inclusion criteria for the sample in this study were male and female patients, age 15-60 years, leprosy type MB in MDT treatment, without reaction, and willing to participate in research. The research subjects were randomly selected, the treatment group was a type of leprosy with MB clinical signs of reaction and the control group was MB leprosy without reaction. Data collection using questionnaires through history, interview, clinical examination, and blood serum examination in case subjects and controls. The number of samples of 72 people consisting of treatment groups 36 people and a control group of 36 people. The case group was given Zinc sulfate supplementation with a dose of 40 mg/day for 12 weeks while in the control group only MDT was given. Data analysis using program SPSS for windows with Correlation test Chi-Square and test t.

Results

At the beginning of data collection, the subject of the study amounted to 72 participants, until the end of Zinc sulfate supplementation the number of subjects who met the criteria for analysis amounted to 62 people (Treatment group 31; control group 31). The characteristics of the research subjects in both the treatment and control groups can be seen in Table 1.

Table 1: Differences in Subject Characteristics between Treatment and Control Groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Treatment n (36)</th>
<th>Controls n (36)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category of Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>36.81 ± 13.9</td>
<td>42.56 ± 13.9</td>
<td>0.101b</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>23 (63.9%)</td>
<td>23 (63.8%)</td>
<td>0.091a</td>
</tr>
<tr>
<td>Women</td>
<td>13 (36.1%)</td>
<td>13 (36.2%)</td>
<td></td>
</tr>
<tr>
<td>Body Mass Index (BMI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI mean</td>
<td>± 2.4921.09</td>
<td>21.47 ± 2.61</td>
<td>0.0545b</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>labor/labor rickshaw farm/kg</td>
<td>25 (69.4%)</td>
<td>27 (75.0%)</td>
<td>0.272a</td>
</tr>
<tr>
<td>Farmer/trader</td>
<td>6 (16.7%)</td>
<td>4 (11.1%)</td>
<td></td>
</tr>
<tr>
<td>Student/Public servant/Employee</td>
<td>5 (13.9%)</td>
<td>5 (13.9%)</td>
<td></td>
</tr>
</tbody>
</table>

a) correlation test Chi-square, b) test Independent t

Based on Table 1, the treatment group and the control group did not have significant differences in terms of age, gender, mean body mass index (BMI), housing conditions and respondent’s work. Data on the frequency and mean risk factors for leprosy reactions between the treatment group and the control group can be seen in Table 2.

Table 2: Comparison of Confounding Variables, Treatment Groups and Controls

<table>
<thead>
<tr>
<th>Variable</th>
<th>Treatment (n: 36)</th>
<th>Control (n: 36)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-infection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are</td>
<td>5 (13.8%)</td>
<td>8 (21.6%)</td>
<td>0.880a</td>
</tr>
<tr>
<td>There are no</td>
<td>31 (86.2%)</td>
<td>29 (78.4%)</td>
<td></td>
</tr>
</tbody>
</table>
Food intake

<table>
<thead>
<tr>
<th></th>
<th>Case Group</th>
<th>Control Group</th>
<th>t-Test value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Adequacy Rate</td>
<td>1380 ± 156.80</td>
<td>1406 ± 165.47</td>
<td>0.527b</td>
</tr>
<tr>
<td>Protein Adequacy Rate</td>
<td>40.35 ± 5.32</td>
<td>40.83 ± 4.63</td>
<td>0.703b</td>
</tr>
<tr>
<td>TKE (%)</td>
<td>59.23 ± 6.97</td>
<td>60.49 ± 7.54</td>
<td>0.489b</td>
</tr>
<tr>
<td>TKP (%)</td>
<td>76.29 ± 9.69</td>
<td>77.53 ± 10.01</td>
<td>Level 0.613</td>
</tr>
</tbody>
</table>

Hb (anemia status)

<table>
<thead>
<tr>
<th></th>
<th>Case Group</th>
<th>Control Group</th>
<th>t-Test value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>11.5 (± 1.44)</td>
<td>12.1 (± 1.83)</td>
<td>0.101b</td>
</tr>
<tr>
<td>Anemia (&lt;12 g/dL)</td>
<td>19 (52.8%)</td>
<td>17 (47.2%)</td>
<td>0.730a</td>
</tr>
<tr>
<td>Normal (&gt; 12 g/dL)</td>
<td>17 (47.2%)</td>
<td>19 (52.8%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 shows that reaction risk factors in the subjects of the study were co-infection, food intake, anemia status (Hb level), and daily food intake, both in the treatment and control groups, statistically get results there are no significant differences. Differences exist in mean levels of Hb, Zinc, TNF-α cytokines, IL-1β, and IL-6 before and after Zinc sulfate supplementation at a dose of 40 mg/day in MB type leprosy.

Discussion

Leprosy infection in host is associated with the quality of the immune response (6). The main defense mechanism in M. leprae infection involves immune cells, especially macrophages, lymphocytes and cytokines that regulate the production, release and modulation of cellular immunity reactions (5).

Macrophages are the main defense system against M. leprae infection. Phagocyte cells such as macrophages, neutrophils, eosinophils and T and B lymphocytes have the enzyme NADPH oxidase which is responsible for the production of ROS when stimulating the immune response. Macrophages will recognize M. leprosy or its cell wall components through TLR, this bond will activate the nuclear factor kappa B (NF-κB) pathway which will induce the release of cytokines such as TNF-α, IL-1, IL-6 and IL-12. These cytokines will cause inflammation and stimulate adaptive immunity. Interleukin-12 will activate T cells and induce the release of IFN γ which in turn activates the enzyme phagocyte oxidase (NADPH oxidase) so that ROS releases such as superoxide, hydroxyl radicals and hydrogen peroxide occur (7).

The distribution of the characteristics of the research subjects showed that there were more male subjects than women. These results are in accordance with a previous study by in Brazil showing that the number of male leprosy patients was more than that of women (8). Leprosy is more common in men with a ratio of 2: 1, whereas according to age the incidence increases at the age of 10-14 years, then decreases followed by another increase at the age of 30-50 years.

Regarding nutritional status, Singh reported that 40.5% of patients who experienced a decrease in hemoglobin levels had a body mass index (BMI)> 18.5 and 59.5% less than that. BMI> 18.5 shows normal nutritional status, while BMI <18.5 indicates malnutrition. Several previous studies have found that micronutrient intake affects the immunological response in leprosy (9). In this study most BMI subjects between leprosy groups and healthy (non-leprosy) groups had normal BMI. This is contrary to previous research which found a significant difference in BMI and Zinc status in leprosy patients with a control group (not leprosy). Most of the research subjects in the leprosy group worked as laborers who were fed food for enough energy when on the move. But if it is observed from a recall of 1x24 hours of food intake consumed, most groups of leprosy consume vegetables more often and consume a little food intake sourced from animal protein. The mean BMI in the case group was 21.09 and in the control group (10).

Based on statistical tests, there is a relationship between energy adequacy rates and protein adequacy rates with the incidence of leprosy reactions. According to previous research, respondents who lack intake of nutrients, especially energy and protein, have underweight nutritional status. Theoretically, lepers will have a thin nutritional status due to increased protein catabolism (11). If this is not supported by providing.
enough protein food, subjects living side by side with leprosy sufferers noted that high protein intake is needed for sufferers and even people around them to increase endurance. Patients with less weight do not have sufficient immunological responses due to low levels of energy and protein consumption will cause abnormalities in immunity as indicated by a decrease in the number of T lymphocytes, decreased cell activity natural killer, and decreased function of interleukin production (12).

The average Hb level in the case group 11.5 and the control group 12.1 were both below the normal Hb level. According to WHO the normal male Hb level was 13 g/dl and adult women 12 g/dl, was declared anemia if the Hb level was lower than normal limits. Anemia in leprosy is caused by a chronic disease, usually me is iron deficiency anemia because of the destruction of iron and iron binding proteins by macrophages, disruption of iron metabolism and release of cytokines which suppress erythropoetin production (13).

In this study the results of the zinc serum levels of the study subjects (± 95 µg/dL) were below the average level of healthy human Zinc (± 104 µg/dL), when seen the average level of Zinc in the treatment group after receiving Zinc sulfate supplementation 40 mg/day for 12 weeks there was a decrease in zinc levels of 1.8 µg/dL, while in the control group it decreased at 3:02 mg/dL, and the statistical test results prove there is a significant difference between serum zinc levels before and after supplementation (p: 0.003). Zinc levels in patients with leprosy can cause bacterial multiplication M.leprae because of decreased cellular immunity which plays a role in eliminating micro bacteria. Zinc supplementation in patients will provide a good influence on increasing levels of Zinc serum which is important for the development of cellular immunity (14).

The daily intake of male zinc intake in a day is 11 mg and adult women is 8 mg, and the mean zinc level of leprosy patients who have previously reacted is lower than patients who have never reacted in the control group, but not significantly different. Based on the results of this study there was a significant difference between the levels of Zinc which received 40 mg/day Zinc supplement intervention and the control group, according to the results of previous study, after 8 weeks supplementation of the intervention group significantly had a higher Zinc concentration than control group (13).

The results of this study also showed increased levels of zinc serum and decreased levels of TNF-α and IL-6 after Zinc supplementation, this is consistent with previous studies that plasma Zinc concentrations rapidly decrease during acute phase responses to different stimulation, pressure, infection, and trauma. (14)

Pro-inflammatory cytokines, including TNF-α, IFN-γ, and IL-1β and IL-6 have been reported to play a role in the mechanism of leprosy reactions both type I reactions (reversal reactions) and type 2 reactions (including ENL).

Chronic inflammation is characterized by an increased level of production of inflammatory cytokines. Some conditions are associated with chronic inflammation such as obesity, where patients with lower zinc food intake present with lower plasma and intracellular zinc concentrations together with IL-1α, IL-1β, and IL-6 gene expression that are regulated compared with patients with Higher zinc intake (16).

In addition to TNF-α inhibiting agents, ENL treatment is corticosteroids, because in addition to having anti-inflammatory and immunosuppressant effects, corticosteroids also have a barrier effect on the activity of various cytokines such as IFN-γ, TNF-α, IL-6, IL-1 and IL-2 receptor expression. Oral corticosteroids recommended by WHO are prednisolone, starting with a dose of 0.5–1 mg/kg/day (40–60 mg) until clinical improvement occurs, then lowering 5-10 mg every week for 6-8 weeks. The treatment dose of 5–10 mg/day can be given several weeks to prevent recurrence of ENL (13).

Production of cytokines can also be decreased by administration of MDT, even cytokines can drop to the same level as healthy patients if all M. leprae antigens can be eliminated. Decreased levels of TNF-α were also found in patients after receiving MDT, which showed a decrease in the number of bacteria due to therapy. Klofazimin has anti-inflammatory effects and can inhibit mitogen stimulated by peripheral blood cells. Together with dapsone, clofazimin can reduce the production of cytokines, especially pro-inflammatory cytokines. Therefore, MDT must still be given when ENL occurs, because MDT can also control ENL episodes (13).

**Conclusion**

Zinc sulfate supplementation of 40 mg/day for 12 weeks can maintain a decrease in serum Zinc levels, and
reduce IL-1β levels, however statistically there is not
enough evidence to reduce levels of TNF-α and IL-6.
Lepers need to pay more attention to the frequency and
quality of daily food intake by fulfilling sufficient energy
and protein needs and need to consume Zinc Sulphate
tablets during treatment.

**Ethical Clearance:** Ethical clearance was obtained
from Health Research Ethics Committee of the Faculty
of Medicine, Diponegoro University, Indonesia. We also
wish to thank all the participants who contributed to this
study.

**Conflict of Interest:** Nil.

**Source of Funding:** Nil.

**REFERENCES**


The Status of Her2 Expression in a Group of Iraqi Women with Cervical Carcinoma

Kawakeb N Abdulla¹, Basim M. Khashman¹, Saba Jassim Alheshimi², Ameer A. Oudah³
¹Iraqi National Cancer Research Center, University of Baghdad; ²Lecturer of Gynecology and Obstetrics, College of Medicine, Misan University, Iraq; ³Department of Clinical Pharmacy, Baghdad Medical City, Baghdad, Iraq

ABSTRACT

Background: Cervical cancer is the third most common cancer and fourth leading cause of death in women worldwide. HER belongs to family of receptors plays a central role in the pathogenesis of several human cancers. They regulate cell growth, survival, and differentiation via multiple signal transduction pathways and participate in cellular proliferation and differentiation. HER2 expression in cervical cancer has been reported to be present in recurrent tumors and its expression is related to poor prognosis in locally advanced cervical cancer.

Objective: study Her2 expression and its correlation with the development of cervical carcinoma.

Method: a retrospective study was designed to involve about 30 formalin fixed paraffin embedded tissues blocks from Iraqi women with cervical carcinoma. The immunohistochemical staining was performed using anti-Her2 to evaluate the expression of this marker.

Results: From the 30 formalin fixed paraffin embedded tissues blocks, 5 were positive for Her2 and 25 were negative. All the 15 normal cervical tissue blocks were negative for Her2.

Conclusion: A significant correlation between Her 2 and cervical cancer.

Keywords: Her 2, cervix, cancer, Iraqi women, immunohistochemistry

Introduction

Cervical cancer is the most common form of cancer in women in developing countries and the third most common form of cancer in women in the world as a whole. The major risk factor for the development of pre-invasive and invasive carcinoma of the cervix is human papillomavirus infection. Cervical screening programs have dramatically improved cervical cancer incidence and reduced deaths, but cervical cancer still a health burden. The biomarker discovery for detection and diagnosis of cervical carcinoma represents one of the current challenges in clinical medicine and cytopathology. HPV infection causes changes in expression of host cervical cell cycle regulatory proteins. These host proteins may have a role as ‘biomarker’ of dysplastic cells. One of these biomarkers is HER2 (human epidermal growth factor 2) is a protein and is a member of the human epidermal growth factor receptor family. HER receptors belong to family of Tyrosine kinase. Over-expression of HER 2 has been shown to play an important role in the development and progression of certain aggressive types of breast cancer. In recent years the protein has become an important biomarker and target of therapy for approximately 30% of breast cancer patients. It is strongly associated with increased disease recurrence and a poor prognosis of some cancers. Over-expression is also known to occur in ovarian, aggressive forms of uterine cancer, such as uterine serous endometrial carcinoma. HER2 testing is performed in breast cancer patients to assess prognosis and to determine suitability for certain therapy. In cervical cancer, HER2 receptor expression has been reported to be upregulated, but its prognostic and therapeutic value remains unclear.
The signaling pathway of EGFR may be dysregulated in cancer and is associated with carcinogenesis and tumor growth. In cervical cancer, EGFR is a potential prognostic biomarker, since the co-expression of EGFR is associated with a poor response to chemo-radiation.

HER2 expression can be identified in various cancers other than breast; its incidence ranges from 1% to 12% in cervical cancers. HER2 expression in cervical cancer has been reported to be present in recurrent tumors and that its expression is related to poor prognosis in locally advanced cervical cancer.

**Material and Method**

A retrospective study was designed to involve 30 formalin fixed paraffin embedded tissues blocks from Iraqi women with cervical carcinoma and 15 normal tissue blocks. The immunohistochemical staining was performed using anti-Her2 to evaluate the expression of the marker.

Analysis of the results was done using Easy Fisher Exact Test Calculator.

**Results**

The immunohistochemical expression of HER2 was evaluated. From the 30 formalin fixed paraffin embedded tissues blocks with cervical cancer, 5 were positive for expression of Her2 and 25 were negative. All the remaining 25 cervical cancer tissues blocks were negative for Her2. All the 15 normal cervical tissue blocks were negative for Her2, there was no significant difference between both groups. As shown in table 1.

<table>
<thead>
<tr>
<th>Number</th>
<th>Cervical Cancer</th>
<th>Normal Tissue</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Her2 positive</td>
<td>5 (16.7%)</td>
<td>0 (0%)</td>
<td>0.153</td>
</tr>
<tr>
<td>Her2 negative</td>
<td>25 (83.3%)</td>
<td>15 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1:** Immunohistochemistry positive result for detection Her2 in cervical cancer tissues (10x). The DAB produced (Brown) signals while the counter staining by Harris Hematoxlin produced (purple).  

**Figure 2:** Immunohistochemistry positive result for detection Her2 in cervical cancer tissues (40x). The DAB produced (Brown) signals while the counter staining by Harris Hematoxlin produced (purple).
Discussion

Cervical cancer is a major women health problem worldwide. It ranks high among the causes of female cancer mortalities and is an important disease in developing and developed countries.

The tumor markers is conventionally used for screening, but recent studies have revealed the mechanisms of carcinogenesis and the factors associated with a poor prognosis in cervical cancer. Utilization of biomarkers may facilitate personalized treatment and improved outcomes in cervical cancer, biomarkers for predicting prognosis have emerged from recent studies. The human epidermal growth factor 2 (HER2) is a transmembrane receptor tyrosine kinase located on chromosome 17q21. In normal cells, activation of HER2 mediates cell signaling pathways including the phophotidylinositol 3- kinase/protein kinase B and others which regulate cellular processes of proliferation, motility and survival. HER2 overexpression resulting in several reactions which leads to uncontrolled cell proliferation, angiogenesis and invasion leading to tumor growth and invasion.

In the present study, Her2 expression was found in 5 of the 30 tissues blocks of cervical carcinoma which was studied through immunohistochemical staining. All the 15 normal cervical tissue were negative for Her2. This result was in agreement with a study done by Iida et al were they found significant amplification of the EGFR locus in six of 59 cases of cervical SCC, but in none of 52 cases of adeno/adenosquamous cell carcinoma, with EGFR amplification significantly correlated with shorter overall survival rates.

A study on cervical cancer samples by immunohistochemistry also revealed that HER2 was frequently expressed in (53.5%) of the studied samples. The overexpression of Her2 may be behind the abnormal growth of the stimulus to cells to become abnormal or cancerous cells. As in some studies were they found that HER2 overexpression is related to a worse prognosis in cervical cancer.

On the other hand the overexpression of HER2 may have no relation to the changes that stimulate the cervical normal cells to change into cancerous cells but there are other factors that play this role as shown by a study done by Alma Chaves et al were they found low frequency of HER overexpression in the studied samples of cervical cancer.

Conclusion

This study showed the importance of HER2 expression in the pathogenesis of cervical cancer which may have an importance in the diagnosis. We recommend to perform a study on large number of tissue blocks in the future to clarify the relation between HER2 and cervical cancer.

Conflict of Interest: None

Ethical Clearance: Informed written consent obtained from all the participants in the study, and the study and all its procedure were done in accordance with the Helsinki Declaration of 1975, as revised in 2000. The study was approved by Iraqi National Cancer Research Center, University of Baghdad.

Source of Funding: This work were supported by authors only

REFERENCES


The Immunohistochemical Evaluation of BRCA2 Expression with HPV Infection in a Group of Iraqi Women with Cervical Carcinoma

Kawakeb N Abdulla1, Basim M. Khashman1, Saba Jassim Alheshimi2
1Iraqi National Cancer Research Center, University of Baghdad; 2Lecturer of Gynecology and Obstetrics, College of Medicine, Misan University, Iraq

ABSTRACT

Background: Cervical cancer is the third most common cancer and fourth leading cause of death in women worldwide. There is an increased evidence of correlation between BRCA with HPV onco-proteins. Some researchers found that the E7 and E6 onco-proteins interact directly with BRCA1 in vitro and associate with BRCA1 in vivo in cultured cells.

Objective: study BRCA2 expression and its correlation with the oncogenic HPV16 in Iraqi women with cervical carcinoma.

Method: A retrospective study involve 30 formalin fixed paraffin embedded tissues blocks from Iraqi women with cervical carcinoma previously diagnosed for HPV infection. The immunohistochemical staining performed using anti-BRCA to evaluate the expression of both markers.

Results: From the 30 formalin fixed paraffin embedded cervical carcinoma tissues blocks, 8 blocks were positive for BRCA expression and 22 were negative. All the normal cervical tissue blocks were negative for BRCA.

Conclusion: immunohistochemical evaluation of BRCA2 expression with HPV infection in a group of Iraqi women with Cervical Carcinoma was significant.

Keywords: BRCA2, HPV17 infection, oncogene, cervix, cancer, Iraqi women, immunohistochemistry

Introduction

Cancer of the uterine cervix is the third most common gynecologic cancer diagnosis and cause of death among gynecologic cancers in the United States 1. Cervical cancer has lower incidence and mortality rates than uterine corpus and ovarian cancer, as well as many other cancer sites. These rankings are similar to global estimates for other developed countries. Unfortunately, in countries that do not have access to cervical cancer screening and prevention programs, cervical cancer remains the second most common type of cancer (17.8 per 100,000 women) and cause of cancer deaths (9.8 per 100,000) among all types of cancer in women 2.

Human papillomavirus (HPV) is central to the development of cervical neoplasia and can be detected in 99.7 percent of cervical cancers 3. The most common histologic types of cervical cancer are squamous cell (69 percent of cervical cancers) and adenocarcinoma (25 percent) 4. HPV is a group of more than 150 related viruses. Two HPV types (16 and 18) cause 70% of cervical cancers and precancerous cervical lesions 5.

Mutations in the BRCA (which normally produce tumor suppressor proteins that help repair damaged DNA and, therefore, ensure the stability of each cell’s genetic material), mutations in these genes predispose an individual to malignancy 6. People who have inherited mutations in BRCA1 and BRCA2 tend to develop breast and ovarian cancers at younger ages than people who do not have these mutations 7. A large study of cancer

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risk in BRCA1 cancer families in Europe and North America revealed that BRCA1 mutation carriers are also at significantly increased risk for the development of several other cancer types, including pancreatic cancer, uterine cancer, and cervical cancer. The evaluation of biomarker status in cancers yields information about prognosis and treatment response. The aim of this study was to identify BRCA expression in Iraqi women with cervical cancer.

**Material and Method**

This retrospective study was designed to involve 30 formalin fixed paraffin embedded tissues blocks from Iraqi women with cervical carcinoma previously diagnosed for HPV infection and 15 with normal cervical tissue. The immunohistochemical staining performed using anti-BRCA and anti-HPV to evaluate the expression of the both markers. Analysis of the results was done using Easy Fisher Exact Test.

**Results**

Table (1) shows that from the 30 formalin fixed paraffin embedded cervical carcinoma tissues blocks, 8 blocks were positive for BRCA2 expression and 22 were negative. From the 15 formalin fixed paraffin embedded normal cervical tissues blocks, all were found to be negative for BRCA2 expression.

<table>
<thead>
<tr>
<th></th>
<th>Cervical Cancer</th>
<th>Normal tissue</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>30</td>
<td>15</td>
<td>-</td>
</tr>
<tr>
<td>Her 2 positive</td>
<td>8 (26.7%)</td>
<td>0 (0%)</td>
<td>0.038</td>
</tr>
<tr>
<td>Her 2 negative</td>
<td>22 (73.3%)</td>
<td>15 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

Advances in molecular techniques have allowed for the identification of biomarkers in tumor cells like BRCA. Mutations in BRCA can lead the cells that are more likely to develop genetic alterations change into cancer cells. Studies have found that BRCA mutation carriers have increased risk of cancer at other sites than breast or ovary such as the cervix.

The current study showed that BRCA expression was significantly present in patients with cervical cancer, from the 30 cervical carcinoma tissues blocks that studied through immunohistochemical evaluation, 8 samples were positive for BRCA expression. This result was in agreement with several studies, in which for women carrying a BRCA mutation, the estimated risk of developing a cancer other than breast or ovarian cancer by the age of 70 years was roughly twofold that of the general population (i.e., 1 in 5 versus 1 in 10). In another study they found that tumor cells carrying BRCA1 promoter hypermethylation are hypersensitive to DNA-damaging drugs and may result in pronounced tumor death because of their underlying defect in BRCA pathway. A large study of cancer risk in BRCA1 cancer families in Europe and North America revealed that BRCA1 mutation carriers are at significantly increased risk for the development of pancreatic cancer, uterine cancer, and cervical cancer.
The high BRCA expression could be the induced factor that cause the normal cells to change into cancerous cells, which was reported by K. Rhein et al where they found an increased risk of cervical cancer for women with BRCA1 and BRCA2 13.

Interaction of E6 and E7 onco-proteins with BRCA could reflect a mechanism through which these HPV onco-proteins disturb the cellular transcriptional mechanism. A study demonstrated that interaction between BRCA and oncogenic HPV-E6 and E7 proteins that results in the antagonism of several different functional activities of BRCA1 14.

BRCA expression in the other hand may be not related directly in changing normal cells into cancerous cells but it is due to presence of HPV or other risk factors which may be present that increase a person susceptibility for cervical cancer 6. A study done by O. Johannsson et al suggest that apart from breast and ovarian cancer, the incidence of other cancer types like cervical cancer do not appear to be greatly increased in BRCA1- and BRCA2- associated families and does not warrant specific clinical follow-up in carriers 15.

**Conclusion**

The present study showed the importance of BRCA expression in cervical cancer pathogenesis which may be of value in the diagnosis, treatment and prognosis. We recommend a further study that includes large number of samples to give more clear view on the relation of BRCA expression and cervical cancer.

**Conflict of Interest:** None

**Ethical Clearance:** Informed written consent obtained from all the participants in the study, and the study and all its procedure were done in accordance with the Helsinki Declaration of 1975, as revised in 2000. The study was approved by Iraqi National Cancer Research Center, University of Baghdad.

**Source of Funding:** This work were supported by authors only

**REFERENCES**


Prognosis Within 24 Hours Using Nursing Early Warning Scoring System (Newss) Method On Left Heart Failure Patients At Mitra Delima Hospital, Malang

Luluk Nur Aini¹, Lilik Supriati², Titin Andri Wihastuti²
¹Nursing Master Program, Faculty of Medicine, ²Lecturer in Medical Faculty, University of Brawijaya, Malang Indonesia

ABSTRACT

Assessment in emergency department determines the accuracy of diagnosis and administration of therapy at left heart failure patients. NEWSS is a fast scoring method in assessment. This research has purpose to analyze prognosis within 24 hours using NEWSS method with left heart failure patients. Observational analytical research method was used with a prospective cohort design. Research location at Mitra Delima Hospital, Malang. The respondents were 48 patients which selected by consecutive sampling. Data analysis used univariate tests and ROC diagnostic tests. The results shown that statistical analysis of univariate tests obtained prognosis results in 24 hours on 39 patients (81.3%) with left heart failure who did not experience cardiac arrest, and 9 patients (18%) experienced cardiac arrest. The diagnostic test shown the AuROC results were 0.967 (95% CI 91.2%-100%), sensitivity of 0.889 and specificity of 0.872. In conclusion, sensitivity value of NEWSS was 0.889, which means clinically, the ability to produce positive cardiac arrest rate was 88.9%. Clinical specificity value was 0.872 to produce a negative value of no cardiac arrest by 87% and AuROC value of 0.967 which included into category of very good in predicting prognosis within 24 hours on left heart failure patients.

Keywords: Prognosis in 24 hours, Left Heart Failure, NEWSS

Introduction

The prevalence of heart failure in all most country and abroad continues to increase year by year, but the prognosis is always bad. Data from hospitals in the United Kingdom from 2000 to 2017 heart failure mortality rates were 30,906 from 55,959 patients \(^1\) While in Indonesia the incidence of cardiac arrest in patients with heart failure also shows a high prevalence with the most cases in east Java \(^2\). Which is 54,826 patients from 226,698.

The treatment in patients with heart failure requires high costs, especially for health care including pharmacological and rehabilitative. Early detection and rapid assessment can increase patient life expectancy.

The NEWSS is a new method applied in Indonesia since 2015 as a way to predict the deterioration rate of patients based on their clinical conditions.

The accuracy prediction to know prognosis of cardiac arrest in the short term has been investigated with the AuROC NEWSS results of 0.89 \(^3\). This is in accordance with a study that independent predictor of mortality in patients with cardiovascular disorders were RR, SpO₂, temperature, pulse, blood pressure, and mental status with an AuROC value of 0.90 \(^4\). The NEWSS method has not been implemented in all of hospitals in Malang region, certainly with various considerations. One of them is because of the need for a high level of accuracy from nurses who do scoring like the one which states that the output of NEWSS is influenced by the involvement of practitioners in scoring because it determines accurate results \(^5\).

Thus, the researcher interested to know how the value of sensitivity and specificity of NEWSS in scoring patients with left heart failure at Mitra Delima Hospital, Malang in Indonesia.
Methodology of Research

This study used an observational analytic method with a prospective cohort design. The samples were 48 patients with left heart failure which selected based on consecutive sampling. Data retrieval was conducted from March 25 to April 20, 2019 at Mitra Delima Hospital in Malang Indonesia. Analysis of univariate data based on age, educational level and gender were categorical data, thus the presentation was in the form of frequency distribution while the numerical data was presented with mean and standard deviation.

Result of Research

1. General Data

Table 1: Characteristics of Research Subjects at Mitra Delima Hospital Malang

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>36-45</td>
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<td>4,2</td>
</tr>
<tr>
<td></td>
<td>46-55</td>
<td>8</td>
<td>16,7</td>
</tr>
<tr>
<td></td>
<td>56-65</td>
<td>17</td>
<td>35,4</td>
</tr>
<tr>
<td></td>
<td>&gt;65</td>
<td>21</td>
<td>43,8</td>
</tr>
<tr>
<td>Educational level</td>
<td>Elementary School</td>
<td>23</td>
<td>47,9</td>
</tr>
<tr>
<td></td>
<td>Junior High School</td>
<td>17</td>
<td>35,4</td>
</tr>
<tr>
<td></td>
<td>Senior High School</td>
<td>8</td>
<td>16,7</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>18</td>
<td>37,5</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>30</td>
<td>62,5</td>
</tr>
</tbody>
</table>

Source: Primary Data 2019

Table 1 explained that the characteristics of the age was dominated by patients who age >65 years old which were 21 people (43.8%), the highest educational level of respondents was Elementary School which were 23 people (47.9%). While the gender of the respondent was dominated by female, with 30 people (62.5%).

2. Specific Data

Table 2: Distribution of NEWSS Indicator in Left Heart Failure Patients at Mitra Delima Hospital Malang

<table>
<thead>
<tr>
<th>Indicator</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviasi</th>
<th>CI 95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory Rate</td>
<td>48</td>
<td>25,02</td>
<td>4,68</td>
<td>23,66-26,38</td>
</tr>
<tr>
<td>Pulse</td>
<td>48</td>
<td>93,25</td>
<td>22,19</td>
<td>86,81-99,69</td>
</tr>
</tbody>
</table>

3. Prognosis in 24 Hours

Table 3: Prognosis Description within 24 hours on Left Heart Failure Patients at the Emergency Department of Mitra Delima Hospital, Malang, Indonesia

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prognosis within 24 hours</td>
<td>No cardiac arrest</td>
<td>39</td>
<td>81,3</td>
</tr>
<tr>
<td></td>
<td>Cardiac arrest</td>
<td>9</td>
<td>18</td>
</tr>
</tbody>
</table>

Source: Primary Data 2019

Table 3 explained that was mostly no cardiac arrest with 39 people (81.3%).

4. Analysis of Diagnostic Test

Figure 1: ROC Curve
Based on the figure 1 and table 4, obtained cut off point score was at point 6, which meant the detection of cardiac arrest at a score of 5.50 with a sensitivity value of 0.889 and a specificity of 0.872.

**Discussion**

NEWSS scoring method consisted of 6 components of assessment including, respiratory rate (RR), systolic blood pressure, temperature, pulse frequency, level of consciousness and oxygen saturation. Table 2 shown that the average respiratory rate was 25x/min. Increasing the frequency of breath was influenced by a decrease in cardiac output, this was an effort to compensate the mechanism because of the increased need for oxygenation in the heart muscle cells. Every person had several phases of development, when entering the phase of the elderly the function of organs would progressively decrease, especially at the age of more than >65 years. The researcher stated that at the age of the elderly, their blood vessels were no longer elastic and inflexible, causing plaque or fat that accumulate more easily and blocking the blood flow until atherosclerosis occurred which was one of the causes of coronary heart disease and could become heart failure with the initial symptom was having difficulty breathing. This sign could be caused by the presence of a murmur, atrial fibrillation and dysfunction in the left ventricle. Thus, the patient should be followed by a blood test to find out the exact cause that tightness was not caused by anemia but by the underlying disease of left heart failure.

Table 2 also shown that the average pulse frequency of heart failure patients was 93x/min. Pulse could show changes in the cardiovascular system. The pulse could be felt where the arteries passed. In the normal human heart, the pulse originated from the SA node (normal sinus rhythm). The greater the metabolism in an organ, the greater the blood flow. The next heart compensation was to accelerate the heart rate and increase the flow of blood pumped from the heart throughout the body. According to sympathetic and parasympathetic nerve activity in the heart and blood vessels was influenced by the activity of the hormones epinephrine and norepinephrine (adrenaline). Increased secretion of both would induce and excite the sympathetic nerve to carry out vasoconstriction resulting in an increase in heart rate frequency followed by an increase in blood pressure.

The average blood pressure in the study results was 140mmHg. Blood pressure was referred to as mean arterial pressure when arterial pressure was averaged over one heart cycle. Mean Arterial Pressure (MAP) or blood pressure was a reflection of peripheral resistance and average volume in the arteries. MAP values should be maintained at a minimum limit of 60mmHg and preferably above 60mmHg, because if it was less than 60mmHg, perfusion to the brain of the coronary arteries and kidneys would experience metabolic disorders. The category of MAP values which was above 100 made a situation that was not good because it indicated blood pressure in the blood vessels to be high and then had an effect on increasing capillary vascular and rupture damage. In patients with left heart failure, the high blood pressure raised the weight of the heart while low blood pressure indicated a failed heart work.

Based on table 1, the majority of left heart failure patients were female. Generally, left heart failure occurred in groups of women because most of women experienced menopause, where at that time LDL cholesterol increased and estrogen decreased which caused women to suffer more from left heart failure. Researcher before also agreed with the theory which stated that women were at small risk of heart failure because a woman’s blood vessels were protected by estrogen before a woman entered the menopause process. The estrogen hormone increased the production of Highdensity lipoprotein (HDL) which could prevent the process of atherosclerosis.

The average body temperature of the patient was at 36.48°C. Increased temperature could dramatically increase the workload of a patient’s body organs. Humans basically always tried to maintain the normal state of the body with a very perfect body system in order to adjust to changes that occurred through the process of convection, radiation and evaporation. Temperature was also influenced by air temperature, if the air temperature was higher then the body responded with the onset of body fatigue and hypertermia, but if the air temperature was under 35°C it would cause hypothermia at the

---

**Table 4: Cut of point, Sensitivity dan Speisificity of NEWSS**

<table>
<thead>
<tr>
<th>Score of NEWSS</th>
<th>Cut off Point</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.50</td>
<td>0.889</td>
<td>0.872</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Primary Data 2019
patient’s body temperature. If the level of heat produced was the same as the level of heat lost, body temperature would be stable in body temperature (10).

The average of SpO₂ was 94.73%. Oxygen saturation was the presentation of hemoglobin that bound to oxygen in the arteries. The condition of hypoxemia indicated that patients needing oxygenation therapy. To determine the administration of oxygen there were several categories that should be observed, among others: scores of <4 was light respiratory distress using the nasal canule, a score of 4-5 was moderate respiratory distress while using nasal CPAP, a score > 6 was severe respiratory distress using intubation and ventilator. Heart failure patients could experience a decrease in oxygen saturation due to a decrease in the diffusion of oxygen in the blood, thus in clinical conditions there would be a decrease in oxygen saturation. Patients would experience shortness of breath, rapid and superficial pulse, and decreased consciousness (11).

Patients with left heart failure could experience decreased consciousness or called syncope. This was because the level of oxygen in the brain decreased and then the manifestation was that the brain was unable to maintain consciousness and it could even occurred even harder, coma. Syncope was transient loss of consciousness due to transient global cerebral hypoperfusion characterized by rapid onset, short duration and spontaneous recovery. The researcher explained that this loss of consciousness was caused by a decrease in blood flow to the reticular activation system located in the brain stem which occured limiting cerebral blood flow for 10 seconds.

The research data shown that many patient categories were elderly, elderly people easily experienced orthostatic hypotension. They had decreased oxygenation less than 3.0-3.5mlO₂/100 gram tissue/minute, thus the effect of this decrease in oxygen supply was a decrease in consciousness of patients with left heart failure. If you see the results of the pulse examination, there were also patients who had a tachycardia of 160x/min. Tachycardia was a manifestation of the condition of the long pause phase of the pacemaker to start an impulse so that if the hemodynamics were still inadequate due to this phase, the patient become unconscious and could even become cardiac arrest.

The medical team and nurses should be aware that if a decrease in consciousness occurs then this was a sign of danger before the occurrence of Sudden Cardiac Death. Hospitals also often accepted patients with left heart failure who were re-hospitalized due to low levels of education (12). This was in line with the research of explaining that there were factors in the social structure of education that affected individuals to know about the utilization of health services. The higher the education status, the individual would access health service and could reduce the risk of high prevalence, but if they were low, they would move away. This was called self-efficacy, it is belief in the ability of an individual to move motivation.

The AuROC value in this research was statistically very strong, cut off point value 5.50 with a sensitivity value of 0.889 and a specificity of 0.872. The results of this study were in line with study that predicted value of NEWSS AuROC was 0.93 while APACHE II was only 0.79 and the difference was statistically significant (Z=4.348 P <0.01)(13). Other researchers also in line with stated that the value of NEWSS could predict the incidence of cardiac arrest for 2-6 hours faster (13, 14). This study was conducted in 433 patients with acute heart failure. Data analyzed by binary logistic regression showed P <0.05 with area under curve 0.911 and 0.662 (p <0.05).

However, NEWSS also had weaknesses, the success of NEWSS was determined by the ability of practitioners to do scoring. Experienced practitioners were more reliable in applying this method, thus the results could be trusted. But on the contrary, if the practitioner was an inexperienced person there would be many obstacles faced so that the scoring obtained was not right, the decision of the intervention chosen was ultimately not suitable, thus the algorithm of the left heart failure patient could not be continued.

**Conclusion**

The prognosis in 24 hours with the NEWSS method on patients with left heart failure in the hospital obtained 39 from 48 patients (81.3%). The NEWSS method had a sensitivity value of 0.889 and a specificity of 0.872 including into a strong category. In similar studies could consider the research sample group specified to one age group of the elderly with a certain age limit to minimize the presence of confounding factors.

**Conflict of Interest:** None

**Ethical Clearence:** This research was conducted based on the approval of the Health Research Ethics Commission of the Faculty of Medicine, University of Brawijaya No. 68/EC/KEPK-S2/02/2019.

**Source of Funding:** None
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Descriptive Mapping of Needs among Diabetes Mellitus Patients

Made Kurnia Widiastuti Giri¹, Adnyana Putra¹, I Made Kusuma Wijaya¹, Komang Hendra Setiawan¹, Ni Putu Dewi Sri Wahyuni¹

¹Faculty of Medicine, Universitas Pendidikan Ganesha Bali, Indonesia

ABSTRACT

There are some kinds of therapeutic guidelines that have been created for diabetes mellitus patients. However, it cannot be denied that it has a part of nonpharmacologic therapy. Theoretically, nonpharmacological therapy is dietetic and exercise. Related to the statement, this study aimed at describing statements of what diabetic patient need for pharmacological and nonpharmacological therapy. Twenty-five diabetic patients (13 females and 12 males) were invited to join a month-small-group discussion for 4 months in Chronic Disease Forum, Buleleng- Bali, Indonesia. They were asked to discuss what they face in therapeutical and what they need based on (1) comfort, (2) aesthetics, and (3) safety aspects on pharmacological and nonpharmacological therapy. From the depth interview, patients state that they need doctors and nurses services in a better communication. As the result from small group discussion, it has been known that patients need exercise model and booklet of 2 weeks diet menu. Furthermore, they need the certainty of an exercise model developed in future research which will be validated by the expert.

Keywords: yoga, diabetes mellitus, therapy, mapping needs

Introduction

Diabetes mellitus (DM) is the condition in which the level of blood sugar is increasing due to the insulin malfunctions [¹]. Clinically, the increased level of blood sugar stimulates the serious complication in blood vessels (angiopathy) and nerves (neuropathy) thus DM potentials to disrupt almost all of the organs [²]. Statistically, DM has quite high morbidity and mortality, it is estimated that at 2030 Indonesia will have the highest number of diabetes in the world. This phenomenon increase Indonesian burden of diseases [³].

Exercise is one of the integral parts of DM management along with education, diet, and pharmacology therapy [⁴]. Unfortunately, many DM patients do not conduct appropriate exercise based on the latest research finding.

As illustrated, the model of the diabetes exercise that was developed in Indonesia in the period in the 1990s took the form of Senam Diabetes Indonesia only incorporate aerobic technique. Meanwhile, several recent types of research show that the use of the technique aerobic is not sufficient in controlling the level of blood sugar. The technique should be combined with the strengthening exercise (resistant training) that stimulated the skeletal muscle. The muscle subsequently will produce cytokines (IL 3 and IL 6) that play roles in the increase in the sensitivity of insulin [⁴].

Furthermore, the strengthening exercise increases the muscle mass, therefore, increase the capacity of glycogen savings which helps to regulate blood sugar. Another problem in conducting the exercise in DM is that the exercise should be conducted regularly. Therefore the exercise model should interest the subjects and yields a high exercise adherence.

Yoga is the practice of the physical activity that came from India since 4000 years ago [⁵]. Several kinds of yoga are practiced to increased wellbeing. Among them are asanas (postural), pranayama (control of the breath), Dharana (concentration), and mudras (finger gesture) [⁶]. Asanas yoga provides combined aerobic, resistant and balances training therefore potential to control the level of blood sugar [⁷]. Pranayamas and mudras are also potential to improve neural and vascular health of DM patients [⁸]. Yoga also provides relaxation which potentials to increase exercise adherence. This research aims to develop a yoga exercise model which potential to control blood sugar and yield on the high exercise adherence among the DM patients.
Method

The methods of the current research comprised three main stages which were Designing, Validating, and Reception Test.

1. Designing
   a. Based on a literature review based on DM pathophysiology and exercise physiology.
   b. Based on social-psychology aspects which aims to increase exercise adherence
   c. Based on the safety aspect to minimize adverse effects. The designing was based on Perkeni (Perhimpunan Endrokinologi Indonesia) recommendation which requires exercise to employ CRIPE principles (continue, rhythmic, interval, progressive and endurance)

2. Validation (Expert Judgment): The yoga prototype was validated by three experts on exercise therapy, endocrinologist and exercise trainer.

3. Reception Test (Secondary Validation): The validated yoga model was tested to 25 DM subjects (13 female and 12 males). During this stage, the subjects were invited to attend once a week (supervised) and advised to conduct twice a week (unsupervised) for eight weeks. The percentage of attendance (supervised session) and compliance (unsupervised session) in 8 weeks represent absolute unsatisfactory while 10 represent absolute satisfactory. At weeks 8, the dropout rate was also calculated by calculating the percentage of subjects who were not attended to the last session.

Results

a. Development Phase

   (i) Literature Review: Based on the literature review several standing, seated and combined poses were identified as the main asanas. Those poses were selected due to their characteristics and potential to provide aerobic, resistant and balance exercise which are needed in diabetes mellitus patients. The main asanas were combined with pranayamas (breathing exercise) to stimulate autonomous nerves.

   The pranayamas were selected since there is plenty of evidence suggest that pranayama exercise increased parasympathetic and decreased sympathetic activity. With this regards, it is assumed that pranayama may decrease glucagon and epinephrine release before exercise as anticipation responses and during exercises which can cause blood sugar elevation. In addition to asanas and pranayamas, several mudras were identified to increase peripheral blood flow so that prevent neuropathy and microangiopathy.

   b. Socio-Psychological Aspects: To increase exercise adherence, the prototype should stimulate addictive effect” so that it will attract the subject to do the exercise regularly. Pranayama components were intended to increase relaxation which stimulates comfort to the diabetes mellitus patients. Another aspect which needed to be considered was the difficulty level of the poses. The poses which were difficult to be conducted were less likely to attract subjects to regularly do the exercise.

   Therefore, everyone poses selected in this developmental phase was tested to inexperience subjects. Their response to the difficulty level of each pose was rated. The poses which were selected were fell into category very easy and easy, while the poses which fell into difficult and very difficult were omitted.
c. Safety Aspects: The majority of diabetes mellitus patients are old and have already suffered from health complication such as high blood pressure and neuropathy. They also have a relatively low aerobic capacity and stiff joint. Therefore, several poses which require high physical capability were not selected. One the examples of those poses are the pose which requires a large range of movement. Other reasons were the pose which gives a high impact on a certain part of the body, for instance, standing in one leg for a long time or balancing upon small muscle groups such as hand and arm.

(ii) Prototype Development: Based on progression and esthetics, the following prototype was modeled.

a. Warming Up: The basic asana pose in warming up was standing poses. It was started with mountain pose (tadasana) which was combined with pranayama (breathing exercise) which included three-part breath (dirgha pranayama). This incorporated (i) prolonged and fine inhalation, (ii) exhalation and (iii) retention.

Mountain pose (tadasana) was combined with arm movement to increase heart rate and neck movements to increase flexibility. Meanwhile, the poses also incorporated mudras to increase peripheral blood flow and to enhance the pranayama effect. Several mudras which were selected in the prototype includes gyan, rudra, pritvi, shanka, vayu, linga, surabhi, and surahi mudras.

Mountain pose was followed by five-pointed star pose, goddess pose, crescent moon pose, chair pose, stork pose, and dancer pose so that more muscle groups were involved to increase heart rate. The poses were modified with arm and hand movements. The final pose in the warming up was mountain pose which was the initial movement in the main exercise.

b. The Main Exercise: The main exercise incorporated surya namaskara especially turiya yoga branches which includes (i) invoke, (ii) intent/inhale, (iii) surrender/exhale, (iv) assume/inhale, (v) allign/exhale,(vi) awareness/inhale, (vii) surge upward/exhale, (viii) expand as space/exhale, (ix) ignite/inhale, (x) void/exhale, (xi) fullness/inhale and (xii) third eye/exhale.

Surya namaskara was selected because it provides resistant and balance exercises which were needed by diabetes mellitus patients. The aerobic metabolism can be stimulated with the modulation of intensity and repetition of the Surya Namaskar cycles.

For the first time yoga learners, Generally, it is suggested to them to complete one cycle in 5 to 10 minutes. After the physical condition allowed the subjects to increase the exercise dosage, it can be conducted more than once. The Surya namaskara was finished with a mountain position which was followed with surrender as the transition pose to obtain easy pose (sukhasana).

c. Colling Down: The basic pose in the cooling down was seated positions. It was started with an easy pose (sukhasana) as the basic pose. It is followed with bound angle pose (buddha kanasana), half lotus pose (Arda padmasana), lotus phase (padmasana), cow face pose (gemukhasana, simple twist (parsva sukhasana), seated half spinal twist and (ardya matsyendrasana). The seated position was followed with the last pose which is child pose.

d. Validation and Revision: The validation was conducted by three experts on each exercise therapy, endocrinology, and exercise training. The prototypes were approved by the experts so that it can be used in the reception test to evaluate the exercise adherence related to the prototype and the perception of the subjects upon the comfort, aesthetics and the safety aspects of the models.

e. The Reception Test

(i) Exercise Adherence and Drop Out Rate: The first analysis was based on the percentage of subject attendance once a week yoga session. The average of the percentage of subjects attendance during the invited session for both sexes was 95.5 % (female and male were 95.1 % and 95.8% respectively). The detail percentage of attendances from first to eight weeks were illustrated in Figure 2.
It can be observed from the graph that the drop out rate was 0. The percentage of attendance during the first to eight weeks was between 90 to 100%.

As the subjects were advised to do two more yoga exercise unsupervised at home. During the meeting, they were asked to report how many yoga session they did unsupervised. The percentage of the subject did unsupervised yoga exercise during first to eight weeks were 82.0% in total and 69.79 % and 93.0% for male and female respectively. The detail percentages of unsupervised exercised from first to eight weeks were illustrated in Figure 3.

(i) Subjects Perception Upon Yoga Exercise: In the final week, the subjects were asked to rate the yoga model they have done for eight weeks upon esthetics, comfort, and safety.
The scale was 0 to 10 which 0 represent unsatisfaction and 10 was the maximum satisfaction. The average satisfaction for esthetic, comfort and satisfactory were 7.44; 8.90 and 7.52. The detail responses for both sexes were provided in Figure 4.

![The Perception of Subjects toward The Yoga Model](image)

**Figure 4: The Perception of Subjects toward the Yoga Model**

**Discussion**

In recent years, yoga has been an exercise basis which is closely related to the improvement of several ailments including diabetes [8]. This research attempt to model yoga exercise which benefits diabetic patients based on the literature review and socially accepted by the subjects.

Based on the literature review, several aspects need to be considered. Firstly the exercise should accommodate aerobic, balance and resistant training and secondly the exercise should apply CRIPE (continue, rhythmic, interval, progressive and endurance) concept [8]. The yoga model develops in this research includes several standing and seated poses and also utilize sun salutation (surya namaskara) poses as those has the potential to benefit diabetic patients [9]. The asanas were combined with pranayamas to stimulate autonomic nerves so that the balance between sympathetic and parasympathetic can be achieved. The mudras were utilized to increase peripheral blood flow to manage and prevent neuropathy [10].

In order to be accepted and increase patients’ motivation to conduct the exercise, the exercise models should incorporate the easy but challenging exercise which allows patients to improve in line with their ability. The level of difficulty of the poses should be arranged to stimulates the feeling of success so that motivates them to continue the practice [11].

They should enjoy the exercise and look forward to continuing to practice them supervised or unsupervised. Those concepts were applied in this research to increase exercise adherence.

The prototype of the yoga model in this research was validated by the experts of exercise therapy, endrocynologist, and exercise trainer to ensure that the models were conceptualize based on diabetes mellitus pathophysiology, exercise physiology, and aesthetics. The experts control the models so that the models will have the maximum benefits in controlling blood sugar level, preventing and managing DM complication and have optimal exercise adherence.

The reception test which was conducted for three weeks on 25 of diabetes mellitus patients (13 females and 12 males) revealed that the average of the percentage of subjects attendance during the invited session for both sexes was 95.5 % (female and male were 95.1 % and 95.8 % respectively). This implied that the model yielded a quite high exercise adherence.

It is also found that the dropout rate of the program was 0%. However as the exercise should be conducted more than once a week to obtain maximum benefits, therefore the subjects were advised to conduct unsupervised exercises at home at least twice a week.

The percentage of unsupervised exercised (the number of sessions divided by two) was 82% on average
and 69.79% and 93% for male and female respectively. From Figure 3, it can be seen that more female conducted unsupervised exercises each week. In addition, during the last weeks, there were several females subjects which conducted exercises more than twice a week. It might imply that females subjects were more independent in memorizing the poses and have more motivation to conduct the exercise.

On average, the rating provided by the subjects in esthetics, comfort, and safety were 7.44; 8.9 and 7.52 respectively. This means that the prominent features which were valued the greatest by the subject were a comfort. Meanwhile for esthetics and safety were aspects which needed to be addressed.

Conclusion

Yoga prototype for diabetes mellitus patients was successfully modeled. The model contains (i) several standing, seated and combined asanas, (ii) basic pranayamas and (iii) mudras for controlling blood glucose, balancing autonomic nerve responses and increasing peripheral blood flow. The model has been validated by exercise therapist, endocrinologist and exercise training experts. Upon the reception test, it is revealed that the model yielded quite a high exercise adherence and receive a relatively high rating for esthetics, comfort, and safety.

Conflict of Interest: The authors declare that there is no conflict of interest regarding the publication of this article.

Source of Funding: Self Funding

Ethical Clearance: Nil

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Evaluation of Malaria Surveillance Based on Attribute in Health Office of East Sumba District

Margaretha Domingga¹, Atik Choirul Hidajah²

¹Master Study of Epidemiology, ²Department of Epidemiology, Faculty of Public Health, Airlangga University, Surabaya, Indonesia

ABSTRACT

Malaria is infectious disease caused by malaria mosquitoes. East Sumba District in 2017, API is 30.9/1000 population and SPR is 17.95%. One of the important factors that influence the high of malaria cases is the performance of malaria surveillance because it has a role in preventing disease, it is necessary to evaluate malaria based on approach system and evaluation surveillance attribute. This study was qualitative research with an evaluation study design. Identification of problems in the input, namely there are no analyst staff, laboratory facilities are lacking limited funds. The process of data entering from the PHC to the district is not timely, namely 68.18% and incomplete at 77.27%. At the output, information dissemination has been carried out at regular meetings. The result of evaluation attributes where simplicity are not simple. Flexibility is inflexibility. Data quality, acceptability, sensitivity, representative, timeliness are low, PPV and stability is high. The alternative solution is to increase the capacity of malaria surveillance managers and health analysts.

Keywords: API, Surveillance Attribute, e-SISMAL, Malaria

Introduction

Malaria is an infectious disease caused by plasmodium parasites which are transmitted by malaria mosquitoes, can cause death especially babies, toddlers, pregnant women. It is realized that the spread of malaria knows no administrative boundaries, therefore malaria control efforts require national, regional, and even international commitments. Diagnostic malaria will be examined using RDT or giemsa blood test to confirm the presence of parasites in the blood. World data shows that since 2000 deaths from malaria globally have fallen by around 60%, of which 65% occur in children under five. Around 3.2 billion people live in areas at risk malaria. In 2015, an estimated 214 million cases of malaria, of which 400 thousand cases of them died.

This disease is still endemic in Indonesia. Economic losses due to malaria for one year in Indonesia reached Rp 366,576,403,496. In Indonesian, 247 districts have received malaria elimination certificates. Profile Health East Nusa Tenggara Province illustrate that API in 2017 is 3.77/1000 population.

Distribution of malaria cases according to the report on Prevention of Communicable Disease of the East Sumba District Health Office.

Table 1: Malaria Distribution in East Sumba

<table>
<thead>
<tr>
<th>Description</th>
<th>Target</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis</td>
<td></td>
<td>2015</td>
</tr>
<tr>
<td>Microscopic</td>
<td>12.132</td>
<td>19.093</td>
</tr>
<tr>
<td>RDT</td>
<td>1281</td>
<td>3.871</td>
</tr>
<tr>
<td>Clinical</td>
<td>266</td>
<td>54</td>
</tr>
<tr>
<td>Positive Malaria</td>
<td>2.177</td>
<td>3.964</td>
</tr>
<tr>
<td>API &lt; 1/1000</td>
<td>9,39</td>
<td>16,16</td>
</tr>
<tr>
<td>SPR &lt; 5%</td>
<td>16,23</td>
<td>17.00</td>
</tr>
<tr>
<td>ABER &gt;10%</td>
<td>5.56</td>
<td>10.88</td>
</tr>
</tbody>
</table>

Source: East Sumba District Health Office, 2017

The Report Profil Health East Sumba District in 2017 illustrates that from 158 villages with low API
were identified as many as 18 villages (11.39%), moderate as many as 35 villages (22.15%), and high as many as 105 villages (66.46%) (9). The pattern minimum maximum pattern serves to determine the peak period of transmission and the right time to carry out malaria control activities (10), looking at the lowest and highest cases then graphed and compare with the malaria pattern in the following year (11).

![Pattern of Malaria Transmission in East Sumba District](source: East Sumba District Health Office, 2017)

The above conditions illustrate that the peak of malaria cases occurred in December and March and decreased in July and August.

One of the important factors that influence the high incidence of malaria is the performance of malaria surveillance (12), because surveillance is a series of continuous observation processes in the collection of data, analysis, and interpretation of data to detecting trends in disease (13).

The purpose of this study is to describe the implementation of malaria surveillance based on a system approach and evaluate surveillance attributes, identify solutions for consideration in determining the policy for making malaria control, prevention and eradication programs.

**Material and Method**

Evaluation of the malaria surveillance system was carried out in the East Sumba District Health Office from July-August 2018. The design of this research is qualitative research with an evaluation study design. The subjects in this study were evaluation components of the malaria surveillance and attributes.surveillance. Research informants were managers Malaria program in

the Health Office and program managers in 22 Public Health Centers (PHC).

Primary data collection techniques through interviews with respondents using questionnaires and observation. While secondary data collection was obtained through the study documents of malaria surveillance data in the East Sumba District Health Office and PHC. Data analysis was carried out descriptively with technical instructions related to malaria published by the Indonesian Ministry of Health and Guideliness for Evaluating Surveillance Systems from CDC and Prevention in 2001 (14).

**Findings**

**A. Surveillance System**

1. Input

   a. Man: The human resources in the malaria program are doctors/midwives in the Public Health Sub-Center (PHsC), the analytical staff, the pharmacist, malaria program manager and Head of PHC. From 22 PHC that only 6 analyst (27.27%) of PHC while other that work are employees who are trained and do not have competence in the laboratory.
b. **Machine**: The implementation of surveillance system has been supported by adequate media such forms, computer, and transportation (100%). e-SISMAL application at the national level which facilitated the recording and reporting system\(^{(15)}\), but this application had not been tested in East Sumba.

c. **Money**: Funding for surveillance comes from Center Fund and District Government. East Sumba District has received assistance and grants from the Global Fund (GF) but has now been stopped, while the allocation from Government has not been sufficient for the program activities.

d. **Method**: Surveillance system was supported by malaria prevention guidebook, including Regulation of the Health Minister Number: 042/Menkes/SK/1/2007\(^{(16)}\), Decree of Director General of P2P Number: HK.02.02/IV/1813/2017\(^{(17)}\), Technical Guidelines for Investigating Epidemiological Malaria\(^{(18)}\), and several other guidebooks.

e. **Market**: Disseminated information through periodic reports to the district level to the central level, was also conveyed at a meeting forum involving cross-sectors. The Regional Governments is still lacking supports Malaria program where absence of a Regional Regulation.

2. **Process**: Malaria data is the results of malaria program services, entered to the malaria register and recapitulated by PHsC, collecting reports to PHC and sent to District Health Office at the latest every 5 months. Data that entered was not on time, namely only 15 PHC (68.18%) and completed report only 18 PHC (77.27%). Records in the malaria are the processed and presented in the form of tables, graphs. Data validation will be conducted once every 3 months. Descriptive data analysis using indicators API, SPR and ABER. Data interpretation is giving a description on a results so that the data becomes meaningful and produces epidemiological information.

3. **Output**: The achievement of the Malaria program performance to be disseminated in the form of report from District to a higher level and feedback to the PHC. The result of the scope of indicators are also disseminated at program evaluation meetings but not yet made in the form of bulletins, scientific publication or writing on the website.

B. **Surveillance Attribute**

1. **Simplicity**: According to respondents the current flow of malaria surveillance reporting is simple (72.73%) but the rest (27.27%) states difficulties because the diagnosis of malaria through a laboratory examination. RDT supplies are insufficient. From 22 PHC that only 6 analyst (27.27%). It can be concluded that the program are not simple because laboratory tests is needed for diagnosis.

2. **Flexibility**: Malaria surveillance which is region with high endemicity, namely early discovery, appropriate treatment and complications, expansions of services with survey, active and passive case detection. It can be concluded that surveillance is inflexible because laboratory examination are not equipped with adequate equipment.

3. **Data Quality**: Almost all PHC filled out incomplete 77.27% in malaria program reports. PHC rarely conducts data validation with PHsC officers. It can be said that the quality of data is low.

4. **Acceptability**: The local government had not optimally contributed to malaria prevention and the accuracy of the PHC reports was still 68.18%. It can be concluded that the acceptability is still low.

5. **Sensitivity**: Almost all respondents stated that the malaria surveillance system was able to analyze malaria events (90.91%), was able to analyze the API, SPR and ABER trends every year (86.36%), but because the collected data was invalid, it could be concluded that sensitivity was not sensitive.

6. **Positive Predictive Value (PPV)**: From slide shipments from January to June 2018 from 9 existing PHC, there were 482 positive slides examined from total of 1226 slides. And people who are found to be positive malaria (100%) are truly experiencing malaria.

7. **Representativeness**: Case analysis based on the variables of person, place and time
(90.91%), and the presentation was carried out during the quarterly mini workshop and presented on the wall data but if validity of the data 72.73% it can be concluded that system were not representative.

8. Timeliness: Respondents stated that 68.18% of PHC had not sent reports to the Health Office on time, so it could be concluded that the timeline were not timely.

9. Stability: Respondents had used computers and report files to do processing and storage (86.36%). For the nature of equipment, respondents stated that it was easy to obtain and operate computers as much as 95.45% and operate a computer properly so it could be concluded that the stability was high.

Discussion

The discovery of malaria as indicated by the API in 2017 was 30.9/1000 population and placing as a malaria endemic area with the aim of reducing malaria transmission with findings and management patient, prevention of risk factors, epidemiological surveillance, improving human resources\(^{(19)}\).

Enforcement of malaria diagnoses still a problem because use clinical diagnosis, 266 people in 2015, 54 people in 2016 and 2 people in 2017. Determination of the diagnosis of malaria by microscopic examination to improve the validity of the diagnosis, so that it can reduce the incidence of anti-malarial drug resistance and prevent transmission\(^{(20)}\).

SPR was 17.95%, shows the magnitude of infection rates in population. Calculation of SPR should be done every month, not only at the end of the year because it can help identify local transmission of malaria compared to the number of cases of raw malaria\(^{(21)}\).

Maximum and minimum patterns of an illness describe the pattern of disease over a period of time. In chart 2, it is known that peak malaria cases occur in the rainy season, so that the peak of mosquito density can be predicted around November and February and decreases during the dry season. This is due to high rainfall and a breeding ground for mosquitoes in stagnant pools and ponds. Joseph \textit{et al} (2014) said that the maximum and minimum patterns, it can be seen that the effective time for malaria vector control activities can be carried out in October and January.

According to CDC (2001) simplicity means simple and easy to operate structures, but can still reach the goal. The diagnosis malaria with the laboratory, but RDT are insufficient and it can be concluded that are not simple. A system can be said to be simple where the case definition is easily applied\(^{(22)}\). Decree of Indonesia Health Minister number 1116/Menkes/SK/VIII/2003, states that epidemiological surveillance resources consist of epidemiologists, functional positions including laboratory\(^{(23)}\), but the lack of analysts in PHC made the surveillance not simple.

Flexibility means a system that is able to adapt to changes in information or field conditions with limited time, budget and easily integrated with other systems (CDC, 2001). East Sumba District is a region with high endemcity and find patients with surveys, active and passive case detection but become inflexible because the discovery of patients must go through laboratory tests.

According to CDC (2001) data quality describes the completeness and validity of the data recorded; acceptability can be seen from the desires of organizations to participate, completeness of reports; and timeliness of reporting means the rate of speed to find out trends, and outbreaks. PHC rarely conduct data validation, the report completeness was 77.27% smaller than the target >90% and timeliness reporting was only 68.18% of target 80% in accordance with Regulation of the Minister of Health Number: 1479/Menkes/ SK/ X/2003. To get good data quality, it is necessary to have periodic malaria monev meetings, training in malaria, strengthen the information system with e-SISMAL application. Supported by Research who conducted Nicola (2016) some countries have built electronic-based reporting systems and achieved success such as Sri Lanka, because with electronic-based reporting, shortening time and reducing the level of miscalculations. With high data quality, timely information, can detect disease early and accelerate health service responses\(^{(24)}\). The need for rewards for PHC with a good surveillance system, because attributes are highly subjective, including the personal willingness of those responsible for implementing system to provide data accurate, complete and timely\(^{(25)}\).

Sensitivity is ability to capture accurate information data, through level of reporting and the level of ability to detect outbreaks; Representation means being able to describe health incidents according to time and place (CDC, 2001). The interviews revealed that was able to
analyze malaria incidence based on person, place and time variables (90.91%), but because the collected data was incomplete (77.27%) it was concluded that program is insensitive and irrepresentative. According to CDC (2001), PPV is the proportion of people identified as actual cases, relating to the clarity and accuracy of case definitions. No errors were found indicating PPV was high.

Stability is related to the reliability is the ability to collect and provide data precisely without errors and availability is the ability to operate when needed (CDC, 2001). Respondents stated that they had used computers and report files to do processing and storage so it could be concluded that the stability was high.

**Conclusion**

Malaria is an infectious disease caused by malaria mosquitoes. Surveillance performance affected the high number of malaria cases because have a role to preventing disease, it is necessary to do an evaluation based on the system approach and surveillance attributes. The evaluation surveillance attributes where simplicity are not simple, flexibility is inflexibility, data quality, acceptability, sensitivity, representation, timeliness are low. PPV and stability is high.

Problems in conducting surveillance at the PHC are lack of cross-sector cooperation, lack of labor and laboratory facilities, and alternative solutions that can be carried out are increased cross-sector cooperation, increasing the capacity of malaria surveillance managers.

**Suggestion**

The need for policies from Central Government to using e-SISMAL applications, legal regulations from the regional government, cooperation with the private sector to find out, treat patients and prevent malaria. There needs to be additional analysis staff, procurement of infrastructure, malaria training and additional operational costs for implementing malaria surveillance at the PHC and East Sumba District Health Office.

**Conflict of Interest:** None

**Source of Funding:** Independent

**Ethical Clearance:** This Study was approved by Health Research Ethics Committee of Public Health, Airlangga University.

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Low Level Laser Therapy on Postoperative Trismus and Swelling after Surgical Removal of Impacted Lower Third Molar

Marwah Safaa Ali¹, Sahar Shakir Al-Adili²
¹Department of Oral and Maxillofacial Surgery, College of Dentistry, University of Kufa, Iraq; ²Department of Oral and Maxillofacial Surgery, College of Dentistry, University of Baghdad, Iraq

ABSTRACT

Background: Low-Level Laser Therapy (LLLT) offer many benefits in controlling the inflammatory process, so it is used in reducing postoperative sequelae following extraction of third molar. The exact biological mechanism behind its action still unclear. There is evidence to suggest that it may have significant neuropharmacological effects in the synthesis, release, and metabolism of a series of biochemical substances.

Objective: This study aimed to demonstrate the effect of intraoral and extraoral low level laser therapy after surgical removal of lower third molar.

Material and Method: forty patients who were in need for surgical removal of lower third molar were studied. Patients were randomly assigned into two groups, LLLT and placebo. Patients in the LLLT group received low level irradiation intraorally (at three point occlusal, buccal and lingual to operation site at 1cm away from the target tissues) and three point extra orally at the masseter muscle including origin and insertion. The total energy was 18 J. While in the placebo group the handpiece was inserted intraorally at proximity to the operation site and then was touched extrorally to the masseter muscle for 180 s total, but the laser was not activated. Assessment of trismus and swelling was done before surgery as a baseline record as well as at the second and seventh postoperative days.

Results: there was no significant difference in trismus between the two groups, while the swelling in the LLLT group was significantly less than in the placebo group in the 2nd and 7th postoperative days.

Conclusion: this study showed that low level laser application have beneficial effect in swelling reduction after third molar surgery, but the trismus did not reach statistically significant level.

Keywords: low level laser therapy, impacted lower third molar, trismus, facial swelling.

Introduction

Third molar eruption occur between the age of 17-21 although there is wide variation in eruption dates. Sometimes third molars may stays impacted in the jaw as a result of many causes like adjacent teeth conditions and soft and hard tissue barrier, the prevalence is about 20%-30% of the population, so that surgical removal of impacted wisdom teeth is one of the most common procedures performed by oral surgeon (¹,²).

Complex factors lead to swelling and trismus after extraction of impacted third molar, however they originat from inflammatory process that is caused by surgical trauma (³).

Different methods are being used to reduce or inhibit trismus, and swelling after third molar surgeries (⁴) (⁵) (⁶) (⁷).

Some of these treatment modalities have side effect or possible limitations, this lead to find out other method like the use of low level laser therapy which shows promising possibilities.
The biological effects of laser first were studied in 1976 for the first time \(^{(8)}\) then the concept of laser treatment started to take shape in 1971 \(^{(9)}\) and from that time it has been used in treatment of several disorders like rheumatoid arthritis, carpel tunnel syndrome, non-healing ulcer and so on. \(^{(10)}\)

Low-level laser therapy (LLLT) is a technique that is effective in modulation of inflammatory response and as a result reduction of swelling and pain and speed up healing \(^{(11)}\).

The anti-inflammatory effect of the LLLT could be due to inhibition of IL-6, MCP-1, IL-10, and TNF-\(\alpha\) in a dose-dependent manner which lead to increase of phagocytic activity, reduction of blood vessel permeability, and restoration of micro capillary circulation \(^{(10,12)}\).

Although the applications of LLLT are numerous, the results about thier efficacy are controversial \(^{(13)}\). This may be caused by different methodology used by various studies, different types of laser device and handpiece, different irradiation parameters and variation or difficulties in measuring the variables related to postoperative sequelae \(^{(14)}\).

This study aimed to evaluate the effectiveness of using low level diode laser, 980 nm in the management of postoperative trismus and edema after surgical removal of impacted third molar.

**Patients and Method**

This study was carried out as double blind placebo controlled randomized prospective clinical study. It was performed during period from December 2018 until the end of April 2019.

A total of 40 patients participated in the study, 18(45%) male and 22(55%) female, age range was between 18-35 years, with a single impacted mandibular third molar in similar positions (Class I-II-III and position B, Pell and Gregory’s classification) \(^{(15)}\). They were randomly assigned into two groups, 20 patients LLLT group, received LLLT immediately after surgery; and 20 patients placebo group; received sham LLLT.

All patients had mandibular third molar, totally or partially impacted in the bone in need of surgical extraction. Exclusion criteria were medical illnesses like diabetes, corticosteroid and anti-inflammatory therapy, patients with history of head and neck radiotherapy, pregnant and nursing women, patients with acute infection in relation to third molar especially pericoronitis.

All participants were informed about the risks of oral surgery and treatment hazards, and a written consent was obtained from all. This study was approved by the Ethical approval Committee in the Collage of Dentistry/ University of Baghdad.

Surgical procedures for all patients were done by the same surgeon who used a standardized technique. The patients were operated under local anesthesia that had been obtained by inferior alveolar, lingual and long buccal nerve block injection using the same agent Lidocaine hydrochloride 2% with Adrenaline 1:80,000 in 1.8 mL glass cartridge (Septodent®, France). A proper two sided mucoperiosteal flap was reflected. The bone removal and/or tooth sectioning was done. Bone removal was performed with fissure or round bur in a surgical straight handpiece under copious saline irrigation.

The tooth was removed and the edges of the wound were sutured with a black silk suture 3/0 with simple interrupted suturing technique.

After surgery, all patients received 625 mg Amoxicillin with Clavulanic acid. A single dose of oral Azithromycin 500mg was given for patients with history of allergy to Penicillin (one patient). Paracetamol (500 mg) with caffeine PO q12hr, and a Chlorhexidine digluconate 0.12% mouth rinse for 10 days except on the day of surgery.

A gallium-aluminum-arsenide (Ga-Al-As) diode laser device (Pioneer®, china) with a continuous wavelength of 980 nm was used as source of laser light. Both patient and operator were wearing safety goggles for eye protection.

Immediately after the operation, patients in the LLLT group had been received low-level laser therapy at six points 3 extra oral at the masseter muscle, including origin and insertion, and 3 intraoral, placed at 1 cm from operation site administered on occlusal, buccal and lingual sides. Laser energy was applied to treatment groups at 100 mw (0.1 w) for a total of 180s (30 s for each point), 0.1W x180s=18 J.
In the placebo group the handpiece was inserted intraorally at proximity to the operation site and then was touched extraorally to the masseter muscle for 180 s total, but the laser was not activated.

Post operatively, assessment of the mouth opening was done by asking the patients to open their mouth as much as possible and the inter-incisal opening was measured with a caliper in millimeter between the incisal edges of the right maxillary and right mandibular central incisors, the outer contour of the check was assessed by measuring the distance between the lateral corner of the eye and the angle of the mandible(Line A), tragus and the outer corner of the mouth (Line B) and tragus and soft tissue pogonion (Line C), using measuring tape. These measurement were done on three occasions, before surgery, at the 2nd, and 7th postoperative days using the same method and by the same examiner who was different from the operator and in double blind way. The time of operation was also recorded using stopping watch and compared between the groups.

**Result**

The mean operation time for LLLT Group was 35.95 min. and for placebo group was 35.75 min. There was no statistically significant difference between the two groups in terms of mean duration of surgical operation (p-value = 0.910). Table 1.

<table>
<thead>
<tr>
<th>Time of operation (min.)</th>
<th>Groups</th>
<th>Independent sample T-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Placebo</td>
<td>LLLT</td>
</tr>
<tr>
<td>Minimum</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Maximum</td>
<td>45</td>
<td>48</td>
</tr>
<tr>
<td>Mean</td>
<td>35.75</td>
<td>35.95</td>
</tr>
<tr>
<td>SD</td>
<td>4.95</td>
<td>6.14</td>
</tr>
</tbody>
</table>

Mouth opening was better in the LLLT group as compared with placebo group but the statistical analyses showed no significance in the differences between the two groups in the 2nd and 7th postoperative days (P > 0.05). Table 2.

<table>
<thead>
<tr>
<th>Mouth opening difference (mm)</th>
<th>Descriptive</th>
<th>Groups</th>
<th>Independent sample t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Placebo</td>
<td>LLLT</td>
</tr>
<tr>
<td>Mouth opening difference (preop -2nd day)</td>
<td>Minimum</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>26</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>17.85</td>
<td>15.20</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mouth opening difference (preop -7th day)</td>
<td>Minimum</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>6.80</td>
<td>7.10</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>2.91</td>
<td>4.38</td>
</tr>
</tbody>
</table>

Facial swelling was less in LLLT group as compared to placebo group, it showed highly significant difference in the second postoperative day and significant difference in the seventh postoperative day (p> 0.01) and (P < 0.05) respectively. Table 3.

<table>
<thead>
<tr>
<th>Facial swelling (cm)</th>
<th>Descriptive</th>
<th>Groups</th>
<th>Independent sample t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Lines difference 2ndd - preop.</td>
<td>Minimum</td>
<td>0.27</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>1.67</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>0.98</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>0.41</td>
<td>0.19</td>
</tr>
<tr>
<td>Mean Lines difference 7thd -preop.</td>
<td>Minimum</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>1.8</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>0.82</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>0.57</td>
<td>0.43</td>
</tr>
</tbody>
</table>
Discussion

Topical sign of inflammation, like swelling, and severe discomfort commonly related to surgical removal of impacted lower third molar \(16\). Previously suggested that there may be a close association between time of operation and postoperative morbidities \(17\). However in this study, there was no significant difference in time of surgical operations between LLLT group and placebo group.

Different preventive method have been used to manage these postoperative sequelae, one of them is the use of LLLT that has been shown to prevent or reduce trismus and facial swelling following surgical extraction of impacted mandibular third molar without any side effect, however some studies didn’t report any positive effect.

This controversy may be a result of variations in study designs and absence of uniform reporting of physical variable like type of laser device, wave length, time of application, and distance between the source and tissue in addition to lack of standardization in measuring variables related to postoperative morbidities after third molar surgery, like trismus and facial swelling \(18\).

In some studies LLLT was applied only extraorally \(19\) or only intraorally \(14\) while other authors performed both extraoral and intraoral application \(20\).

Trauma of surgery during mandibular third molar removal may lead to muscles spasm, particularly masseter muscle which lead to difficulty in mouth opening known as trismus. For evaluation of trismus manual caliper is used to measure maximum oral aperture. The present study concluded that the difference in trismus scores between the LLLT group and placebo group was statistically not significant, this finding agreed with study conducted by López-Ramírez et al. \(14\) and Røynesdal et al. \(21\), while Carrillo et al. \(22\) and Aras and Güngörmüş \(20\) reported that LLLT reduced trismus and has positive effect.

Postoperative facial swelling is an expected sequel after removal of impacted third molar. The probable cause is tissue response to surgical trauma in oral cavity. Swelling is gradually increased and reaches its peak value during 48 hrs postoperatively and regress by the 4th day and it is fully resolved in one week \(23\).

According to the result of this study LLLT have positive effect on swelling and there was statistically significant difference in swelling between the two groups in the 2\(^{nd}\) and 7\(^{th}\) postoperative days this result is similar to that obtained by Ferrante et al. \(24\), Kazancioglu et al. \(19\), and Aras and Güngörmüş \(25\) who reported in their studies that reduction of facial swelling can occur by the use of LLLT. However, the current findings are not consistent with those of Carrillo et al. \(22\) who found no statistical significant effect of helium-neon laser on studied patients.

The difference in methodology and results of the different studies are too varied to find the ideal parameters for use of the laser therapy and to estimate its clinical effectiveness.

This study revealed that LLLT is useful for decreasing trismus and swelling after impacted lower third molar removal. The effects of LLLT may depend on the method of its application.

Conclusion

1. Facial swelling was significantly less in LLLT group compared to placebo group after third molar surgery.
2. Trismus was less in LLLT group compared to placebo group, although statistically not significant.

Ethical Clearance: The study was approved by the Ethical approval Committee at College of Dentistry/University of Baghdad, Iraq.

Source of Funding: There is no financial disclosure.

Competing Interest: The authors declare that they have no competing interests

REFERENCES


Role of Betatrophin and Irisin on Diabetes Mellitus Type 1 Management (Experimental Study)

Maysaa J. Majeed1, Zainab A. Razak Al-Sharifi1, Shifaa Jameel Ibrahim1

1Department of Biochemistry, College of Medicine, University of Baghdad, Baghdad, Iraq

ABSTRACT

Background: Type 1 diabetes occurred when immune system destroys cells of pancreas called beta cells, usually treated with insulin and was advised to get regular physical activity.

Aim of Study: Evaluate irisin hormone as represented the exercise hormone in the treatment of diabetes type 1 rats in comparison with betatrophin hormone.

Material and Method: Twenty three rats were included in this study, five of them was considered as control group, while the rest injected with a single dose of alloxan 0.1mg/g, in order to develop diabetes type 1, six of them were dead. Six of inducible diabetes type 1 rats were treated with betatrophin. The other six rats were treated with irisin. Spss version 18 was used in the expiations of statistical methods of the research.

Results: After diabetes type 1 induction, diabetic rats type 1 groups showed higher blood sugar and serum irisin and lower serum insulin and betatrophin level than control group with p<0.05. Diabetic rats’ type 1 with Betatrophin injection showed significant lower blood sugar and significant higher serum insulin level with when compared with Diabetic rats type 1 after irisin injection treatment.

Conclusion: Betatrophin can hold a hope for diabetes type 1 control more than irisin

Keywords: diabetes mellitus, irisin, betatrophin and rats.

Introduction

Regular exercise assists everybody health, for diabetes, it plays a major role in keeping health, regardless of the type of diabetes it is important for the overall health and wellness. With type 1 diabetes the key of treatment is keeping the balance between insulin doses with the food eaten and the activity has been done (1). Novel hormones discovered by different studies can improve the diabetes status. On one hand, betatrophin (2) can hold the best treatment for both types of diabetes (type 1 and 2) by regenerate the pancreatic β-mice cell mass. On the other many researches documented that irisin exercise hormone generated by endurance exercise training in both mice and humans, which act on the cells of white adipose tissue thus increasing total energy expenditure and mitigating diet-induced insulin resistance in certain animal models (3). Circulating irisin is also significantly lower in individuals with T2D compared with non-diabetic controls, whereas recombinant irisin administration to fat mice significantly improves glucose tolerance (4, 5).

Material and Method

Seventeen rats involved in this study, their age range was 2-3 months-old, and the study was done at animal house, College of Medicine-University of Baghdad. The animal protocols were approved by the Use and Care of Experimental Animals Committee of the Jichi Medical University Guide for Laboratory Animals (6).

Study Design: Twenty three rats were induced type 1 diabetes by subcutaneously injection of a single dose of alloxan 0.1mg/g, six of them were dead then the rats were divided into two groups:

Group 1: Involve six DMI rats, after a day from diabetes inducible, they were treated with 0.2 mg betatrophin/g body weight.
Group 2: Six DMI rats, after a day from diabetes inducible, they were treated with 100ng/ml of recombinant protein (lyophilized irisin Fc-Fusion).

Group 3: Five rats represented control non-diabetic rats.

All rats were not significantly differing in their body weight and age.

Method

Fasting serum glucose was measured by colorimetric methods, serum insulin concentration were measured using an enzyme-linked immunosorbent assay. Rats’ weight was measured by weight meter. Glucose and insulin and recombinant proteins (betatrophin and irisin) were provided by Phoenix pharmaceuticals, INC, GERMANY.

Results

To confirm the matching between studied rats groups, The statistical a nova- test was done and all studied parameters showed no significant difference with p>0.05.

Table 1: General basal characterization of studied rats (mean ± SD)

<table>
<thead>
<tr>
<th>Studied Parameters</th>
<th>Control rats No = 5</th>
<th>Rats before diabetes induction No = 6</th>
<th>Rats before diabetes induction No = 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>weight (gm)</td>
<td>85.78 ± 8.12</td>
<td>89.88 ± 7.66</td>
<td>87.56 ± 6.78</td>
</tr>
<tr>
<td>Fasting blood glucose (mg/dl)</td>
<td>77.89 ± 3.90</td>
<td>80.93 ± 6.44</td>
<td>76.79 ± 5.74</td>
</tr>
<tr>
<td>Serum insulin</td>
<td>1.70 ± 0.99</td>
<td>1.81 ± 0.21</td>
<td>1.63 ± 0.49</td>
</tr>
</tbody>
</table>

After diabetes type 1 induction as mentioned in methods, diabetic rats type 1 groups showed significant higher blood sugar and serum irisin and lower serum insulin and betatrophin level than control group with p<0.05, while their weight were lowered but did not reach to a significant value p>0.05.

Table 2: Mean ± SD of blood sugar, insulin, irisin and betatrophin of rats groups after diabetes induction

<table>
<thead>
<tr>
<th>Studied parameters</th>
<th>Control rats No = 5</th>
<th>diabetic rats type 1 No = 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (gm)</td>
<td>88.23 ± 2.65</td>
<td>85.34 ± 3.12</td>
</tr>
<tr>
<td>Fasting blood sugar (mg/dl)</td>
<td>97.34 ± 3.4</td>
<td>300.00 ± 10.34</td>
</tr>
<tr>
<td>Serum insulin</td>
<td>1.79 ± 1.20</td>
<td>0.58 ± 0.11</td>
</tr>
<tr>
<td>Serum irisin</td>
<td>0.56 ± 0.19</td>
<td>1.79 ± 0.96</td>
</tr>
<tr>
<td>Serum betatrophin</td>
<td>5.38 ± 2.36</td>
<td>2.6 ± 0.81</td>
</tr>
</tbody>
</table>

Diabetic rats type 1 with Betatrophin injection showed significant lower blood sugar with p<0.05 and significant higher serum insulin level with p<0.05 when compared with Diabetic rats type 1 after irisin injection treatment, note that one rat of the group treated with betatrophin injection was dead.

Table 3: Mean ± SD of blood sugar and insulin of both treated diabetic rats type 1 groups after irisin and betatrophin treatment

<table>
<thead>
<tr>
<th>Studied Parameters</th>
<th>Diabetic rats type 1 after irisin injection treatment No = 6</th>
<th>Diabetic rats type 1 after betatrophin injection treatment No = 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (gm)</td>
<td>85.29 ± 1.88</td>
<td>85.56 ± 2.98</td>
</tr>
<tr>
<td>Fasting blood sugar (mg/dl)</td>
<td>200.90 ± 15.89</td>
<td>150.78 ± 10.48</td>
</tr>
<tr>
<td>Serum insulin</td>
<td>0.89 ± 0.23</td>
<td>1.56 ± 0.69</td>
</tr>
</tbody>
</table>

Irsin showed positive significant correlation with blood sugar and insulin in diabetic rats type 1 before irisin injection treatment with r= +0.45, p <0.05. Same results was obtained in Diabetic rats type 1 after irisin injection treatment r= +0.34, p <0.05. While Betatrophin showed negative significant correlation with insulin.
Discussion

Irisin has discussed by many previous studies as a messengers molecules released by skeleton and heart in response to exercise \(^{(7,8)}\) acting on various tissue including skeleton, heart, liver, fat and the brain \(^{(9,10)}\). Researchers suggest that irisin can be used as therapeutic potential in insulin resistance and type2 diabetes mellitus by browning of white adipose tissue, facilitating glucose uptake in skeletal muscle and heart, improving hepatic glucose and lipid metabolism, and pancreatic β cell function \(^{(11-15)}\). Most studies talk about the role of irisin in diabetes type 2 but only few focus on its role in diabetes type 1.

As well as most studies documented the role of irisin in diabetes type2, the researchers documented the role of betatrophin in the proliferation of pancreatic cells consequently increasing insulin secretion \(^{(16)}\) and improving diabetes type1 statues, which the current research undergo this explanation. but this betatrophin don’t have this role in diabetes type2 that may not control pancreatic β-cell expansion or its function \(^{(17)}\).

Diabetic type1 rats treated with irisin showed no improvement in their blood sugar suggested that irisin have no role in glucose metabolism in diabetic type1 rats, although plurality studies \(^{(18)}\) suggest that that irisin is insulin-rebuilding hormone, and can specifically accelerate the generation of mouse beta cells and regenerating mouse beta cells \(^{(19-23)}\). In general experimental studies proved that irisin has anti-apoptotic effect on pancreatic beta-cells and stimulates beta-cell proliferation, irisin fails to regulate blood glucose that may be related to the damage severity of beta cells and glucose toxicity.

Different studies suggest that people with long-standing type 1 diabetes may be treated only when beta cell destruction can be inhibited. That the apoptosis of beta cell and new beta cell formation must be occurring that concomitant must be occurring even after long-standing type 1 diabetes \(^{(24)}\).

Conclusion

Betatrophin can hold a hope for diabetes type1 treatment, but the role of irisin in the diabetes type1 treatment need for further research controlling the way and severity of destruction of beta cell.


Source of Funding: self-funding as am a member in department of biochemistry/Collage of medicine/University of Baghdad with monthly salary of 830.996$ according to https://www1.oanda.com/currency/converter/

Conflict of Interests: Nil

REFERENCES


Correlation between LDL, HDL, LDL/HDL Ratio and Preeclampsia Incidence at RSUD Pamekasan, Indonesia

Mazdalina Rahmawandari Nurhani¹, Kusworini², Bambang Rahardjo²
¹Student of Master Program, ²Lecturer of Master Program, Midwifery Faculty of Medicine Universitas Brawijaya Malang

ABSTRACT

Besides bleeding and infection, preeclampsia is the leading cause of maternal mortality in Indonesia. Preeclampsia may cause multi organ dysfunction which may result in death. Although the exact causes of preeclampsia are not known, one of the widely accepted theories is oxidative stress. Oxidative stress may be triggered by high LDL-c, low HDL-c and high LDL/HDL ratio. The study aimed at investigating the correlation between LDL-c level, HDL-c level, LDL/HDL ratio and preeclampsia incidences at dr. H. Slamet Martodirdjo Regional General Hospital (RSUD) Pamekasan. The study used analytical observational method and case control design. The subjects were 64 pregnant women consisting of 32 preeclamptic and 32 non-preeclamptic women. The subjects were selected using consecutive sampling method. Data were collected from physical examination and laboratory tests. Data were analyzed using eta and logistic regression test. Result showed that there was a significant correlation at α < 0.05 between LDL-c level (ρ=0.000), HDL-c level (ρ=0.000), LDL/HDL ratio (ρ=0.000) and preeclampsia incidence. LDL-c level, HDL-c level, LDL/HDL ratio were risk factors for preeclampsia. These factors should be targetted by health care professionals when conducting routine prenatal checkups.

Keyword: LDL-c, HDL-c, rasio LDL/HDL, Preeclampsia

Introduction

Today, preeclampsia is still a leading cause of maternal mortality in the world, accounting for 15 % to 20% of maternal mortality. This is also the leading cause of infant mortality and morbidity. This condition occurs after 20 weeks of gestation and is marked by increased blood pressure of more than 140/90 MmHg and proteinuria of more than 0.3 mg/day. Without immediate intervention, preeclampsia may result in multi organ dysfunction which causes death.

In Indonesia, preeclampsia is the second leading cause of maternal mortality after bleeding, while in East Java Province it is the first leading cause of maternal mortality in 5 consecutive years.

The exact causes of preeclampsia are not yet known, although ED occurring in placental blood vessels has been widely accepted as a theory that explains the etiology and pathophysiology of preeclampsia. One theory that develops in pathogenesis preeclampsia is oxidative stress theory.

Oxidative stress is induced by reactive oxygen species (ROS). This includes superoxide anion (O2-), hydroxyl anion (OH) and peroxide hydrogen (H2O2) which may damage cell structure including lipid, protein and DNA. Some studies showed that excessive production of ROS may be caused by high LDL-c level and low HDL-c level which may result in increased production of lipid and oxidized protein which lead to vascular endothelial damage which is the main pathogenesis of preeclampsia.

Normally, lipid profile level, including LDL-c and HDL-c level, increases during pregnancy, particularly during the second and third trimester. This is due to an increase in steroid sex hormones as well as a change in hepatic metabolism and adipose. Such changes contribute to an increase in LDL level. It has been...
reported that during pregnancy LDL becomes smaller lipoprotein and is, consequently, more atherogenic (10). Meanwhile, HDL stays at recommended level and is at its highest in the second trimester. The combination between elevated LDL and decreased HDL in the blood increases the risk of atherosclerosis (11). This places pregnant women at higher risk of atherosclerosis which has similar characteristics with preeclampsia (12).

Although some studies have investigated the relationship among an increase in LDL-c concentration, a decrease in HDL-c concentration, an increase in LDL/HDL-c ratio and increased risk of preeclampsia, the results have not always been consistent (13)(14)(15). Considering the high prevalence of preeclampsia in Indonesia, as well as its exorbitant health care cost and considerable impact, establishing the exact relationship among the variables seems urgent. Up to now, eventhough pregnant women with preeclampsia characteristically show atherogenic lipid profile and oxidized lipoprotein, routine measurement of lipid and lipoprotein have not become a standard procedure during pregnancy checkups (16). Cholesterol test as preeclampsia screening is easy and cheap, thus can be performed by all health-care facilities in Indonesia. Therefore, the study aimed at finding out the correlation among LDL-c level, HDL-c level, LDL/HDL ratio and incidence of preeclampsia at RSUD Pamekasan.

**Materials and Method**

The study used analytical observational method and case control design to investigate the correlation among LDL-c level, HDL-c level, LDL/HDL ratio and preeclampsia. The study was conducted at RSUD Pamekasan from Februari to April 2019. The subjects were 64 pregnant women who were divided into two groups; preeclamptic and non-preeclamptic group.

The inclusive criteria were: Age between 20-40, gestational age of more than 34 weeks, no previous preeclampsia and eclampsia history.

The exclusive criteria were: Chronic hypertension, Diabetes Mellitus, heart diseases, thyroid diseases, kidney and liver dysfunction deseases, Cushing syndrome, Trombofili, Lupus Erythematosus, consumption of lipid profile management drugs (estrogen, corticosteroid, lipid decreasing drugs, anti-epileptic drugs) alchohol consumption and cigarette smoking, and gemellus.

Every preeclamptic subject and non-preeclamptic subject were matched on the basis of their age, BMI and parity.

**Blood Pressure Measurement:** Blood pressure was measured using digital blood pressure monitor. The measurement was done while subject was supine, on her left lateral position. The head was elevated 30 degrees. Before measurement, the subject was allowed 5 minutes to relax and blood pressure was read. The reading was repeated 2 times with 5 minutes interval and the mean of these two readings was recorded as the result of the reading.

**Proteinuria Test:** Proteinuria is tested using dipstick method with Combostik 10M strip test and the result was read using ComboStik R300 automatic machine.

**Blood Sample Collection:** LDL-c and HDL-c level. LDL-c and HDL-c was measured using enzymatic colorimetric method with Selectra Pro M Chemistry Analizer machine and Cholestest LDL and HDL SL 2G reagent by Elitech.

**Statistical Analysis:** Data were analyzed using SPSS for Windows version 25. Data were presented descriptively to indicate means and standard deviations. Independent Sampel t test was used to analyse the difference between LDL-c and HDL-c level and LDL/HDL ratio. Eta test was used to find out the correlation between LDL-c level, HDL-c level, LDL/HDL ratio and preeclampsia. Multivariate analysis was performed using Logistic Regression test.

**Finding**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Preeclampsic Women (n = 32)</th>
<th>Non-preeclampsic Women (n = 32)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>29.7500 ± 1.24839</td>
<td>29.8438 ± 1.19399</td>
<td>0.957</td>
</tr>
<tr>
<td>BMI</td>
<td>28.3563 ± 0.50541</td>
<td>26.8344 ± 0.57285</td>
<td>0.051</td>
</tr>
<tr>
<td>Parity</td>
<td>2.0938 ± 0.19239</td>
<td>2.0625 ± 0.18479</td>
<td>0.907</td>
</tr>
<tr>
<td>Gestational Age</td>
<td>37.5625 ± 0.28018</td>
<td>37.8438 ± 0.28080</td>
<td>0.481</td>
</tr>
<tr>
<td>Systolic Blood Pressure</td>
<td>169.8125 ± 3.27639</td>
<td>124.3750 ± 1.88090</td>
<td>0.000</td>
</tr>
<tr>
<td>Diastolic Blood Pressure</td>
<td>110.3438 ± 2.08615</td>
<td>79.4375 ± 1.21974</td>
<td>0.000</td>
</tr>
</tbody>
</table>
Result presented in table 1 indicates that there was no difference in age, parity, BMI, and gestational age between case sample (preeclamptic women) and control sample (non-preeclamptic pregnant women) ($\rho$>0.05). Blood pressure of both preeclamptic and non-preeclamptic women was also presented in table 1. The average systolic blood pressure of preeclamptic group was 169.8 MmHg and the average of diastolic blood pressure of the group was 124.3 MmHg. Meanwhile, the average systolic blood pressure of non-preeclamptic group was 110.3 MmHg and its average diastolic blood pressure was 79.4 MmHg. The table also indicates that there was a significant difference in blood pressure between preeclamptic pregnant women and non-preeclamptic pregnant women ($\rho$ = 0.000).

Table 2: Comparison of LDL-c, HDL-c and LDL/HDL ratio between preeclamptic and non-preeclamptic pregnant women

<table>
<thead>
<tr>
<th>Cholesterol</th>
<th>Preeclampsia (n = 32)</th>
<th>Non-preeclampsia (n = 32)</th>
<th>$\rho$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDL cholesterol</td>
<td>232.33 + 8.59</td>
<td>175.84 + 7.59</td>
<td>0.000</td>
</tr>
<tr>
<td>HDL cholesterol</td>
<td>39.75 + 1.11</td>
<td>52 + 1.55</td>
<td>0.000</td>
</tr>
<tr>
<td>LDL/HDL ratio</td>
<td>5.95 + 0.24</td>
<td>3.41 + 0.13</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 2 shows that the average LDL-c level of preeclamptic pregnant women was 232.33 mg/dl, while that of non-preeclamptic pregnant women was 175.84 mg/dl. The average HDL-c level of preeclamptic pregnant women and non-preeclamptic women were 39.75 mg/dl and 52 mg/dl respectively. The average LDL/HDL ratio of preeclamptic pregnant women was 5.95, while that of non-preeclamptic pregnant women was 3.41. Table 2 also indicates a significant difference in LDL cholesterol, HDL cholesterol, and LDL/HDL ratio between preeclamptic and non-preeclamptic pregnant women at $\rho$ value of 0.000.

Table 3: Correlation between LDL-c, HDL-c, LDL/HDL Ratio and Preeclampsia

<table>
<thead>
<tr>
<th>Nominal by interval</th>
<th>$\rho$ value</th>
<th>LDL-c</th>
<th>HDL-c</th>
<th>LDL/HDL ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preeclampsia dependent</td>
<td>0.89</td>
<td>0.758</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 shows that LDL-c, HDL-c and LDL/HDL ratio were strongly correlated with preeclampsia. The correlation between LDL-c level, HDL-c level, LDL/HDL ratio and preeclampsia were 0.89, 0.757, and 1.00 respectively. A correlation value ranges from 0 to 1; the closer to 1, the stronger the correlation. This indicates that the three variables had strong correlation with preeclampsia, especially LDL/HDL ratio which had a correlation value of 1.

Table 4: Result of Multiple Logistic Regression Test of LDL cholesterol level, HDL cholesterol level, LDL/HDL ratio and Preeclampsia

<table>
<thead>
<tr>
<th>Faktor resiko</th>
<th>$\beta$</th>
<th>$\rho$ value</th>
<th>Odd ratio (OR)</th>
<th>95%CI for EXP (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kadar kolesterol LDL</td>
<td>2.475</td>
<td>.000</td>
<td>11.880</td>
<td>3.535-39.925</td>
</tr>
<tr>
<td>Kadar kolesterol HDL</td>
<td>-5.120</td>
<td>.000</td>
<td>4.564</td>
<td>02.001-5.054</td>
</tr>
<tr>
<td>Rasio kolesterol LDL/HDL</td>
<td>3.355</td>
<td>.000</td>
<td>28.636</td>
<td>5.744-142.776</td>
</tr>
</tbody>
</table>

Table 4 indicates that the odd ratio of LDL-c was 11.880. This means that pregnant women with high LDL-c (>190 mg/dl) had 11-fold higher risk of preeclampsia, compared to pregnant women with LDL-c <190 mg/dl. The odd ratio of HDL cholesterol and LDL-c/HDL-c ratio were 4.564 and 28.63 respectively. This means that pregnant women with low HDL-c and high LDL-c/HDL-c ratio had 4-fold and 28-fold higher risk of preeclampsia respectively.

Discussion

The result of the study indicates that LDL-c level and LDL/HDL ratio was higher in preeclamptic women than in non-preeclamptic women, while HDL-c level was lower in preeclamptic women than in non-preeclamptic women. This is in line with a study conducted by Salhood dan Anjum which stated that there was higher LDL-c level and higher LDL/HDL ratio in
preeclamptic pregnant women than in non-preeclamptic pregnant women, while HDL-c level was lower among preeclamptic pregnant women than in non-preeclamptic pregnant women (17)(18)(19).

Endothelial dysfunction plays a vital role in the pathogenesis of preeclampsia (18). In the last three decades, LDLox and NO have been intensively studied and regarded as important mechanism which contributes to endothelial dysfunction (ED). LDLox and NO exert contradictory actions in protecting endothelium microenvironment which influence key events in ED (20). NO is the most important vasodilating molecule which is synthesized by nitric oxide synthase (eNOS dan NOS III) (21). Besides its vasodilatation function, NO also has pleiotropic vasoprotective, cardioprotective and anti-atherogenic effects. These functions have been summarized from numerous article reviews (21)(22)(23). NO and OxLDL are significant biological mediators which promote protective effect vs pathogenic effect in blood vessels simultaneously. As production of NO and its bioavailability decrease, OxLDL breaks the balance of vascular walls which leads to ED (20). The level of circulating OxLDL depends on the level of oxidative stress and the number of LDL particles. Some studies have revealed a strong positive correlation between OxLDL and LDL-c. One particular study involving 624 respondents came up with strong positive correlation between the two parameters (r = 0.67, P < 0.001) as well as a conclusion that LDL-c was one of the key determining factors in OxLDL concentration. The study also indicated a negative correlation between OxLDL concentration and HDL level (24).

Low HDL-c level was also negatively correlated with preeclampsia and this study showed that a decrease of HDL-c may lead to 4-fold higher risk of preeclampsia. This may be due to the fact that the main function of HDL-c is protecting the function and integrity of endothelium (25). A decrease in HDL concentration is related to ED. HDL tends to increase the number of progenitor cells in serum compartment and in the area of endothelial injury, thus may stimulate direct endothelial repair. One very important aspect is the ability of HDL to promote vasodilatation (26). HDL binds apo A-I from SR-BI receptor and this activates eNOS in endothelial tissue. The presence of apo A-I allows eNOS to pair with SR-BI receptor. Moreover, HDL-c also contributes to vasodilatation when SR-BI induces the expression of cyclooxygenase 2 and the production of prostacyclin (PGI2) by endothelial cells. Besides its vasodilatation function, PGI2 also inhibits trombocyte aggregation. HDL-c may inhibit endothelial cells apoptosis that is induced by LDLox and TNF-α (25). Some writers maintain that HDL-c particles are susceptible to oxidized lipids and proteins, both of which transform these particles into “disfunctional HDL” particles. Disfunctional HDL loses its vasoprotective effect which results in impairment of the function of endothelial tissue (27). Dysfunctional HDL does not stimulate NO release. In fact, it inhibits NO release by inhibiting eNOS activation. Dysfunctional HDL loses its anti-apoptotic effect in endothelial cells which causes ED (28).

High LDL-c/HDL-c ratio is associated with the development of coronary plaque (29). Individuals with high total cholesterol/HDL ratio or high LDL/HDL ratio have higher cardiovascular risk which is caused by an imbalance between atherogenic LDL-c and HDL-c as protective lipoprotein. This imbalance may be due to high LDL-c level may decrease the anti-atherosclerosis properties of HDL-c (30).

**Conclusion**

There was a strong correlation between LDL cholesterol level, HDL cholesterol level, LDL/HDL and preeclampsia.

**Recommendation**

The study may be used as a reference in conducting cheap and easy screening for preeclampsia risk.

**Conflict of Interest:** None

**Source of Funding:** None

**Ethical Clearance:** The study obtained an ethical clearance from the ethics committee of RSUD Pamekasan

**REFERENCE**


Evaluation of the Antibacterial Activity of Iraqi Garlic Derivatives to Escherichia Coli

Minen Al-Kafajy
Lecturer, (PhD), Department of Microbiology, College of Medicine, Thi-qar University

ABSTRACT

Objectives: As a foodborne pathogen, Escherichia coli (E. coli) encounters many barriers to invade and disseminate in the human body, but it might cause disease. Although Fresh garlic juice (GJ) and Garlic oil (GO) were reported to possess antibacterial activity, the mechanism that underlay the garlic antimicrobial activity still obscure.

Method: The hypothesis of my study is to examine the antimicrobial activities of GJ and GO and the combination of either GJ or GO with Amp and CF, respectively.

Results: In my current project, the antibacterial activity of GJ was found to be significant in reducing the bacterial protein synthesis against E.coli, while GO negatively correlated; but, unfortunately, did not reach the significant level. Moreover, GJ and GO were correlated with improvement of the sensitivity of bacteria to antibiotics.

Conclusion: further investigation of the potency of GJ and GO in treating the infections is highly needed.

Keywords: E. coli, antibacterial activity, garlic juice, garlic oil

Introduction

Historically, Garlic (Allium sativum) has considered as customary dietary and medicinal supplements as an anti-infective agent 1. In vitro, it has been proofed the antimicrobial action of fresh and freeze-dried garlic extract against numerous microorganisms such as viruses 2 Bacteria 1 and fungi 3. It has been reported in several papers that allicin (diallyl thiosulfinate) is the primary inhibitory component of garlic that possess antimicrobial activity 4.

Several papers have reported that the main inhibitory component of garlic is the allicin (diallyl thiosulfinate) that produced when garlic cloves are compressed. The concerning issue in the allicin is unstable, and this could be the reason in the differences in reporting garlic bioactivity in multiple publications 5. Interestingly, Cavallito and his workers were discovered that removing allicin from the garlic juice will demolish its biological activity 6.

On the other hand, E.coli is one of the few microorganisms that considered versatile discovered for the first time by Theodor Escherich in 1885. It is one of the harmless bacteria residing in the intestinal area of the human and mammals. As a healthy flora, it inhabits in a mutually beneficial relationship with the host and seldom causes illness. In the industry, E. coli has been widely used in recombinant DNA technology to clone various types of plasmid, produce proteins, nucleic acids, etc 7.

Despite the harmlessness of E.coli, it could cause a severe infection that may affect humans and feeding mammals. E.coli rod-shaped belongs to a gram-negative facultative aerobic bacterium Enterobacteriaceae family historically discovered in the soil and rotting vegetation. Some of the E.coli strains obtaining virulence factors throughout plasmids, transposons, bacteriophages, and pathogenicity islands. Although only seven serotypes of E.coli are recognized as pathogenic, thirteen serotypes of E.coli have been discovered, but only seven of them causing most dangerous cases of human disease such as

Corresponding Author:
Minen Al-Kafajy
Department of Medical Laboratory Analysis,
University of Sumer, Thi-qar, Iraq
Email: minen2006@gmail.com

dysentery, diarrhea, and infections in the area other than the intestine such as the urinary system and meninges 7.

Studies that focused on using a fecal carriage estimated that most people will consume E. coli contaminated foods between 10 and 15 times a year in middle east countries. E. coli is a common pollutant of a raw diet, nuts, and dairy, and is yearly blamable for many universal recalls of both human and animal food. The USA Centers for Disease Control and Prevention (CDC) has estimated that the epidemic cases were associated with consumption of food products, 73,000 illnesses, 2,200 hospitalizations, and 60 deaths annually in the United States. Complete genome sequencing of bacteria isolated from the product confirmed the genetic presence of the E. coli in the isolated bacteria. In recent years, E. coli accounted for a stunning 50% of the total amount of food recalled by the USDA, the liability in large part to contamination of frozen vegetable products manufactured by food companies. 8

For the majority of humans who ingest E. coli, the only symptoms that happen will be self-limiting gastroenteritis or flu-like symptoms. In the senior people, however, or in patients with low immunity level such as HIV, cancer, diabetes mellitus, and those on immunosuppressive medicine, the disease may proceed to invasive enteric illness, described by septicemia, meningitis, and encephalitis, before analysis is made. The latest study ranked E. coli infection as the fifth most costly foodborne pathogen in the US because the invasive enterobacteria generally result in admission to intensive care 9

The minimum inhibitory concentration (MIC): MIC method was employed to find out the minimum concentration of an anti-microbial agent able to successfully inhibit the observable growth of a microorganism for 24 h incubated at 37°C. MIC has been determined using the method developed by Caldwell and Danzer 10 with minor modification.

Disc Diffusion Method: Whatman No.1 filter paper discs (6 mm in diameter) was impregnated in Fresh GJ solutions, the paper dried and has been cut into discs. 50 l of sterile distilled water (SDW) was added to discs to serve as a control. Discs were placed on Molar Hinton plate completely streaked with the bacteria. The plates were kept for 24 h at 37°C. Next day the inhibition zones were measured. Positive control 10 g Nitrofurantoin (Nit) and erythromycin (Ery) where used as a positive and negative control for E.coli, respectively 11. 0.5 McFarland standard suspension was used to adjust the concentration of the suspension that has been made of the isolated strains.

Material and Method

Garlic Juice (GJ) extraction: Fresh garlic bulbs (Iraqi white-yellowish species) were purchased from the south of Iraq farm. 200 g garlic bulbs were blended in 100 ml sterile distilled water (SDW). The juicer was used to produce a fine garlic juice. The supernatant was collected after centrifugation at 3000 rpm for 30 min and directly filtered (0.4 mM pore size, Millipore). Finally, I obtained 50% w/v, and the extract was Freeze at -20°C for the future experiments.

Garlic oil (GO): The Garlic oil was purchased from a farm. Chemical composition has been determined by HPLC to ensure having the primary component that could possess the antibacterial effect, data not shown.

Microbial Strains: Three hundred clinical isolates were cultured (on blood agar and MacConkey) from clinical specimens of patients at the private internal medicine center (south of Iraq). The isolated bacteria were obtained from the urine of cancer patients that suffer systemic infections and also from pregnant women. The isolates were identified as E.coli would be selected for the present study. The total of E.coli (n=75) was chosen for the present study. Bacterial identification using API 20 E (BioMerieux company, marry Eliote, France) was used for identifying E.coli. Bacterial staining standard microbiology methods were used to examine the purity of the isolated strains. Finally, Nutrient agar slants were used to store the isolated bacteria at 8°C until further consideration.
The suspension was cultured on Mueller Hinton agar (Sigma Aldrich). The agar was incubated for 15 min at 37 °C to ensure that the agar will absorb the bacterial suspension. Finally, the disks containing the Amp, CF, FDG, and GO were placed on the agar using sterile forceps. A total of 5 replicates have been used in my study. After incubation for 1 days at 37 °C, the plates were observed, and the diameters of the zones of inhibitions were measured using a ruler, table (1).

**Protein Synthesis Assays:** 150 ml liquid growth cultured aerobically at 37°C with the presence of unlabeled-DL-Leucine, then, the level of bacterial protein synthesis was detected via adding 10 µCi of L-(5.5-3H) leucine (Sigma Aldrich) to the bacteria. The 150 ml divided into three cylinders, 50ml had supplemented with 10ml GJ (1:5) dilution, the other supplemented with 10ml GO (1:5) dilution while the third left as a control. 2ml of the growth has been taken from each of the 3 cylinders divided into two tubes placed on ice, and each of them was received 0.1 ml of 5% perchloric acid. After 2 hours, all the samples were provided with 5ml of 5% cold perchloric acid and incubated on ice for half an hour. The liquid growth then filtered by 0.4 µm filter. Radioactive counter was used to measure the activity.

**Statistical Analysis:** SPSS software version 18.0 (SPSS Inc. Chicago, IL) was used to determine the significant correlation of the data. One-way ANOVA was employed to detect the correlation between the parameters, while the factorial experiment was performed to evaluate the relationship between the Garlic extracts and the bacterial growth with or without the antibiotics that have been used in my study. Finally, two-way ANOVA was used to determine the significant interaction as P≥ 0.05 was identified as a significant correlation.

**Results and Discussion**

**Clinical Strains:** From all the clinical samples that have been tested in the study, I isolated many strains. However, I chose 75 E.coli to do the further experiment.

**Determine the Garlic derivatives of anti E.coli activities using discs diffusion methods:** By measuring the diameter of the antibiotics, NIT was reflected resistant when the ZOI exactly ≤14, intermediate when it 15-16 and sensitive if it 17mm according to the manufacture instructions. Finally, Ery 15 µg was measured resistant when the ZOI is ≤13, intermediate if it 14-16 and sensitive when it 18mm.

The results that shows that NIT is highly toxic to E.coli which is scientifically expected according to 11. While most of the E.coli strains were resistant to Ery and this results come a long previous data reported by 12. GJ has shown an interesting result by successfully inhibiting 40 strain out of 75. The results comes along the data that suggested GJ can be toxic to variety of bacteria including MRSA 13. Unfortunately, GO has shown toxicity to only 10 strains which is unexpected, since GO has reported to have high anti-bacterial activities 14.

My hypothesis stated that the garlic derivatives would post the antibiotic activity; therefore, I used a combination of the antibiotics with either the GJ or GO. As I expected, the GJ significantly enhance the NIT activity and reduce the number of resistant and intermediate bacteria producing more sensitive bacteria. GO had enhanced the NIT activity. However, the difference did not reach essential effect. The combination of Ery and GJ have significantly increased the sensitivity of the bacteria; However, I am not exactly sure whether the reduction was due to the combination or it is solely from the Garlic derivatives (table 1). Therefore, further investigation is needed for exploring Garlic products effects. My project aims to eliminate the infecting organisms or to prevent the onset of E.coli diseases. The results explain that the GO and GJ exhibit selective toxicity as it demonstrates more significant toxicity to the infecting pathogens than to the host. The next step in the future research will focus on testing the antibiotics and the garlic derivatives on cell lines and animals.

**Table 1:** Test the antibiotics and the Garlic derivatives ability to reduce E.coli growth on the agar plates

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Isolated E. coli strain in two replicates</th>
<th>Sensitivity test determined by ZOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIT</td>
<td>75</td>
<td>Resistant N% 5</td>
</tr>
<tr>
<td>GJ</td>
<td>75</td>
<td>Resistant N% 16</td>
</tr>
<tr>
<td>GO</td>
<td>75</td>
<td>Resistant N% 50</td>
</tr>
</tbody>
</table>
Protein Synthesis Assays: A significant negative effect has been detected when measuring the bacterial growth that has supplemented with GJ as compared to the control group, $p=0.02$ (figure 1). The GO protein synthesis showed decreased in the protein synthesis, but the results did not reach a significant level, $p=0.08$ (figure 2). This data suggests that the GJ as it fresh could have a more antimicrobial effect than GO. Another possible explanation is that the GJ could have components that are a potent antimicrobial structure such as allicin in higher concentration than GO. This could be due to the oil extracting mechanism that might be harsh and caused unintentionally distraction and loss in the amount of allicin.

<table>
<thead>
<tr>
<th></th>
<th>ND+GJ</th>
<th>75</th>
<th>1</th>
<th>2</th>
<th>72</th>
</tr>
</thead>
<tbody>
<tr>
<td>ND+GO</td>
<td>75</td>
<td>1</td>
<td>3</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Ery</td>
<td>75</td>
<td>67</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Ery+GJ</td>
<td>75</td>
<td>15</td>
<td>4</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Ery+GO</td>
<td>75</td>
<td>40</td>
<td>13</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: List of abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli</td>
<td>Escherichia coli</td>
</tr>
<tr>
<td>SDW</td>
<td>sterile distilled water</td>
</tr>
<tr>
<td>GJ</td>
<td>Garlic Juice</td>
</tr>
<tr>
<td>GO</td>
<td>Garlic oil</td>
</tr>
<tr>
<td>Nit</td>
<td>Nitrofuration</td>
</tr>
<tr>
<td>Ery</td>
<td>erythromycin</td>
</tr>
<tr>
<td>ZOI</td>
<td>Zone of inhibition</td>
</tr>
</tbody>
</table>

Ethical Clearance: The study is a part of regular university of Sumer observation.

Conflict of Interest: The author has no conflict of interest.

Source of Funding: The author declared that the self fund has been used for this work.

REFERENCES


6. Hughes BG, Lawson LD. Antimicrobial effects of Allium sativum L. (garlic), Allium ampeloprasum


Effect of Using Zirconia and Metallic Bar Attachment Overdentures on the Supporting Structures of Mandibular Edentulous Ridge Area (Randomized Control Trial)

Mohamed Z. Debi1, Amr I. Badr2, Emad M. Agamy3, Gehan F. Mohamed3
1Lecturer, Removable Prosthodontics, Faculty of Dentistry, Pharos University, Alex, Egypt; 2Associate Professor, 3Professor, Prosthodontics, Faculty of Dentistry, Minia University, Minia, Egypt

ABSTRACT

Statement of Problem: Mandibular conventional denture is no longer the most appropriate first choice of treatment, nowadays implant retained overdentures proved to be a predictable and effective method as compared to complete dentures.

Purpose: The aim of the present study was to evaluate the effect of using zirconia and metallic bar attachment overdentures on peri-implant supporting tissue clinically for implant-supported overdentures in the mandible during a year period.

Materials and Method: Twelve completely edentulous patients had two inter-foraminal implants. The patients divided randomly into two equal groups. Six patients received zirconium bar attachment system and the other group received metallic (Cr-co) bar attachment, modified plaque index was obtained for both groups.

Results: No implants were lost from baseline to a year registration. Metallic bar attachments showed significant plaque accumulation than zirconium bar attachments.

Conclusion: There was better modified plaque index for zirconium bar attachment.

Keywords: mandibular overdenture, two implants, zirconium bar, metallic bar

Introduction

After tooth loss, the alveolar ridge resorbs occurs resulting in diminishing of stability and retention of the lower denture, this leads to reduction of comfort, chewing ability, biting force and facial esthetics, this in turn leads general dissatisfaction with the mandibular prosthesis and finally patient seeks replacement of his conventional denture [1,2].

The implant supported bar overdenture is preferred as less expensive alternative, can be removed at night, offers retention and stability similar to those of implant supported fixed-prosthetic.[3,4].

Zirconia has been used to manufacture primary and secondary copings [5, 6,7] due to its good biocompatible and mechanical properties including high wear resistance, esthetics, and low both thermal and electrical conductivity as compared to Cobalt Chromium (CoCr) or Gold copings [8,9].

In the lower jaw two individual zirconium bars was fabricated using the CAD/CAM technology, each zirconium bar was supported by two implants. He found that there was no galvanism due to the metal freedom, good esthetic and good patient psychological acceptance also there was good hygienic ability due to the smooth ceramic surface [10].

Overdenture with two implants would be considered the treatment of choice in completely edentulous patients. Combining the advantages of bar attachment
overdenture and zirconia as a biocompatible strong bar material, made with high precision and fit by the CAD/CAM system, a satisfactory worthwhile prosthesis will be provided.

Materials and Method

Study Design: A Randomized control trial was conducted on 12 completely edentulous healthy patients. For each patient an implant retained mandibular bar overdenture was fabricated using minimally invasive flapless surgical technique.

The study was performed after gaining the approval of the research ethics committee. Patients were informed about the research procedures and follow-up examinations. Informed consent was filled out by each patient in accordance with the regulation of the Ethics Committee in Faculty of Dentistry, Minia University.

Patient’s selection criteria and allocation: The participating subjects in this study were selected according to the following criteria:

Inclusion Criteria: Patients age (45-65 years), sufficient residual alveolar bone quantity and quality, healthy mucosa covering the residual alveolar ridges, Angle’s class I maxilla-mandibular relation, U-shaped lower ridge, Sufficient interarch space greater, Proper oral hygiene, Non smoker patients.

Exclusion Criteria: History of radiotherapy, uncooperative patients, patients with TMD or neuromuscular disorders, abnormal habits, e.g. bruxism, clenching, smoking and alcoholism, diseases that affects bone metabolism e.g. Diabetes, contraindicated patients for any surgical procedures.

All patients who participated in the study received:

- Complete dentures before surgeries.
- Received two implants inserted at the canine region bilaterally. All implants were of the same length and the same diameter (Oxy implant. Via Nazonale Nord, 21A, 23823Colico LC, Italy). The twelve edentulous patients were randomly divided into two equal groups (six patients each).
- Maxillary complete denture and an implant retained mandibular bar overdenture.

Methodology

1. Pre-operative cone-beam computed tomography (CBCT) (SORDEX 3DX. Nahkelantin 160, Tuusula. P.O. Box 148, FI-04301 Tuusula. Finland) to check the quality and quantity of the bone at the planned implant site.

Every patient received complete set of upper and lower complete denture. Bilateral balanced occlusion was

2. utilized for arrangement of artificial posterior teeth and was verified inside the patient’s mouth.

3. Also every patient received surgical guide fabricated using CAD/CAM technology. (Figure 1)

Surgical Stage: To allow repeated placement of the surgical guide intra-orally, an interocclusal index was fabricated after remounting the complete dentures.

1. Infiltration anesthesia was injected to the planned implant sites.

2. Three holes were drilled into the mandible, through the lateral cylinders of the guides, to allow for the insertion of the anchor pins for fixation of the guide throughout the drilling steps.

3. After fixation of the guide, drilling started with the pilot drill and ended with the final drill.

4. After complete osteotomy preparations, surgical guide was removed then implant placement was started first manually till resistance was felt then complete implant placement was done using the wrench system (Oxy implant. Via Nazonale Nord, 21A, 23823Colico LC, Italy). All implants were of the same length and the same diameter.

Figure 1: Surgical guide with fixation lateral pins
5. Two Cover screws were used to cover the implants till delayed loading after 3 to 4 months.

6. Denture Modification:

- The fitting surface of the denture was prepared opposite to the implant sites to accommodate the implant heads
- A tissue conditioning material (Alpha dent products Co., subsidiary of Wallace A. Erickson &Co. 1920N. Clybourn Ave., Chicago, IL 60614, USA) was used to reline the mandibular denture to avoid tissue irritation or implant overloading.

Stage 3: Bar Attachment Fabrication:

- The patients were randomly divided into 2 groups: 
  - group 1 received Co-Cr bar joint attachment while 
  - group 2 received Zirconium bar joint attachment.
- For group 1:
  - Two plastic castable abutments were attached to the implant (fig 2).
  - A plastic castable bar (bar joint design) was used to determine the length of the bar that was going to be used, and then marking the length and the excess was cut.
  - Two retaining slots were made in the mesial aspect of each plastic abutment. These two slots facilitated bar fixation to the abutments and facilitates occlusogingival positioning of the bar pattern. (fig 2)

- Then complete fixation of the bar to the two plastic abutments was done using burn-out self-cured acrylic resin (Duralay, Reliance Dental Manufacturing Co., Chicago, USA.) (fig3)

- Figure 2: Bar placed in the notches

- Figure 3: Bar attached to the plastic abutments with Duralay

For group B:

- The same procedures were made as group A except that:
- After the removal of the assembly of the plastic bar and the two plastic abutments it was sprayed with 3D laser scanning spray to be allowed to be scanned then it was suspended on a tray fo the 3D extra-oral scanner (Zirconzan, scanner SG00, ART, Worldwide, An Der Ahr 7, 39030 Gais/South Tyrol,
Italy) then the 3D image of the scanned bar was checked for accuracy and was milled with the milling machine (Zirconzan, Milling unit M1 Worldwide, An Der Ahr 7, 39030 Gais/South Tyrol, Italy).

- The milled bar was larger than its actual size by approximately 25% so after milling it was placed in a sintering Zirkonofen Furnace (Zirconzan 600/v2. Worldwide, An Der Ahr 7, 39030 Gais/South Tyrol, Italy) at 1600 degree for 12 hours, this allows for the shrinkage of the milled zirconium.

- Then the bar was checked for passive fit and accuracy intraorally. (fig 5)

Figure 5: Zirconium bar intra-orally

Stage 3: (pick up of the plastic clip):

- The clinical pick-up procedure was the same for both groups. The aim was to attach the sleeve to the fitting surface of the existing mandibular overdenture under maximum biting force.

- The nylon clip was fixed on the top of the bar. (fig 6)

Figure 6: Plastic clip on the bar

- A window was opened in the lingual flange of the lower existing denture to accommodate the bar with no interference.

- Any undercuts beneath the bar and copings was blocked out using smooth casting wax (Glattes Gusswachs, smooth casting wax 0.3mm., Ref. no. 40092, BEGO, Germany)

- With using Methyl metha acrylate free self-curing rebase material (Tokuyama Rebase II Fast, Tokuyama Dental Corporation, Japan) was applied in the fitting surface of the mandibular overdenture.

- The denture was seatead in the patient mouth and the patient was asked to close in centric relation and maintain maximum biting for consequently this small window was closed and hence picking up the plastic clip with the fitting surface of the existing denture after setting of the picking up material.

- After setting of the rebase material; the lower overdenture was removed slowly then finished and polished and tried into the patient for any occlusal adjustments.

- The patient was instructed about the oral hygiene procedures and denture care.

Evaluation Phase: Modified plaque index was recorded for every patient at the time of final prosthesis insertion (base line), 3, 6, 9 and 12 months after insertion.

Data was collected, tabulated, and statistically analyzed.

Results

<table>
<thead>
<tr>
<th>Modified Plaque Index</th>
<th>At Insertion</th>
<th>At 3 months</th>
<th>At 6 months</th>
<th>At 9 months</th>
<th>At 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0.0-1.5</td>
<td>0.0-1.00</td>
<td>0.25-1.2</td>
<td>0.50-1.25</td>
<td>0.5-1.25</td>
</tr>
<tr>
<td>Mean</td>
<td>0.79</td>
<td>0.90</td>
<td>0.96</td>
<td>1.01</td>
<td>1.03</td>
</tr>
<tr>
<td>S.D.</td>
<td>0.406</td>
<td>0.062</td>
<td>0.072</td>
<td>0.062</td>
<td>0.07</td>
</tr>
<tr>
<td>Group II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0.0-1.4</td>
<td>0.25-1.80</td>
<td>0.50-1.80</td>
<td>1.2-2.0</td>
<td>1.3-2.0</td>
</tr>
<tr>
<td>Mean</td>
<td>0.74</td>
<td>1.32</td>
<td>1.41</td>
<td>1.79</td>
<td>1.81</td>
</tr>
<tr>
<td>S.D.</td>
<td>0.41</td>
<td>0.285</td>
<td>0.36</td>
<td>0.62</td>
<td>0.17</td>
</tr>
</tbody>
</table>

P comparison between group I and II at the same time

* Significant at level 0.05
At the time of implants loading, Paired t-test showed no statistical significant difference between the two groups.

After 3 months of implants loading, Paired t-test showed statistical significant difference between the two groups with (p) value of 0.011.

After 6 months of implants loading, Paired t-test showed statistical significant difference between the two groups with (p) value of 0.023.

After 9 months of implants loading, Paired t-test showed statistical significant difference between the two groups with (p) value of 0.017.

After 12 months of implants loading, Paired t-test showed statistical significant difference between the two groups with (p) value of 0.008 indicating more plaque accumulation around the implants of group II.

Discussion

Two implants connected with bar were used in this study (zirconium bar in the first group and metallic bar in the second group).

In the present study, modified plaque index was recorded according to (Lobene et al; 1986), [11] there was a slight increase in plaque and gingival indices scores in both groups, but it was higher around metal than zirconia bar attachments. It was concluded that zirconia has lower affinity for plaque adherence, and it is more biocompatible. It is well known that plaque induces gingivitis, and hence zirconia has lower plaque index, lower gingival index was predictable. These findings agreed with other studies that have examined removable dentures retained on teeth or implants using zirconia for the fabrication of copings, concluded that zirconia copings can help stabilize soft tissue against inflammation[12,13] (Busscher et al; 2010, Egawa et al; 2013). Also this was in agreements with other in vivo and in vitro studies for bacterial colonization on zirconia ceramic surfaces [14,15] (Rimondini et al; 2002, Scarano et al; 2004)

Elsayed et al; 2012, found that zirconia copings are much better for oral hygiene maintenance than metal cobalt chromium copings; and explained that by the lower bacterial adherence affinity of zirconia [16] CoCr has greater surface roughness, hydrophobicity, and greater electric conductivity and galvanic action, so the surface charge on CoCr can attract the microorganisms to be adhered to the charged surface. Kanerva et al; 2001, stated that regarding biocompatibility; Metallic ions, such as nickel Ni, Co, and Cr are known to cause adverse tissue reactions and allergy; although in our study, there was no observed allergic reactions or patient’s complain from metallic bar attachments. [17]

Degidi et al; 2006, Örtorp et al; 2009, found that Zirconia was found to create less phlogistic reactions in tissue than other restorative materials. [18,19] The level of bacterial products was higher on titanium than on zirconium oxide. Zirconia also could be regarded as a self-regulatory material that can modify turnover of the extracellular matrix, as they can regulate expressions of some genes (Warashina et al; 2003). [20]

Conclusions

Zirconium bar attachment is associated with superior clinical parameters than metallic bar attachment. It has lower plaque adherence affinity and better gingival index which stabilizes peri-implant soft tissue.

Conflict of Interest: No

Source of Funding: Self funding

Ethical Clearance: Every patient in this study had given their informed consent for inclusion before their participation. Which is conducted in accordance with the declaration of Helsinki, it was approved by the Ethics Committee of Minya university number(133).

REFERENCES


The Construction, Effectiveness and Reliability of Mental Health Inventory among Students in Malaysia

Mohammad Aziz Shah Mohamed Arip¹, Ainisyunita Abdul Rahim², Umah Devi Muthu Panjasaram², Anne Christina Amaladass²

¹Professor, ²Postgraduate Student, Faculty of Human Development, Sultan Idris Education University, 35900 Tanjong Malim, Perak, Malaysia

ABSTRACT

The research aims to construct, acquire the validity and reliability of Mental Health Inventory (MHI). The MHI’s questionnaire aims to measure the level of Mental Health for the subscales of positive and negative thoughts, positive and negative feelings and positive and negative behaviors of individuals aged 13 to 19. The construction of MHI is based on Cognitive Behavioral Therapy theoretical basis pioneered by Aaron Beck (1967). This inventory contains 60 items that measure 3 subscales. Subscale 1: Positive and negative thoughts, subscale 2: Positive and negative, subscale 3: Positive and negative behavior. Each subscale has 20 positive items and 10 negative items. In order to achieve the reliability, MHI was evaluated by eight expertise consisting of 4 academicians and 4 specialists in psychology, counseling and education. 146 students were chosen to be the respondents from schools in the state of Perak to achieve the reliability. The overall validity of MHI is acceptable which at 0.7864 (78.64%). The value of reliability indicates the acceptable value of 0.731. Hence, this research has successfully developed a questionnaire of MHI which has the value of validity and reliability and it also accepted for Malaysian education usage.

Keywords: Mental Health Inventory, Validity, Reliability.

Introduction

In the era of globalization, the social community nowadays have improving the issues of health problems and psychological disorders such as marriage problems, family, work stress, alcohol abuse, drug abuse and so on. This condition can lead to depression, anxiety, stress and various psychological disorders that give an impact to the quality and well-being of a holistic life.

Mental health is often associated with mental illness but it is not accurate. Mental health is closely related to our lives. It encompasses feelings, thoughts and behaviors within oneself, the ability to interact properly with others, groups and surroundings. It is also about how the person handles the responsibilities, challenges and pressures that happen in everyday life. Individuals who are mentally healthy are able to participate in community activities.

Lately, global awareness of mental health is increasing and we recognized that many mental health issues exist at adolescents (4).

Now, drug abuse is one of the public health issues that are significantly addressed and linked to various mental and behavioral problems (8,7,5).

When the issues of mental health problems in adolescents are not addressed, it can lead to severe mental and physical illness and it will affect the environment including increases the risk of suicide.

The inability to deal with mental problems among adolescents between the ages of 10 to 24 is also the largest contributor to adult mental health disorders (2).

Research on Mental Health: This Mental Health Inventory (MHI) is developed by researchers as an instrument to measure mental health among students aged 13 to 19 years. Based on Behavioral Cognition
theory, this theory aims to change the mindset to an orientation of action that assumes the wrong thoughts leads to wrong behavior and negative emotions. It is a form of psychotherapy that aims to change the pattern of human thought (cognitive) to an action, in order to make people feel better and effective. Model based Cognitive Behavioral Therapy (CBT), the assumption that our feelings and actions are influenced by a person’s thoughts, rather than an uncontrollable external factor. CBT focuses on changing the form of thoughts and negative behavior with new forms of thoughts and behavior.

Basic Theoretical of Mhi’s Construction: The researchers of Mental Health Inventory (MHI) construction states that there are three major subscales of individuals interacting and affecting his mental health, which are subscale of thoughts, feeling and behavior. Nevertheless, these three subscales are not considered separate as they overlap each other. The researchers have been using the MHI Concept Model’s Theory as the basis of theoretical approach to building MHI inventories to test the validity and reliability of this inventory. This theory is used as a guide to coincide with the construction of these inventory items.

Individuals whose mentally healthy can express their emotions and be able to successfully adapt to various stressful situations (1).

The Mental Health Inventory has been developed for a special mental health assessment. Analytical reliability and validity analysis were conducted to provide psychometric information (3,6). A normal individual may not have good mental health at all times, but still be able to do daily activities as usual.

The summary, though these three subscales can be measured separately, but basically it relates to each other as in figure. 1.

A. Subscale 1: Positive and negative Thoughts: Thought is a process of thinking, building knowledge and understanding that involves mental activity in the human brain. Therefore, this subscale is intended to measure thinking as a mental activity in life as well as the process of solving the problems faced. There are two types of thinking which are positive and negative thoughts.

B. Subscale 2: Positive and negative Feelings: Feelings are generally regarded as state or the sense that exists in the individual at a time. This means that feelings are characterized as a psychological state of the individual as a result of events or perceptions experienced by the individual. As such, the MHI is also aimed at testing the level of feeling and how the individual can deal with something, event or problem. There are two types of feelings which are positive and negative.

C. Subscale 3: Positive and negative Behavior: Behavior refers to the action or response of a person. The behavior is usually closely related to the environment. Behavior is also conscious or subconscious, real or obscure, willing or not and naturally or learned. Human behavior can be usual or unusual, acceptable, or unacceptable. Humans assess the acceptability of behavior based on social norms to control it through social control. This Mental Health Questionnaire also aims to measure the extent to which the individual responds or behaves in response to a change in the environment or the problem. There are two types of behavior which are positive and negative behavior.

Purpose of the Research

The main purpose of the research is to construct and measure the validity and reliability of Mental Health Inventory which includes thoughts, feeling and behavior among students in Malaysia. Hence, this research also aims to:

a. Constructing a Mental Health Inventory (MHI) based on literature review
b. Determine the validity value of the MHI questionnaire content.
c. Determines the validity value of the subscale of the MHIs questionnaire

Figure 1: Mental Health Inventory Subscale (MHI)
d. Determine the reliability of the questionnaire.

e. Determine the reliability of the subscale of the questionnaire.

**Administration, Scoring and MHI’s Interpretation:**
Mental Health Inventory (MHI) is an inventory that can measure the mental health of students. MHI contains 60 items to measure three major subscales namely positive and negative thoughts, positive and negative feelings and positive and negative behavior. MHI has 60 items in total and 20 items per subscale. These subscales are divided into subscale 1: Thought: Positive Thoughts and Negative Thoughts, while subscale 2: Feelings: Positive Feelings and Negative Feelings and subscale 3: Behavior: Positive Behavior and Negative Behavior.

Mental Health Inventory (MHI) is easily administered as it takes 20 to 30 minutes to answer. MHI is suitable for group or individual administration. The administration of this MHI is suitable to be administered in a conducive environment without any interruption to the respondent. For the scoring method, the questionnaire of this MHI uses the scale of agreement between 1 to 5 which are strongly disagree (1), disagree (2), half agree (3), agree (4) and strongly agree (5).

**Research Method**

The design of this research is a descriptive study. Descriptive study was used to obtain the validity of the content and the reliability value of MHI which was developed through questionnaire. This research involved three phases: Phase 1: Construction of MHI, Phase 2: Obtaining Content Validity, and Phase 3: Analysis of reliability value.

**Phase 1: Construction of MHI:** The construction of MHI is based on a thorough literature review. Based on previous studies, an approach to the MHI Model would be the foundation of MHI construction. This Mental Health Questionnaire aims to measure the extents of a person’s mental health. MHI contains 60 items to measure three major subscales namely Positive and negative thoughts, Positive and negative feelings and positive and negative behavior.

**Phase 2: Obtaining the validity of the face and the validity of the content:** Face validity is to test accuracy in terms of language, grammatical accuracy and understanding to respondents. Face validity is derived from three language experts who comments and construct the proposals for MHI’s improvement. For the purpose of obtaining the validity of the content, the researchers have stated that the validity of the content refers to the extent to which the test tool is able to collect data that includes the objectives of a field or survey instrument surveyed. Therefore, this questionnaire should be tested on the validity of the content. Hence, once the MHI items are built, the content validity questionnaire is given to 16 expert panel comprising eight academicians and eight counseling and education psychologists to check the accuracy of the contents of MHI items. The review made by the expert panel is to obtain the value of the legal validity of MHI.

**Phase 3: Reliability Analysis:** Next, the third phase is aimed to obtain the value of MHI’s reliability. After MHI gained the value of content, MHI tested the reliability of 146 secondary school students in Malaysia. Data were analyzed using computer program *Statistical Package for the Social Sciences* (SPSS) to obtain value *Cronbach’s Alpha* to determine the reliability of the major scale and subscale of MHIs.

**Results and Discussion**

**Findings of Phase 1: Construction of Scale and Subscale of MHI:** The construction of MHI is based on thorough literature review through the source of books, articles and various journals from local and international. This literary research examines the definitions, concepts, factors, implications and mental health levels of various perspectives. Furthermore, the theoretical foundation for the construction of the MHI’s subscales is the Mental Health Model based on Cognitive Behavior Therapy (CBT). Based on the theoretical basis of CBT, MHI is constructed of 60 items that divide mental health levels into three subscales (20 items for each subscale) namely subscale 1: positive and negative thoughts, subscale 2: positive and negative feeling and subscale 3: positive and negative behavior.

**Phase 2 of research findings: The Face and MHI’s Content Validation:** The expert assessment results have been collected and analyzed to obtain the validity value of the content. Table 1 shows the overall validity and subscale values of MHI.
Table 1: The overall validation and subscale’s value of MHI (n = 8)

<table>
<thead>
<tr>
<th>Scale/subscale</th>
<th>No. item</th>
<th>Value</th>
<th>Expert Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall MHI</td>
<td>60.</td>
<td>0.7864 (78.64%)</td>
<td>Accepted</td>
</tr>
<tr>
<td>Positive and negative thoughts</td>
<td>20</td>
<td>0.7888 (78.88%)</td>
<td>Accepted</td>
</tr>
<tr>
<td>Positive and negative feelings</td>
<td>20</td>
<td>0.7966 (79.66%)</td>
<td>Accepted</td>
</tr>
<tr>
<td>Positive and negative behavior</td>
<td>20</td>
<td>0.7750 (77.50%)</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

Based on Table 1, the value of the overall validity of MHI is 0.7864 (78.64%). While the validity of the content for subscale Positive and negative subscale is 0.7888 (78.88%), subscale Feeling healthy and unwell is 0.7966 (79.66%) and Positive and negative behavior is 0.7750 (77.50%). Overall the value of content validity is acceptable.

Findings of Phase 3: Reliability of MHI: Furthermore, reliability analysis to obtain coefficient value Cronbach’s Alpha MHI is as follows:

Table 2: Overall reliability and subscale value of MHI (n = 146)

<table>
<thead>
<tr>
<th>Test Reliability</th>
<th>No. item</th>
<th>Cronbach’s Alpha</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall MHI</td>
<td>60.</td>
<td>731</td>
<td>Accepted</td>
</tr>
<tr>
<td>Positive and negative thoughts</td>
<td>20</td>
<td>321</td>
<td>Not Acceptable</td>
</tr>
<tr>
<td>Positive and negative feelings</td>
<td>20</td>
<td>482</td>
<td>Not Acceptable</td>
</tr>
<tr>
<td>Positive and negative behavior</td>
<td>20</td>
<td>639</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

Interpretation of reliability value Cronbach’s Alpha for the whole item and each subscale is based on the theoretical presented by Sekaran (1992) which states that the reliability value less than 0.60 is considered low and unacceptable. Meanwhile, the value of Cronbach’s Alpha between 0.60 and 0.80 are accepted and values greater than 0.80 are considered to be good. Therefore, overall reliability analysis for MHI shows the coefficient value of Cronbach’s Alpha is 731, which means good and acceptable. This shows that MHI has good reliability and proves that MHI can measure the level of mental health among respondents through the subscale of positive and negative thoughts, positive and negative feeling and positive and negative behavior.

Discussion and Proposal

Through the results obtained, the construction of MHI has a strong theoretical basis based on the in-detail literature on definitions, concepts, factors, implications and mental health levels of theoretical variety. Hence, a theoretical foundation is used as the main framework for the construction of major scale and subscale of MHI which is Mental Health Model based of theoretical Cognitive Behavior Therapy. Additionally, based on the analysis done, MHI has a high value of content validity and good overall reliability. High values of content validity indicate that there is an expert panel agreement that the items in MHI are able to measure the definition of scale and each subscale in the MHI. This is supported in the findings of reliability testing that demonstrates that MHI is able to measure mental health levels divided into three major subscales. While there is a subscale that achieves a low reliability value of 0.321 which is subscale of positive and negative thoughts, the overall value of MHI reliability is good at 0.731 and so is the value of each item. This makes MHI still acceptable and applies in actual studies to measure the mental health level among high school students.

MHI is able to provide a basis for identifying mental health among high school students. In addition, MHI can also assist in implementing mental health improvement programs. It is believed that a good level of mental health among school children is very important in ensuring that they enjoy the healthy nature of adolescents. Based on the findings of the research which gained a high degree of validity and moderate reliability for MHI, researchers suggested that MHI be implemented more comprehensively and widely, especially throughout the secondary schools in Malaysia. It is proposed that further research be carried out to make more statistical analysis of items in the MHI. It is really important in making improvements to scale, subscale and MHI items built to be more standard and quality. The number respondents should be increase to produce better quality of MHI.

Closing

Overall, this research has succeeded in establishing a Mental Health Inventory (MHI) which has a good...
value of good content and moderate reliability. Thus, MHI is able to measure the level of mental health of a person acquired through three major subscales namely subscale of positive and negative thoughts, positive and negative feelings and positive and negative behavior. The analysis of each item contained in MHI also has high reliability value and shows that MHI can measure the mental health level of respondents.

Conflict of Interest: None

Source of Funding: Sultan Idris Educational University, Perak, Malaysia.

Ethical Clearance: Not required

REFERENCE


Effect of Immersion Time in 2,5% Sargassum Polycystum Effervescent Granule Denture Cleansing Agent on the Stability Acrylic Resin Plate Colour

Mohammad Dharma Utama1, Harun Achmad2, Ikhriahni3, Andi Adytha M.I.R.3, Anissa F4
1Department of Prosthodontic, 2Department of Pedodontic, 3Postgraduate Program Student, 4Dentistry Study Program, Faculty of Dentistry, Hasanuddin University, Makassar South Sulawesi, Indonesia

ABSTRACT

Sargassum Polycystum is one type of brown seaweed (Phaeopychae) which contains various pigment content such as beta carotene, chlorophyll a and b, and fucoxanthin. Acrylic resin has the porosity and the ability to absorb liquids that can cause discoloration. The purpose of this study was to investigate the colour stability of heat cured acrylic resin plate after immersed in Sargassum Polycystum effervescent granule. This is a laboratory experimental research with a pretest-post test with control group design. The samples are 27 pieces of 20 mm x 10 mm x 2 mm acrylic bars. Samples were divided into 9 groups containing three negative control groups mineral water, three positive control groups Sodium perborate (polident), and three groups of Sargassum Polycystum 2,5% filtrate groups. The immersions were performed in the room temperature for 5, 10, and 15 minutes for every control group. Discolorations of each group were measured using a colorimeter. Statistical tests for this research were independent t-test. Colour change of the acrylic resin plate after immersed in dental prosthesis cleansing agent made from effervescent granule of Sargassum Polycystum 2,5% occurred because of the increase of microporosity on the surface of the rough plate which made pigment micromolecules more attached so that the color of acrylic plate became brown (p<0.05). Acrylic resin plate color changed after immersed in 2,5% Sargassum Polycystum granules at 10 and 15 minutes.

Keywords: acrylic resin, denture cleanser, discoloration, Sargassum Polycystum, effervescent granule.

Introduction

The loss of teeth can result in anatomical and functional changes. As people get older, the susceptibility of losing teeth is increased. This situation also has an impact on the increasing need for dentures. One of the basic material of denture base is the polymethyl methacrylate heat cured acrylic resin. Acrylic resin is commonly used as a denture base due to some properties, such as non-toxic nature, non-irritating to tissues, good in esthetic, inexpensive, and easy to manipulate.1 This acrylic resin also has disadvantages such as the occurrence of porosity, microcracks, absorbing liquid (water and chemicals), residual monomers and discoloration.2 The color stability is a very important clinical characteristic of dental-restoration materials and denture base plate materials. The color changes in the acrylic resin can be caused by two factors: internal and external factors. The internal factors include changes in the matrix that occur due to some physical and chemical changes, while the Denture cleaning can be done with both mechanical and chemical techniques. Mechanical cleaning is a technique using a toothbrush and ultrasonic. While cleaning with chemical techniques is cleansing by immersing dentures in disinfectant solutions such as alkali peroxide, alkali hypochlorite, chlorhexidine, sodium hypochlorite, enzymes, and herbs. This method of denture cleaning has the advantage of being easy to use and it is easily reaching the undercut on the denture base.3,4,5,6 Along with the development of science, the use and utilization of herbal ingredients in Indonesia has
progressed rapidly. Herbal disinfectants are used by the community as an alternative material for cleaning the dentures, in addition to the basic ingredients for denture cleansers in the form of chemicals that develop on the market. The effectiveness of disinfectant ingredients from herbs has been widely researched and proven to prevent the growth of microorganisms found in the denture bases.7

Sargassum sp. Brown algae is one of the herbal ingredients that are antifungal and antibacterial. It can be used as a denture cleaning material.8 from the study conducted tests on methanol extracts that of the three classes of seaweed class Chlorophyta (green algae), Phaeophyta (brown algae), Rhodophyta (red algae), Phaeophyta (brown algae) had the highest antibacterial activity.

Sargassumpolysyctum brown algae has some active compounds such as flavonoids, alkoloid, saponin, phenol, and trapezoid as antibacterial, antiviral, and antifungal agent.9 The research conducted by Rina et al. (2014) stated that Sargassumpolysyctum extracts have an inhibitory effect on the activity of Candida albicans. Several studies have suggested that the pigment content identified in Sargassumpolysycystum (C.Agardh) brown algae extract, named β-carotene, xanthofil, chlorophyll a and chlorophyll c, have been shown to provide antibacterial effects.10,11 Acrylic bases have physical properties which tend to absorb water. Immersion slowly over a period of time causes absorption to pass through the diffusion mechanism (Philips 1991). The occurrence of absorption of liquid dyes in acrylic resin is one of the factors causing color changes in acrylic resin.12 Pigment contained in Sargassumpolycystum could be expected to cause a color change as one of the external factors to the denture. However, information about the effect of immersion of acrylic resin denture plate in granule solution of Sargassumpolycystum on color changes is still limited to this time. Therefore, it is necessary to conduct research to determine the effect of immersion time of acrylic resin plate in granule solution of Sargassumpolycystum as a natural disinfectant on color stability on the denture plate.

Material and Method

Specimen Preparation: Type of heat-polymerized PMMA resin was used for the fabrication of specimens (n=27 per resin). All denture base specimens were prepared according to the manufacturers’ instructions. persegi wax pattern diwidth dimensions of with 20 mm lenght, 10 mm width, and 2 mm thickness. Wax discs were invested in denture flasks followed by a compression moulding technique for conventional heat-polymerized acrylic resin (Q-type) (QC-20, Dentsply) and afterwards melted with boiling water. The heat-polymerized acrylic resins were then packed into the mould, and the metal flasks were placed in a boiler unit for polymerization. All flasks were allowed to cool down for 2 h. All specimens were immersed in distilled water for 24 h for residual monomer release.

Test Immersion Dental Cleanser: Denture cleanser Polident 3 min™ from obtained from the manufacturers. Sargassumpolycystum brown algae is obtained from the coastal waters of Punaga, Takalar district, South Sulawesi, then Sargassum polycystum is made into an effervescent granule which before the effectiveness test has been carried out at a concentration of 2.5%. The sample was divided into 3 groups (Polident 3 min™, granule effervescent Sargassumpolycystum 2.5%, and Aquades. Each group was further divided into 3 small groups according to the immersion time of 5, 10, and 15 minutes for each sample group with 3 plates each. Before being soaked, the glass is cleaned thoroughly. The granule effervescent Sargassumpolycystum 2.5%, Polident 3 min™ Polident andaquades were poured into a jar, the plate was inserted afterward. The 100 ml mineral water then be added slowly. The immersion last for 5, 10, and 15 minutes at the room temperature.

Color Measurement: The Color stability measurement was done using a colorimeter CS-10 (China). The colorimeter was calibrated before being used for sample measurement. The sample placed on a table with a white base and the colorimeter placed perpendicular to the sample with the sensor in the middle of the samples.

Data Analysis: All data were presented as the average ± standard deviation of replicate measurements (n = 3). Statistical analyses of data were carried out with SPSS 21.0 software package. Significance of results was tested by an analysis of t-test. Significance of differences was defined at p < 0.05.

Results and Discussion

This study used colorimeter CS-10 (Chinese) for color measurement. Colorimeter is a device that is sensitive to light and measures the color intensity of an object or the color of a sample in relation to components of red, blue and green light reflected from an object or sample.
**Tabel 1: Results of color stability at 5 minutes immersion**

<table>
<thead>
<tr>
<th>Immersion Grup</th>
<th>L*₀</th>
<th>L*₁</th>
<th>a*₀</th>
<th>a*₁</th>
<th>b*₀</th>
<th>b*₁</th>
<th>ΔE*ab</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>51.2 ± 1.68</td>
<td>51.2 ± 1.79</td>
<td>18.0 ± 0.65</td>
<td>18.0 ± 0.72</td>
<td>3.62 ± 0.95</td>
<td>3.67 ± 0.96</td>
<td>0.15 ± 0.04</td>
<td>0.275</td>
</tr>
<tr>
<td>Polident 3mnt</td>
<td>50.12 ± 1.21</td>
<td>50.16 ± 1.17</td>
<td>17.90 ± 0.34</td>
<td>18.05 ± 0.31</td>
<td>4.33 ± 0.70</td>
<td>4.39 ± 0.75</td>
<td>0.16 ± 0.05</td>
<td>0.376</td>
</tr>
<tr>
<td>2.5% <em>s.polycystum</em></td>
<td>53.03 ± 1.20</td>
<td>52.93 ± 1.22</td>
<td>16.69 ± 1.32</td>
<td>16.85 ± 1.37</td>
<td>7.07 ± 1.13</td>
<td>7.01 ± 1.28</td>
<td>0.25 ± 0.11</td>
<td>0.077</td>
</tr>
</tbody>
</table>

Table 1 shows the results of statistical tests with paired t test obtained p > 0.05 both in mineral water, sodium perborate (polident), and 2.5% granule effervescent Sargassumpolicystum which means that there is no significant difference in color changes.

**Tabel 2: Results of color stability at 10 minutes immersion**

<table>
<thead>
<tr>
<th>Immersion Grup</th>
<th>L*₀</th>
<th>L*₁</th>
<th>a*₀</th>
<th>a*₁</th>
<th>b*₀</th>
<th>b*₁</th>
<th>ΔE*ab</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>51.47 ± 2.56</td>
<td>51.49 ± 2.59</td>
<td>18.16 ± 2.13</td>
<td>18.14 ± 1.98</td>
<td>3.97 ± 0.25</td>
<td>4.06 ± 0.19</td>
<td>0.18 ± 0.04</td>
<td>0.275</td>
</tr>
<tr>
<td>Polident 3mnt</td>
<td>53.00 ± 1.63</td>
<td>52.95 ± 1.65</td>
<td>19.15 ± 1.23</td>
<td>19.28 ± 1.19</td>
<td>4.89 ± 0.13</td>
<td>4.86 ± 0.02</td>
<td>0.19 ± 0.02</td>
<td>0.127</td>
</tr>
<tr>
<td>2.5% <em>s.polycystum</em></td>
<td>52.16 ± 1.58</td>
<td>48.88 ± 2.66</td>
<td>14.07 ± 0.42</td>
<td>14.29 ± 2.11</td>
<td>6.56 ± 0.24</td>
<td>5.97 ± 0.28</td>
<td>10.08 ± 0.99</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Different letters indicate significant differences (p < 0.05)

Table 2 shows the results of statistical tests with paired t test obtained p value > 0.05 in mineral water, and sodium perborate (polident), but 2.5% in granules effervescent Sargassumpolicystum obtained p < 0.05 which means there is a difference changes in color between the negative control and a positive control against the study group. Table 3 shows the results of statistical tests with paired t test obtained p value > 0.05 in mineral water, and sodium perborate (polident), the 2.5% granules effervescent Sargassumpolicystum obtained p < 0.05 which means there is a difference color change between negative control and positive control of treatment and the description of the results of the color change examination on acrylic plates before and after immersion can be seen in Figure 1.

**Tabel 3: Results of color stability at 15 minutes immersion**

<table>
<thead>
<tr>
<th>Immersion Grup</th>
<th>L*₀</th>
<th>L*₁</th>
<th>a*₀</th>
<th>a*₁</th>
<th>b*₀</th>
<th>b*₁</th>
<th>ΔE*ab</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>50.99 ± 1.73</td>
<td>51.02 ± 1.70</td>
<td>17.54 ± 0.87</td>
<td>17.74 ± 0.85</td>
<td>4.39 ± 1.47</td>
<td>4.32 ± 1.55</td>
<td>0.24 ± 0.04</td>
<td>0.275</td>
</tr>
<tr>
<td>Polident 3mnt</td>
<td>51.30 ± 1.70</td>
<td>51.25 ± 1.70</td>
<td>19.13 ± 0.95</td>
<td>19.10 ± 0.93</td>
<td>5.52 ± 0.30</td>
<td>5.61 ± 0.51</td>
<td>0.26 ± 0.04</td>
<td>0.275</td>
</tr>
<tr>
<td>2.5% <em>s.polycystum</em></td>
<td>52.47 ± 0.90</td>
<td>48.17 ± 1.48</td>
<td>14.29 ± 2.11</td>
<td>5.97 ± 0.28</td>
<td>7.98 ± 0.34</td>
<td>5.25 ± 0.79</td>
<td>10.13 ± 1.04</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Different letters indicate significant differences (p < 0.05)

![Figure 1: The results of the color change examination on acrylic plates before and after immersion](image-url)
This research was done by immersing the acrylic resin plates in the three ingredients. Observation of color changes was done in three different time intervals, for 5, 10, and 15 minutes. This time interval was based on the study conducted by13 which stated that several variations disinfectants showed susceptible antimicrobial effectiveness of 5-8 minutes. also stated that 5 minutes of immersing of acrylic resin plates in hydrogen peroxide effervescent solution was as effective as a 30-minute bath conducted a study with chlorhexidine and solutions effervescent (alkaline peroxide) with intervals of 5 to 15 minutes. Based on the above argument, the researcher took an interval of about 5, 10 and 15 minutes. Discoloration of denture elements is influenced by some internal and external factors. The internal factors include formulation (polymerization), material properties, chemical structure, and monomer composition used. External factors include the duration of exposure and the type of stain agents such as tea, coffee, and denture cleaning agents. The longer duration of immersion of the denture in the disinfectant solution, the greater color changes of the denture elements that occur.15,16 In this study, acrylic resin denture plate which was soaked in 2.5% granule effervescent Sargassumpolicystum solution for 5 minutes showed that there was no color change between the control group and the study group (Table 1), while soaking in granule solution of 2.5% Sargassumpolicystum effervescent for 10 and 15 minutes showed that there was a discoloration in the study group while the control group did not experience discoloration (Tables 2 & 3). The control group did not show any changes in color because the disinfectant material had not diffused into the resin plate due to time immersion and because of the absence of external factors, the dyestuff. Which stated that 10 minutes immersion of sodium perborate with effervescent denture cleaning materials did not cause discoloration but intrinsic discoloration of the acrylic resin plate after soaking during 40 minutes, 120 minutes, 240 minutes, and 360 minutes.

Color changes in the immersion process of 2.5% Sargassumpolicystum effervescent granule solution for 10 and 15 minutes occurred due to the presence of dye entering and absorbed through the pores on the denture resin plate. It is similar to an opinion that one of the factors that can cause color changes in acrylic resin is the presence of natural and artificial dyes.17 The content of natural dyes in Sargassumpolicystum β-carotene, xanthofil, chlorophyll a and chlorophyll c diffuse into acrylic and causing the discoloration. It is caused by an increase in the amount of microporosities on a rough surface which make it more micromolecules attached so that the color of the acrylic plate become brownish. This research is similar with the research conducted17 which stated that there was a change in the color of the acrylic base after the use of denture cleaning paste due to exposure to rosetta dyes, anthocyanins entered the pores due to the microporosity properties of acrylic. The porosity in acrylic resin resulted in being able to absorb water or liquids and food and chemicals slowly over a period of time. According to19 the water absorption process in heat cured acrylic resin occurred due to diffusion of a water molecule by penetrating a mass of polymetal methacrylate and occupying a position between the polymer chains. As a result, the disturbed polymer chain was forced to separate.20

Several other studies stated that the longer the immersion of acrylic resin in drinks or foods containing dyes such as tea, coffee, and chocolate, the greater the color changes that occur in acrylic resin denture elements.16,21 Changes in color when immersing acrylic resin plates can also occur due to the presence of a compound in sargassumsp, named tannin compounds which are known to contain acidic polyphenols which can disrupt the hydrolysis reaction between phenol and polymethyl methacrylate esters on the acrylic resin plates so that many cavities resulted on it. This condition is similar to study which stated that the presence of coffee liquid diffusion which enters the acrylic resin plate as a result of changes in the volume of coffee solution can result in changes in the color of the acrylic resin plate due to an increase in absorption of tannin substances.22,23

Conclusions

There was a change in the color of the acrylic resin plate soaked in the 2.5% Sargassumpolicystum granules effervescent denture cleaning agent for 10 minutes and 15 minutes.

Conflict of Interest: There is no conflict of interest in this study.

Source of Funding: Domestic government

Ethical Clearance: This study obtained a label of ethics escaped by the number: 0088/PL09/KEPKFKG - RSGMUNHAS/2018 and register number UH 17120068 on Oktober 9, 2018.
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Assessment of Vascular Endothelial Growth Factor in the Iraqi Patients with Ovarian Cancer and its Correlation with Angiogenesis

Mohammed Sharem Mahbool1, Abdul Hussein Razzaq Ali1, Jabbar Fadeel Mahdi Alaflooge2
1M.B.CH.B.DM Internal Medicine, 2M.B.Ch.B.Dm of Medicine C.A.B.M.F.I.C.M, Al Hussain Medical City, Iraq

ABSTRACT

Vascular endothelial growth factor (VEGF) is an important in the formation of new blood vessels which is also known as angiogenesis. It is important in restoring oxygen supply to tissues in case of tissue hypoxic a condition which is normally occurs in the cancer/tumor cells. The aim of the study was to evaluate the correlation between the serum VEGF and angiogenesis in the ovarian cancer patients. This study included 20 ovarian cancer patients enrolled to the Al Hussain medical city hospital in January 2018 to January 2019. The ovarian cancer was detected by the ultrasonography. The enrolled patients are between the age group between 40-50years. The patients with the diabetes, cardiovascular disease were excluded from this study. The fasting blood was collected after getting participant oral consent. The samples were subjected to serum isolation and it was used to evaluate the serum VEGF level by commercially available kits. In the present study, the malignant tumor patients showed significant high levels of serum VEGF in the pre-surgery stage than the benign tumor patients in the same stage. VEGF can be one of the factors which promote the malignancy in the tumor.

Keywords: Vascular endothelial growth factor, Angiogenesis, Surgery, Malignant tumor

Introduction

Vascular endothelial growth factor (VEGF) is an important in the formation of new blood vessels. It is important in restoring oxygen supply to tissues in case of tissue hypoxic a condition which is normally occurs in the cancer/tumor cells. It is also involved in creating new blood vessels in embryonic development, injury, and exercise and in the case of collateral circulation. It is mainly produced by tumor cells, macrophages, platelets, keratinocytes and renal mesangial cells.

Angiogenesis is the formation and maintenance of blood vessels. This is important for physiologic functions and but results in the progression of diseases like cancer and inflammation. VEGF, ephrin-Eph receptors, angiopoietin and the Delta-Notch system play important role in angiogenesis. VEGF-C and VEGF-D and their receptor mainly are responsible for embryogenesis and are regulators of lymphangiogenesis. VEGF executes many functions like vascular permeability, pro-angiogenic activity, stimulation of cell migration in macrophage and endothelial cells. Angiogenesis by means of capillary sprouting causes new vessel formation. Thus, once original blood supply is depleted, it causes hypoxic conditions and depletion of nutrients. Thus, tumor fails to proliferate and apoptosis is induced. Angiogenesis is difficult to measure and often indirect measures are adopted. Hypoxia is the main trigger for VEGF upregulation acting through HIF-1. In case of Hyperglycemia and proinflammatory cytokines are stimulating factors that increases VEGF production.

Disorders in vasculature are results in many human diseases. In cancer, angiogenesis is a major contributor to tumor growth and metastasis. Many VEGFs have already entered clinical use which is also characterized in human diseases. The family members VEGF namely VEGF-B, placental growth factor (PlGF), VEGF-C and VEGF-D
which probably binds their cognate receptors VEGFR-1, 2 and 3 present on vascular endothelium. Signal transduction by VEGF-C and VEGF-D may be useful in lymphatic metastasis in cancer, whereas if this pathway is stimulated. It is beneficial in treating lymphedema.

Numbers of evidence are available about the over-expression of VEGF in tumors but it was poorly correlated with the outcome. Although, there was substantiation evidence that VEGF is associated with growth, infiltration and metastasis of malignant ovarian tumors, the clinical significance of VEGF expression in ovarian tumors remains unclear. So, it is very important to know the relation between the angiogenesis and serum VEGF levels in the ovarian cancer patients in the Iraqi women.

**Material and Method**

This study included 20 ovarian cancer patients enrolled in the Al Hussain medical city hospital in January 2018 to January 2019. The ovarian cancer was detected by the ultrasonography. In the present study, ovarian cancer patients were screened for their further complications.

Fasting blood (n=20) was collected by a single puncture form the cancer patients, after obtaining informed consent. The enrolled patients are between the age group between 40-50years. The patients with the diabetes, cardiovascular disease were excluded from this study.

The fasting blood was collected in the plain vacutainers from the vein after getting participant oral consent. The samples were kept at room temperature for 30min. Followed by the centrifugation at 3000rpm for 15min. The serum was separated and kept at 20°C for further study. Serum sample was used to evaluate the serum VEGF level by commercially available kits (Sigma, USA).

**Statistical Analysis:** The data were subjected to statistical analysis using GraphPad Instat (3.0, Trial Version). Results were presented as Mean ± Standard Error (SE). Dunnett Multiple Comparison Test and one way Analysis of Variance (ANOVA) was done to estimate the statistical significance.

**Results**

In the present study, we evaluate the serum VEGF levels in ovarian cancer patients enrolled in the Al Hussain medical city hospital.

The serum VEGF levels were significantly higher in patients with malignant ovarian tumors as compared to the patients with benign ovarian tumors. We also measured significantly higher levels of serum VEGF in patients with ovarian cancer before therapy than after therapy (p<0.001).

<table>
<thead>
<tr>
<th>Study group</th>
<th>No of patient</th>
<th>Serum VEGF level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign</td>
<td>11</td>
<td>49.08 ± 3.39</td>
</tr>
<tr>
<td>pre-surgery</td>
<td>105 ± 49.9***</td>
<td></td>
</tr>
<tr>
<td>post-surgery</td>
<td>61.00 ± 4.34</td>
<td></td>
</tr>
<tr>
<td>Malignant</td>
<td>9</td>
<td>52.85 ± 4.60</td>
</tr>
<tr>
<td>pre-surgery</td>
<td>1018.70 ± 460.0***</td>
<td></td>
</tr>
<tr>
<td>post-surgery</td>
<td>64.77 ± 4.60</td>
<td></td>
</tr>
</tbody>
</table>

Results are represented as mean ± standard error. Pre-surgery VEGF levels showed ***p<0.001 as compared to post-surgery VEGF level (unpaired two-tailed test)

The tumor size for the benign and malignant cancer was found to be 1.97 ± 0.18cm and 3.18 ± 0.28cm, respectively. About 45% of the women showed ovarian cancer metastasis. While, about 55% women showed benign tumor (Table 2).

**Table 2: Number of patients showed metastasis**

<table>
<thead>
<tr>
<th>Ovarian cancer</th>
<th>Benign tumor</th>
<th>Malignant tumor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ovarian cancer</td>
<td>9 (45%)</td>
<td>11 (55%)</td>
</tr>
</tbody>
</table>

The serum VEGF levels were lower (p<0.001) in the patients with residual tumor sizes ≤2 cm then the residual tumor sizes >2 cm after surgical therapy. In addition, we found that the serum VEGF levels were significantly higher in the ovarian cancer patients with metastasis to omentum or lymph nodes than in the ovarian cancer patients without metastasis (p<0.001).

![Figure 1: Serum VEGF levels in the enrolled patients](image-url)
The malignant tumor showed positive correlation with the higher VEGF levels in patient with malignant tumors. After tumor removal, the serum VEGF levels were decreased and it was comparable to the benign tumor. The VEGF levels in the benign levels were found to be lower before surgery than the post surgery. Surprisingly, it levels were lower than the pre-surgery malignant tumor patients levels. So, angiogenesis is positively correlated with serum VEGF level.

**Discussion**

Enzyme-linked immunosorbent assay (ELISA) was used to detect the serum VEGF levels in about 74% studies related to the cancer patients14-20. Remaining studies are reported with five other types of assays, including enzyme immunoassay, quantitative sandwich enzyme immunoassay, human VEGF immunoassay quantigo kit, chemiluminescence immunosorbent assay and immunofluorometric assay. Hence, in the present study, we used ELISA assay for detection of serum VEGF level. Since VEGF were also reported to promote angiogenesis in the diabetic conditions. Hence, in the present study, patients with diabetes are excluded.

Plasmin mediated proteolysis in carboxy terminal domains regulated VEGF bioavailability. VEGF-A during embryogenesis can be detected in the trophoblast surrounding the embryo and in the embryonic myocardium, gut endoderm, embryonic mesenchyme and amniotic ectoderm21-22. But in adult organs it declines but is present in vascular beds and in heart21-22. During certain physiological processes such as development of the endocrine corpus luteum during pregnancy, wound healing and tissue repair, formation of new vessels VEGF is upregulated. VEGF is produced by diverse cell types like aortic vascular smooth muscle cells, keratinocytes, macrophages and many tumor cells etc.

Recently in has been demonstrated that Forkhead box P3 (FOXP3) can suppress VEGF at transcriptional level. It has proved by *in vitro* and *in vivo* that via FOXP3 pathway angiogenesis can also be suppressed in breast cancer23. Studies have demonstrated that solid tumors require lymphatic and blood vessels for growth. VEGF is the growth factor facilitating angiogenesis via VEGF receptor (VEGFR)-2 pathways. Thus, modern treatment methods have targeted this endothelial growth factor as a antiangiogenic and antilymphangiogenic therapies24. Oncogenes have an important role in triggering angiogenesis. For eg. H-Ras oncogene in rat cell line (IEC-18) has led in upregulation of VEGF and also increase in vascularization. Tumor suppressor gene p53 is involved in the downregulation of VEGF. In case of mutations in p53, activity of VEGF increases25.

Various animal studies have demonstrated anti-tumour effects of anti-VEGF compounds and anti-VEGF agents. But, in case of human clinical studies the effects of these agents are diverse26. Previously monoclonal antibodies against VEGF receptor 3 have been studied. Study by Valtola et al.27 studied the expression of VEGFR-3 and its ligand VEGF-C in breast tissue. The results suggest that VEGF-3 in upregulated in breast cancer patients and particularly acts as angiogenic growth factor for blood vessels. It is hypothesized that there may paracrine signaling present between cancer cells and that of endothelium. The study also suggested that there may be change in permeability of blood and lymphatic vessels that results in metastasis. Later monoclonal antibodies against VEGF were also tested for its effect on tumour suppression. Development of drug (anticancer agent) named bevacizumab (Avastin; Genentech), which was a humanized variant of anti-VEGF antibody28. It was approved by the US food and drug administration (FDA) as a first line of therapy to treat colorectal cancer patients. This confirmed that VEGF is the main mediator in angioinvasion. However, later Phase 3 trials of bevacizumab showed that when combined with chemotherapy it increased survival rate of cancer patients. But this drug failed to increase the survival of patients who were previously treated with refractory metastatic breast cancer. Also, adding kinase inhibitor, vatalanib to chemotherapy did not show improvement as compared to those in colorectal cancer patients29. How knowledge on angiogenesis and antiangiogenic therapy has made treatment and survival of cancer patients possible. Many markers needs to identified to understand the exact mode of action of these anti-angiogenic drugs30. In the present study, the malignant tumor patients showed significant high levels of serum VEGF in the pre-surgery stage than the benign tumor patients in the same stage. VEGF can be one of the factor which promote the malignancy in the tumor.

The vascular normalization in which VEGF-A is caused transiently normalized vascular structure and permeability of vascular structure is altered. This also results in low tissue pressure so that anticancer drugs
can diffuse within tumors. In the recent era, anti-VEGF-VEGFR drugs such as neutralizing and multikinase inhibitors have been introduced to treat solid tumors. However to develop more efficient anti-angiogenic therapies more research is needed as currently they do not provide a complete cure. Also, the molecular basis of this is not fully elucidated. On the other hand the possible side effects and its clinical implications must be restudied.

**Conclusion**

In the present study, the malignant tumor patients showed significant high levels of serum VEGF in the pre-surgery stage than the benign tumor patients in the same stage. VEGF can be one of the factors which promote the malignancy in the tumor.

**Ethical Clearance:** The blood was collected from the Hussain medical city hospital after their investigation. Oral consent was taken before enrolled the patients in the study.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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The Usage of Low Level Laser Therapy Bio Stimulation and Bone Grafting in Accelerating the Healing of Chronic Intra-Osseous Defects: Vivo Study

Muhammed Abouel Seoud1, Medhat Kataia2, Mouchira Salah El Din3, Magdy Ali4, Adel Aboel Fattouh5

1Assistant Lecturer, Endodontics, Endodontic Department Faculty of Oral and Dental Medicine British University; 2Professor, Endodontics, Endodontic Department, 3Professor, Radiology, Radiology Department, Faculty of Oral and Dental Medicine, Cairo University; 4Professor, Endodontics, Head of Endodontic Department, Faculty of Dentistry, Minia University; 5Associate Professor, Oral Surgery, Oral and Maxillofacial Department, Faculty of Oral and Dental Medicine, Cairo University

ABSTRACT

The application of LLLT has become popular in the promotion of wound healing and reduction of pain following nonsurgical and surgical procedures. The aim of this article was to evaluate the efficiency of an SBX putty nano-bone graft with and without applying LLLT in accelerating the bone formation of the intra-bony defects through apical curettage without apicoectomy. In this study a total of 30 upper anterior maxillary teeth with periapical lesions. Patients were divided into two equal groups: Group I: apical curettage without apicoectomy and applying SBX putty nano-bone graft inside the intra-bony defects (n=15). Group II: apical curettage without apicoectomy, applying SBX putty nano-bone graft inside the intra-bony defects and then treating the defect with LLLT (n=15). CBCT was taken to determine the approximate size of periapical radioluencies, All patients were followed up using CBCT for 1 year for evaluation of the size of the radiolucent area and bone density. Results showed that the differences in bone density measured on the panoramic as well as the cross-sectional views at all time intervals were non-significant (p<0.05) Conclusion: The Use of both SBX nano-bone graft and LLLT is considered an optimum choice for accelerating the healing of intra-bony defects.

Keywords: LLLT, Apical curettage, putty nano-bone graft.

Introduction

After the failure of non-surgical RCT, periapical surgery is the last available resort to resolve inflammatory processes in the periapical area(18).

Many materials were used to accelerate bone tissues formation after periapical surgery(9,15). However, the use of bone substitution materials to fill the space created after removal of periapical pathological lesions, speed up the healing process(20,26).

However, one of the drawbacks of traditional apical surgery is affecting tooth integrity (Crown-root ratio) and slow intra-bony formation. So, an Alternative to preserve teeth integrity was to perform periapical curettage without apicectomy(21).

Development of Osteoconductive and Osteoinductive materials in a gel or putty form can allow easy delivery of the material into the bony defect with a syringe. One of these biomaterials is the NanoBone, consisting of ncHA embedded in a silica gel matrix (10,22).

Low level laser therapy which is used in biomodulation, stimulation of healing, decreasing inflammation and pain relief.
The beneficial effect of LLLT on bony healing was proven by many authors.\textsuperscript{(4,27)}.

CBCT allowed for 3D measurements which solved many problems done with the old 2D images and also low radiation dose in comparison with CT\textsuperscript{(8)}, So the main objective of this article was to evaluate the efficiency of an SBX putty nano-bone graft with and without applying LLLT in accelerating the bone formation of the intra-bony defect through apical curettage without apicoectomy.

Materials & Method

30 affected maxillary anterior teeth with necrotic long-standing chronic periapical lesions were selected with no history of previous root canal treatment. The patients were divided randomly into two equal groups: Group I (SBX nano-bone graft), Group II (LLLT + SBX Nano-bone graft).

LLLT (Optodan, Labtajm LTD Kiev, Ukraine) and putty SBX nano bone graft (syringe)(ARTOSS (GmbH), Rostock, Germany) were used in this study.

LLLT Parameters:

- Gallium Aluminum Arsenide(diode).
- Power: 13mw. (0.013w).
- Mode: CW & Pulsed.
- Wavelength: 980nm.
- Noncontact mode at 0.5-1 cm distance from the oral mucosa, in circular motion.

A. Inclusion Criteria:

1. Patients were free from any systemic diseases that may impair healing.
2. All patients came regularly for follow-up visits.
3. The size of the periapical radiolucencies related to the upper anterior teeth were ranging from 6-9mm.
4. Teeth had no history of root canal treatment.
5. All patients included in this study had no history of taking analgesics or other drugs in the 12 hours prior to the intervention.
6. All patients that participated in this study were informed in details about the procedure and its advantage and consequences.
7. All patients were asked to sign a written consent form.
8. The Faculty of Research Ethics Committee reviewed the proposal and the data were kept confidential.

B. Exclusion Criteria:

1. Shouldn’t be taking chemotherapy or radiotherapy to the head and neck region in the 12-month period prior to the treatment.
2. Shouldn’t be taking any drugs which may affect the healing process e.g. systemic steroids or anticoagulant therapy.
3. Patients having periodontal diseases have been excluded from this study.

Patients were evaluated by Cone beam computed tomography in order to estimate the approximate size of the periapical lesions(measurements were taken from Sagittal, Coronal, and Cross-Sectional views) it’s approximate and not definite, as the measurements were taken from three different dimensions, views, angulations and the mean of the three measurements were taken, in order to give us the approximate size of the defect.

An access cavity was taken, clamp, rubber dam and frame were applied on the treated teeth then an apex locator(J-MortiaII) were used to determine the working length and shaping of the canals done using ProTaper Gold Rotary Files(Dentsply) mounted on J-Mortia endomotor. In asymptomatic teeth, Root canals were cleaned or irrigated by Sodium hypochlorite while in Symptomatic teeth, initially with saline and then finally with Sodium hypochlorite. Then root canals were dried and filled with Di-antibiotic paste(Metronidazole and Ciprofloxacin) using lentulo-spiral and plugged apically with a plugger according to the size of the MAF then access was closed By(Fuji2) for a period of 15 days, after 15 days patients were examined to ensure that there are no symptoms, if the patients were asymptomatic, then patients were recommended to rinse with 0.2%CHX one day before filling the root canal and periapical surgery, if the patients were symptomatic, then the same protocol was used again(usually this protocol continuous until the symptoms subside depending on patients immunity, the virulence factor of the bacteria and also giving a chance for the intercanal medication to show it’s effect and most cases took from 3 to 5 weeks to subside. The next step, the canals were filled by pro taper gold gutta Percha depending upon the prepared sizes of the canal and
Resin-based root canal sealer then surgical operation were followed the same day.

**Group I:** A Total of 15 maxillary anterior teeth were selected to this group, a modified Rectangular Flap were considered, followed by apical curettage and then the osteo-conductive and osteo-inductive material was applied (putty SBX-Nano bone graft).

**Group II:** A Total of 15 maxillary anterior teeth were selected to this group, a modified Rectangular Flap were considered, followed by apical curettage and then the osteo-conductive and osteo-inductive material (putty SBX-Nano bone graft) were applied with the low-intensity laser treatment for six sessions, two sessions was applied on the same day, the first session was applied immediately after periapical surgery, the second session after 45 minutes, the third session and the fourth session was at day four and the fifth and sixth sessions were taken at day six. The duration for each session was five minutes.

One week after periapical surgery, all patients were instructed for cone beam as a baseline and followed up for three, six and twelve months respectively for evaluation of the bone acceleration, at following settings: 90 KVP, 8 Ma. 6.1 seconds exposure time, 125 um resolution, 5x5 cm field of view (FOV) and image slice thickness 1.5 mm.

Evaluating the bone acceleration, is done by measuring the bone density, it was calculated using the Hounsfield Unit through the measuring the ROI (Region Of Interest) within the software (On-demand software, OnDemand3D Technology Inc, Irvine, California.), where the region of interest was determined in square area selected depending upon the size and dimension of each lesion. Fig. (1), on the other hand, the mean pixel grayscale values of serial ROIs can be analyzed to determine whether changes in radio densities have occurred or not.\(^{(24, 25, 11)}\)

![Figure 1: a,b.Snapshot of the On Demand software showing Panorama(a) and Cross-Sectional(b) In Panoramic view, shows the Baseline of the periapical radiolucent area related to upper right Central Incisors, the ROI was fixed at 24x14 and the Average of the grey value was -11.9. While in the Cross-Sectional View the ROI was fixed at 74x51 and the Average of the grey value was 197.9.](image-url)
Statistical Analysis: Numerical data were explored for normality by checking the data distribution and using Kolmogorov-Smirnov and Shapiro-Wilk tests. All data showed non-normal (non-parametric) distribution.

Data were represented by mean and standard deviation (SD) values. Kruskal-Wallis test was used to compare between the three groups. Friedman’s test was used to study the changes by time within each group. Dunn’s test was used for pair-wise comparisons.

The significance level was set at P ≤ 0.05. Statistical analysis was performed with IBM® SPSS® Statistics Version 20 for Windows.

Results

Mean and standard deviation values for measurements of bone density recorded for the groups were tabulated and statistically analyzed. Results showed that the differences in bone density measured on the panoramic as well as the cross-sectional views at all time intervals were non-significant (p<0.05).

Discussion

According to some researches (12,16,3) there was a high osteoconductivity of n HA. As well as the presence of silicate ions appears to promote the process of bone formation and remodeling at the bone nHA interface, as well as induction of angiogenesis, as the adequate blood supply is a prerequisite for cellular activity.

LLLT is a treatment that utilizes specific wavelengths of light to interact with tissue and is thought to help accelerate the healing. Studies reported (19,30,17) that laser irradiation of bone stimulates the proliferation of fibroblastic, osteoblastic and mesenchymal cells in their early phase. Immediately after injury, the bone repair process starts in the vascularized regions in tissue anoxia and is accelerated by the stimulatory effect of laser on bone matrix.

Cone beam has been used in many clinical investigations. In the periapical region, the bone density can be measured in (HUs) by using CBCT, studies reported (11,6,29) that the results of these studies support the use of Cone beam to measure bone density before and after periapical surgery.

In this study results showed that the differences in bone density measured on the panoramic as well as the cross-sectional views at all time intervals were non-significant (p<0.05). On the other hand, The highest mean value was found in (Group I), while the least mean value was found in (Group II). Although that, after 12 months, Some cases in both groups had shown full bone formation of the defect as it became indistinguishable from the surrounding bone, this may be attributed to the action of nanoparticles of the nano-bone, effect of LLLT or the combination of both the LLLT and Putty SBX nano-bone graft, this comes in accordance with the result (13,14,25) that reported that Nanobone accelerate bone healing and improved the quality and quantity of regenerated bone. Also, the effect of LLLT comes in accordance with studies (7,4) that reported that the laser improved the acceleration the bone regeneration process. While in effect of time, In both views within each group, there was a statistically significant increase in mean Greyscale values from baseline to 3 months, 3 months to 6 months as well as from 6 months to 12 months, which showed an increase of bone formation. This comes in agreement with results of Vinod et al (32) and Tobon (31).

Conclusion

The use of SBX putty nano-bone graft and LLLT technique in endodontic periapical surgery is considered an optimum choice, as they both accelerate bony healing.

Conflict of Interest: No

Source of Funding: Self funding

Ethical Clearance: Every patient in this study had given their informed consent for inclusion before their participation. Which is conducted in accordance with the declaration of Helsinki, it was approved by the Ethics Committee of Minya university number(133).

REFERENCES


The Effect of Polyamide Micro-Particles Addition on Some Mechanical Properties of Heat Cured Poly Methyl Methacrylate Denture Base Material

Mithaq R. Mohammed
Ministry of Higher Education and Scientific Research, Al-Iraqia University, College of Dentistry, Baghdad Province, Iraq

ABSTRACT

Aim: The aim of this study is to evaluate the effect of addition of different weight concentration of polyamide (nylon 6) PA-6 micro powder on impact strength, transverse strength, surface hardness, surface roughness of heat cured acrylic resin denture base material (PMMA).

Materials and Method: Polyamide - nylon 6 (PA-6) micro powder with average particle size of 15-20 micron (Good fellow Cambridge limited, England) will be added to heat –curing denture base material in a concentration of (0%, 1%, 3%,5%). (160) specimen will be fabricated, (40) for the control group and (120) specimens for different polyamide powder percentage groups.

The mechanical test examined in the Pilot study are (transverse strength, impact strength, surface roughness and surface hardness).

Results: By using Polyamide - nylon 6 (PA-6) micro powder with average particle size of 15-20 micron added to heat –curing denture base material in a concentration of (0%, 1%, 3%,5%).

The mean value of tear and tensile strength of 1% PA-6 reinforcement group increased significantly when compared to control group on the contrast to the same values of 3% and 5% PA-6 reinforcement groups which were decreased significantly.

Conclusion: polyamide denture material produce high resistance to breakage, its modulus is not yet high in a sufficient manner to become equal to the standard of materials of PMMA Laboratory effects, Polyamide gets certain Exciting benefits, but it needs to have their properties improved better than the present PMMA materials properties.

Clinical Significance: The patient wearing the denture suffering from fracture of denture due to several causes. So, adding the (Nylon6) with PMMA to produce denture base with high resistance to breakage.

Keywords: Denture base materials, mechanical properties, polyamide, Poly methyl methacrylate.

Introduction

The most popular material used for denture fabrication is Poly methyl methacrylate (PMMA) since its production in1937, this material has many advantages as an excellent aesthetic characteristics, solubility and low water sorption, convenient strength, low toxicity, easy to reparaie and a simplified technique for the processing of molding. Nevertheless it shows certain disadvantages like polymarizing shrinkage, weak flexural and influence strength with resistant of low fatigue that causes failure of denture.

The Polyamides that are called ‘nylon’ are the thermoplastic polymers that are generated by combination on certain condense between a di amine and
a dibasic acid. Many studies in the field of polyamide are prepared to be as a denture base polymer between 1950 & 1952. These Studies demonstrated the fact that nylon is not fabricated to be used in a good way for denture construction due to the tendency of discoloration and high level of water absorption. therefore, nylon denture is not fit for common use. It is used in exceptional cases such as denture fracture repeatedly and is given to patients who has tissue allergies against fractures of denture or acrylic denture base.

Therefore, This study aims at evaluating the influence of adding various weight concentration of polyamide (nylon 6) PA-6 micro powder on the strength impact, strength of transverse, hardness of surface, roughness of the surface of heat cured acrylic resin denture base material (PMMA).

**Materials and Method**

Polyamide - nylon 6 (PA- 6) micro powder with average particle size of 15-20 micron (Good fellow Cambridge limited, England) will be added to heat –curing denture base material (supplied by Ivoclar Vivadent) in a concentration of (0%, 1%, 3%,5%). (160) specimen will be fabricated, (40) for the control group and (120) specimens for different polyamide powder percentage groups.

The mechanical test examined in the Pilot study are, (impact strength, transverse strength, surface hardness, and surface roughness).

**A. Test of Impact Strength:** (40) Bar shaped specimen with dimensions of (80 mm x10 mm x 4 mm) length, width and thickness respectively will be fabricated according to ISO.179-1, 2000 specification number

The impact strength is to be calculated according to the equation below after testing as in fig. (1).

\[
\text{Impact Strength} = \frac{E}{BD} \times 10^3
\]

Where:
- E is the impact absorbed energy measured in joules.
- B is the specimen width measured in millimeter.
- D is the specimen thickness measured in millimeter.

**B. Test of Transverse flexural strength:** A specimen in (40)Bar shaped with dimensions of length of (65mm x 10 mm x 2.5 ± 0.1 mm) width, thickness will be respectively fabricated according to ADA specification number 12, 1999.

The transverse strength will be calculated according to the formula below after testing:

\[
\text{Transverse Strength} = \frac{3PI}{2bd^2}
\]

Where :
- P is the load peak (N).
- I is the span length that is measured in millimeter.
- b is the sample width that is measured in millimeter.
- d is the sample thickness that is measured in millimeter.

**C. Test of surface hardness (shore D):** (40)Bar shaped specimen with dimensions of (65mm x 10 mm x 2.5 ± 0.1 mm) length, width, thickness will be respectively fabricated according to ADA specification number 12, 1999.

Test will be conducted using digital udometer hardness tester (Shore D).5 readings for each specimen will be then the mean value is calculated.

**D. Surface Roughness Test:** (40)Bar shaped specimen with dimensions of (65mm x 10 mm x 2.5 ± 0.1 mm) length, width, thickness will be respectively fabricated according to ADA specification number 12, 1999. As shown in figure (2).
Test will be conducted by the use of using a portable surface roughness tester (profilometer). 3 measurements at 3 positions for each specimen will be measured then the mean value is calculated.

The Data from quantitative studies of the experimental groups will be collected and compared to the control group using a statistical software SPSS. one-way analysis of different (ANOVA) will be used to compare the mean values of the group samples and a POST-HOC and LSD test is to be applied to compare the distinguished differences among the specified groups. A P values < 0.05 will be statistically considered significant while those > 0.05 will statistically considered of no significance and the values < 0.01 will considered as distinguished.

**Results**

(160) specimen will be fabricated, (40) for the control group and (120) specimens for different polyamide powder percentage groups. using Polyamide - nylon 6 (PA- 6) micro powder with average particle size of 15-20 micron added to heat –curing denture base material in a concentration of (0%, 1%, 3%,5%).

The mean value of tear and tensile strength of 1% PA-6 reinforcement group increased significantly when compared to control group on the contrast to the same values of 3% and 5% PA-6 reinforcement groups which were decreased significantly.

**Discussion**

Polyamide 6 (PA6) which is called nylon 6, is a crystalline designing thermoplastic that has the properties of being intense, solid, and with high melting temperature. Its utilization in certain applications is restricted due to high cost, low dimensional stability because of water absorption and low viscosity of melting. Nowadays, due to the advancement of the dental industry, there is demanding require for more created materials with high constrain for the reason of creation of more complex materials.

The Poly methyl methacrylate (PMMA) resin, as it is broadly utilized in denture base is because it has many advantageous properties such as the fact that its application and utilization are simple and its reparation is doable; In addition, its application is easy, and it is satisfactory for the patients; when it is used in the oral cavity. At the same time its mechanical property, is not perfect since it has weak quality of affect and its resistance to fatigue is limited. These highlights cause denture failure in the event of chewing or on the occasion that the denture is dropped (1-4). There are more researches about increasing the PMMA weariness and quality resistance.

These researches are about how to

1. reinforce the materials of denture when adding filling materials.
2. modulate the PMMA resin materials chemistry.
3. manufacturing substitution denture base materials.

Researches have brought reaches the fact that the leading alternative is the Fiber-reinforced resin. Materials such as rayon, aramid, carbon, extending from, E-glass in addition to the nylon filaments are considered the most excellent strengtheners. There are numerous endeavors that concentrate on the glass fiber influence on the PMMA resin mechanical characteristic. The support of the resin is done in research facility tests with considerable results concerning the quality. Glass fibers are considered exceptionally valuable. Still, there is continuous look for certain resin materials with more satisfactory mechanical quality than PMMA to be the elective ones. PMMA elective polymer laboratory tests. Knowing that the base fabric of wanted denture is not yet created, however.

The increment in surface harshness and hardness when included to PMMA with rate 3% and 5% since the Polyamide 6 (PA6), that is moreover known as nylon 6, is a crystalline designing thermoplastic that is solid, intense, and abrasion resistant and its melting temperature is high because of water absorption and low viscosity of melting, its usage is limited in certain applications. Blend of polyamide 6 by anionic ring-opening polymerization offers ideal mechanical properties (stiffness/toughness adjustment).

The clarification of diminish in the affect and transverse quality with increment of the rate of polyamide-nylon 6 to 3% and 5% for the handle capacity total denture prosthesis failure made from poly methyl methacrylate, (PMMA) The break ordinarily happens from chewing or toothache.
stretch around the small scale breaks shaped in the fabric since of the applications of fracture of dentures by affect strengths, in addition to, when applying a sudden drive to the denture happen fracture result due to the coincidental dropping of dentures on surfaces, such sorts of breaks are more likely due.

PMMA is among the hardest t thermoplastics and enjoys having a high mechanical power, high Young’s modulus and restricted prolongation at the point of break. On rapture, it does not smash. It is moreover exceedingly scratch resistant. It shows low moisture and capacity of water retaining, which all gather to give dimensional solidness to the products made of them. These two characteristics increase as temperature gets higher. The absconds includes frailness and the relative high shrinkage in the amid the handling of polymerization.

### Conclusion

While polyamide denture material produce high resistance to breakage, its modulus is not yet high in a sufficient manner to become equal to the standard of materials of PMMA Laboratory effects, Polyamide gets certain Exciting benefits, but it needs to have their properties improved better than the present PMMA materials properties.

In the table (1) surface roughness shown the mean of group I in which the percentage of polyamide- nylon 6 micro powder 1% nearly similar to the mean of control group while in the group π and group υ the mean of them shown increase in the surface roughness with increase the percentage of polyamide-nylon 6 micro particles as shown in graph(1).

### Table 1: Descriptive Statistical Analysis for all tests and groups have been made to shown the mean, slandered deviation, minimum and maximum

<table>
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<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>95% Confidence Interval for Mean</th>
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Graph 1: Surface roughness, surface hardness, transverse strength, impact strength values

Table 2: ANOVA Table for all Tests

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<td>(N/mm²)</td>
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</tr>
<tr>
<td>(Kj/m²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>9.407</td>
<td>3</td>
<td>3.136</td>
<td>119.357</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>.946</td>
<td>36</td>
<td>.026</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.353</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: LSD Multiple comparisons Among all groups for each test have been shown mean difference and significance

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Roughness</td>
<td>Group I</td>
<td>-.22910*</td>
<td>.06350</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Group II</td>
<td>-.64760*</td>
<td>.06350</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Group III</td>
<td>-.89860*</td>
<td>.06350</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Group I</td>
<td>-.41850*</td>
<td>.06350</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Group II</td>
<td>-.66950*</td>
<td>.06350</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Group III</td>
<td>-.25100*</td>
<td>.06350</td>
<td>.000</td>
</tr>
<tr>
<td>Surface Hardness</td>
<td>Group I</td>
<td>-.08000</td>
<td>.52285</td>
<td>.879</td>
</tr>
<tr>
<td></td>
<td>Group II</td>
<td>-.75000</td>
<td>.52285</td>
<td>.160</td>
</tr>
<tr>
<td></td>
<td>Group III</td>
<td>-.152000*</td>
<td>.52285</td>
<td>.006</td>
</tr>
<tr>
<td></td>
<td>Group I</td>
<td>-.67000</td>
<td>.52285</td>
<td>.208</td>
</tr>
<tr>
<td></td>
<td>Group II</td>
<td>-.144000*</td>
<td>.52285</td>
<td>.009</td>
</tr>
<tr>
<td></td>
<td>Group III</td>
<td>-.77000</td>
<td>.52285</td>
<td>.150</td>
</tr>
</tbody>
</table>
In the same table surface hardness shown also the group I in which the percentage of polyamide-nylon 6 micro powder 1% nearly similar to the mean of control group while in the group II and group III the mean of them shown increase in the surface hardness with increase the percentage of polyamide-nylon 6 micro particles as shown in graph(1), that’s mean The increment in surface harshness and hardness when included to PMMA with rate 3% and 5% since the Polyamide 6 (PA6), is a crystalline designing thermoplastic that is solid, intense, and abrasion resistant and its melting temperature is high.

And the transverse strength(N/mm2) shown the group I has mean(75,3600) higher than mean of control, group II and group III in them the transverse strength appear decrease with increase the percentage of polyamide-nylon 6 micro particles, The clarification of diminish in the affect and transverse quality with increment of the rate of polyamide-nylon 6 to 3% and 5% for the handle capacity total denture prosthesis failure made from poly methyl methacrylate, (PMMA) The break ordinarily happens from chewing or toothache. And the impact strength(KJ/m2) shown also the group I has mean(7,9840) higher than mean of control, group II and group III in them the transverse strength appear decrease with increase the percentage of polyamide-nylon 6 micro particles as shown in graph (1), that’s mean PMMA is among the hardest thermoplastics and enjoys having a high mechanical power, high Young’s modulus and restricted prolongation at the point of break. On rapture, it does not smash. It is moreover exceedingly scratch resistant.

**Ethical Clearance:** I testify on myself that my article submitted to Indian journal of public health research and development: (The Effect of Polyamide Micro-Particles Addition on Some Mechanical Properties of Heat Cured Poly Methyl Methacrylate Denture Base Material).

**Source of Support:** Nil

**Conflict of Interest:** None

**REFERENCES**


Effects of the Use of Self-Directed Video on Knowledge of Malang City’s Volunteer Communities in Conducting CPR Actions

Apriyani1, Retty Ratnawati2, Ika Setyo Rini2

1Master Program of Nursing, Faculty of Medicine, 2Lecturer in Medical Faculty, University of Brawijaya

ABSTRACT

Cardiac arrest is a cardiovascular emergency which is the highest cause of death in the world, both in developing and developed countries. The occurrence of Out-of-Hospital Cardiac Arrest (OHCA) is commonly encountered by lay people. Therefore, everyone actually has an important role in increasing the survival rate of cardiac arrest patients, especially in the implementation of CPR. One way to improve the ability of lay people to do CPR is to use the learning method of self-directed video. However, several studies have suggested that the self-directed video media is less effective than ordinary knowledge improvement methods. In this regard, the researcher conducted this study with the aim to identify the effects of self-directed video on volunteer knowledge in conducting CPR. This study used a quasi-experiment design with a pretest-posttest approach. Knowledge was measured at pre-intervention, immediate post-intervention, 1-week post-intervention, and 2-week post-intervention using questionnaires. Data were analyzed using Friedman and Wilcoxon tests. The results showed a change in knowledge between pre-intervention and immediate post-intervention, between pre-intervention and 1-week post-intervention, and between pre-intervention and 2-week post-intervention (p=0.001). Thus, self-directed videos are considered able to improve volunteer knowledge in conducting CPR.

Keywords: Cardiopulmonary Resuscitation knowledge, Self-Directed Video, Volunteer

Introduction

Cardiac Arrest is the most common emergency condition of heart disease1. Cardiac arrest is a very crucial global health issue, where quick initial assessment, as well as immediate and appropriate responses, can prevent death2. The incidence of cardiac arrest occurs not only in old ages but also young ages1. Cardiac arrest can occur anywhere, either those that can be anticipated (during intensive care) or cannot be anticipated (outside the hospital)3. The most often-occurred cardiac arrest is Out-of-Hospital Cardiac Arrest (OHCA).

OHCA is an incidence of cardiac arrest occurring outside hospitals4. Out-of-Hospital Cardiac Arrest (OHCA) is one of the focus of world health issues due to its fairly high rate of incidence5. Patients with OHCA generally have a lethal ECG picture characterized by Ventricular Tachycardia (VT), Pulseless Electrical Activity (PEA), Ventricular Fibrillation (VF), and Asystole6.

World Health Organization (WHO) states that the incidence of cardiac arrest is the highest cause of death in the world, reaching 60% of the world’s total population7. WHO also suggests that the world’s first-rank cause of the world’s highest rate of death is ischemic heart disease8. Ischemic heart disease is one of the causes of cardiac arrest9. In Indonesia, the number of cardiac arrest cases reaches 10/10,000 Indonesians with age of < 35 years10.

The high rate of OHCA incidence is not in harmony with the treatment given at the time of its occurrence. The treatment in OHCA patients solely covered 40.1% of the victims where the survival rate of patients only reached 9.5%11. That is why the treatment or aid from lay people play an important role in increasing the survival rate of cardiac arrest victims12.
The cardiac arrest victims’ ability to survive will decrease by 7-10% every minute while waiting for the help and arrival of medical members mostly takes longer time. Cardiac arrest victims must be given quick treatment by the lay people by taking first aid measures. CPR actions immediately given will increase 2 to 3 times the survival possibility or chance of cardiac arrest victims. Conversely, delays in carrying out CPR actions will reduce the survival chance. Therefore, CPR actions are the main focus in improving the CPR ability of lay people. One of the efforts to improve the CPR ability of rescuers is through training because knowledge can significantly increase the survival rate in cardiac arrest cases through the provision of qualified CPR.

In reality, CPR training is not always followed by individual good memory ability. Some other studies also reveal that the ability to do CPR actions will continue to decline over time. This is because patients with cardiac arrest cases who highly need CPR actions are exposure-lacking. One of the training methods in improving the respondents’ knowledge related CPR is through self-directed videos. By using the video learning method, participants are more independent with free time (unattached) and consistent with the directions conveyed in the video. The video learning method can be a more innovative way to increase knowledge independently than the simulation learning method. However, several studies have indicated differences between the demonstration learning method and video playback learning method. According to Wibawa (2007), the group using the demonstration method reached a knowledge level of 58.97%, higher than the knowledge level of the group using the learning method of video playback which reached 24.19%. In other words, the demonstration method is more effective in improving knowledge than the video playing method.

Considering the contradictory results of several previous studies and the absence of research stating that the learning method of self-directed videos is able to increase the retention in knowledge and skills, studies using self-directed videos are necessarily conducted to see the knowledge level of volunteers in performing CPR.

Method and Material

This research was experimental research using a queasy experiment design with a pretest-posttest approach. The research respondents were 15 volunteers. The self-directed video used by the researcher was adjusted to the 2015 AHA guidelines and given to the respondents was about 7 minutes long. The criteria inclusion were who had never participated in CPR training, had cellphones, and were willing to be respondents of this research. The knowledge instrument was made based on AHA 2015 and tested for its validity and reliability with an alpha Cronbach value of 0.889. Measurements were made at pre-intervention, immediate post-intervention, 1-week post-intervention, and 2-week post-intervention. Bivariate analysis was done using Friedman and Wilcoxon tests. This research was conducted after obtaining ethical clearance from the ethics committee of the Medical Faculty of Brawijaya University, Malang.

Discussion

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>Min-Max</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>15</td>
<td>36.2</td>
<td>32</td>
<td>18-65</td>
<td>14.68</td>
</tr>
</tbody>
</table>

Knowledge

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>Min-Max</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>15</td>
<td>2.13</td>
<td>2</td>
<td>1-4</td>
<td>0.83</td>
</tr>
<tr>
<td>Immediate post</td>
<td>15</td>
<td>5.73</td>
<td>6</td>
<td>5-7</td>
<td>0.594</td>
</tr>
<tr>
<td>1-week post</td>
<td>15</td>
<td>5.73</td>
<td>6</td>
<td>5-7</td>
<td>0.704</td>
</tr>
<tr>
<td>2-week post</td>
<td>15</td>
<td>5.80</td>
<td>6</td>
<td>5-7</td>
<td>0.676</td>
</tr>
</tbody>
</table>

Video Playback Frequency

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>Min-Max</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-week post</td>
<td>15</td>
<td>2.07</td>
<td>2</td>
<td>1-3</td>
<td>0.458</td>
</tr>
<tr>
<td>2-week post</td>
<td>15</td>
<td>2.53</td>
<td>2</td>
<td>2-4</td>
<td>0.834</td>
</tr>
</tbody>
</table>
Based on Table 1, the youngest respondent was 18 years old and the oldest respondent was 65 years old with an average age of 36.2. Before being given the intervention (pre-intervention), the highest knowledge score was 4 and the lowest was 1 with an average score of 2.13. Meanwhile, right after being given the intervention (immediate post-intervention), the highest knowledge score was 7 and the lowest was 5 with an average score of 5.73. At 1-week post-intervention, the highest knowledge score was 7 and the lowest was 5 with an average score of 5.73. Meanwhile, at 2-week post-intervention, the highest knowledge score was 7 and the lowest was 5 with an average score of 5.8. At 1-week post-intervention, the highest frequency of video playback was 3 times and the lowest was only once with an average of 2.07 times of playback. Meanwhile, at 2-week post-intervention, the highest frequency of video playback was 4 times and the lowest was twice with an average of 2.53 times of playback.

Table 2: Respondent Characteristics by Gender and Experience of Encountering Cardiac Arrest Cases

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>Category</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gender</td>
<td>Male</td>
<td>11</td>
<td>73.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>4</td>
<td>26.7</td>
</tr>
<tr>
<td>2.</td>
<td>Experience of Encountering Cardiac Arrest Cases</td>
<td>Ever</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Never</td>
<td>13</td>
<td>86.7</td>
</tr>
</tbody>
</table>

Based on Table 2, the most dominant gender of the respondents was male, reaching 11 people. As for the experience of encountering cardiac arrest cases, 14 respondents claimed that they had never come across cardiac arrest cases.

Table 3: Friedman Test Results for the Effect of Self-directed Video on the Knowledge of Malang City’s Volunteer Communities at Pre-intervention, Immediate Post-intervention, 1-Week Post-intervention, and 2-Week Post-intervention

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Median (Min-Max)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge at Pre-intervention</td>
<td>2 (1-4)</td>
<td></td>
</tr>
<tr>
<td>Knowledge at Immediate Post-intervention</td>
<td>6 (5-7)</td>
<td>0.000</td>
</tr>
<tr>
<td>Knowledge at 1-Week Post-intervention</td>
<td>6 (5-7)</td>
<td></td>
</tr>
<tr>
<td>Knowledge at 2-Week Post-intervention</td>
<td>6 (5-7)</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 showed a p-value of 0.000 (p<0.05), indicating that there was a change in the volunteers’ CPR knowledge at all interventions (the provision of self-directed video).

Table 3: Wilcoxon Test Results for the Effect of Self-directed Video on the Knowledge of Malang City’s Volunteer Communities at Pre-intervention, Immediate Post-intervention, 1-Week Post-intervention, and 2-Week Post-intervention

<table>
<thead>
<tr>
<th>Comparison of Knowledge</th>
<th>Delta</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 vs P2</td>
<td>3.6</td>
<td>0.001</td>
</tr>
<tr>
<td>P1 vs P3</td>
<td>3.6</td>
<td>0.001</td>
</tr>
<tr>
<td>P1 vs P4</td>
<td>3.67</td>
<td>0.001</td>
</tr>
<tr>
<td>P2 vs P3</td>
<td>0</td>
<td>1.000</td>
</tr>
<tr>
<td>P2 vs P4</td>
<td>0.07</td>
<td>0.564</td>
</tr>
<tr>
<td>P3 vs P4</td>
<td>0.07</td>
<td>0.317</td>
</tr>
</tbody>
</table>

Description: P1 = Pre, P2 = Immediate Post, P3 = 1-Week Post-intervention, P4 = 2-Week Post-intervention

As seen in Table 4, all the comparisons of knowledge obtained p-values of 0.001, 0.001, 0.001, 1.000, 0.564, and 0.317 respectively. Therefore, it can be said that there was a change in knowledge between pre-intervention and immediate post-intervention (3.6), between pre-intervention and 1-week post-intervention (3.6), and between pre-intervention and 2-week post-intervention (3.67). In contrast, a change in knowledge did not significantly occur between post-intervention and 1-week post-intervention, between post-intervention and 2-week post-intervention, and between 1-week and 2-weeks post-interventions based on the p-values and mean delta.

Discussion

The results of this study showed that the CPR knowledge between pre-intervention and post interventions (including immediate post-intervention, 1-week post-intervention, and 2-week post-intervention) increased with a p-value of 0.001.

These results are consistent with Hernández-Padilla, Suthers, Granero-Molina, & Fernández-Sola (2015) finding that there is a more significant increase in knowledge of a student-directed group using technological learning media compared to instructor-focused learning. Respondents can find out more knowledge about basic life support by using technology¹⁹.
The increase in the value of respondents’ knowledge regarding basic life support based on the self-directed video can be explained by an approach of technology use that affects the human brain. Self-directed video is one of the innovative media using technology that supports learning. The self-directed video contains active images and sounds that provide audio imaginary effects on the human brain. The audio imaginary effects lead to an increased ability of long-term memory in the brain and make it easier for someone to remember the things learned from the video. Long-term memory enhancement is influenced by the prefrontal cortex activation in the human brain due to the audio imaginary effects of the video. The increased activation will trigger cognitive stimulation and strengthen the memory of someone who has studied the material.

Learning by using technology provides a learning process centered on individuals (learner-centered learning) and improves cognitive abilities as desired accordingly to the content studied. This learning process is carried out independently through learning supporting devices that can play videos.

However, in this study, the assessments of knowledge at post-intervention (immediate post-intervention, 1-week post-intervention, and 2-week post-intervention) did not indicate changes with a p-value of > 0.05 (P2 vs P3 = 1.000, P2 vs P4 = 0.564, P3 vs P4 = 0.317).

The results of this study are in line with Hernández-Padilla, Suthers, Granero-Molina, & Fernández-Sola (2015) finding a change or retention in knowledge between post-intervention and 3-month post intervention.

Knowledge retention after the provision of the self-directed video relates to the respondents’ memory ability. The respondents’ memory of learning is influenced by the selection of learning strategies or models. Based on the results of the study conducted Lubis, Ridayani, Manurung, and Binari (2010), there is a significant difference in the memory ability between students who go through contextual learning and those who experience direct learning. The average memory of students taught using the contextual learning model reached 77.69%, greater than the average memory of those taught using the direct learning model which was equal to 74.44%.

Another study states that the learning strategy or model of mind mapping using multimedia is proven to be able to improve memory. The mind mapping strategy encourages students to interact with other groups of friends about problems faced and improve thinking activities for obtaining understanding. This can be proven from the result of the re-test conducted within 2 weeks. The re-test result of mind mapping strategy showed a memory score of 59.85%, higher than the direct learning method through lectures and discussions which only obtained a memory score of 35.54%.

Furthermore, the learning process using this self-directed video makes it easier for the respondents to review the learned content anywhere and anytime as long as they use supporting technology that can play the video. By reviewing the content of the video, the respondents will be easier to memorize or recall the materials that have been previously studied. Besides, the ability to memorize or recall is also influenced by age. In this study, the average age of the respondents was 36 years. According to Nusantari (2015), most people experience a change of memory as they grow older. Active memory in older adults tends to decrease due to the weakening front lobe. That is why older people tend to easily forget something they already know. This tendency grows by 12% at the age of 70-74 years and significantly increases to be 40% at the age of 85-89.

Based on the findings above, the respondents involved in this study are still considered to fall within the age range with a good memory ability.

Conclusion

In conclusion, there is an increase in the CPR knowledge of Malang City’s volunteer communities on the assessments between pre-intervention and post-intervention of self-directed video (including immediate post-intervention, 1-week post-intervention, and 2-week post-intervention). In contrast, no change or retention in the CPR knowledge of Malang City’s volunteer communities is shown on the assessments between post interventions (including immediate post-intervention, 1-week post-intervention, and 2-week post-intervention).

Conflict of Interest: None

Ethical Clearance: This study has passed the ethical test held at Brawijaya University with No. 53/EC/KEPK-S2/02/2019

Source of Funding: None
REFERENCES


11. AHA. Cardiac Arrest Statistic. American Heart Association, Inc. 2014.


Determination of Reference of Concentration (RFC) from Hydrogen Sulfide ($H_2S$) Exposure in the Community Based on Weight in Industrial Area in Medan Indonesia

Citra Dewi Puspasar$^1$, Abdul Rohim Tualeka$^1$, Pudji Rahmawat$^3$, Syamsiar S. Russen$^3$, Atjo Wahy$^3$, Ahsa$^4$

$^1$Department of Occupational Health and Safety, Public Health Faculty, Airlangga University, 60115, Surabaya, East Java, Indonesia; $^2$Department of Development of Islamic Society, State Islamic University Sunan Ampel, Surabaya, Indonesia; $^3$Department of Occupational Health and Safety, Public Health Faculty, Hassanudin University, Makassar, Indonesia; $^4$Faculty of Nurse, University of Brawijaya, Malang, Indonesia

ABSTRACT

Hydrogen sulfide ($H_2S$) is a colorless, highly toxic, flammable and rotten egg smelled gas. This gas can cause adverse effects on health, especially in the respiratory tract. Low concentrations of $H_2S$ for long periods of time can cause permanent effects such as respiratory problems, headaches and chronic cough. Hydrogen sulfide can be formed naturally and from the process of human activity. One of these human activities is the process of processing animal food and marine products in Medan Industrial Area which produces exhaust gas in the form of $H_2S$ gas.

The aim of the study was to calculate the value of RfC from $H_2S$ exposure in communities in Industrial Area in Medan, Indonesia. This is an observational cross-sectional study with quantitative manual data analysis method. The study sample was 52 residents of industrial estates at a radius of 300m and 52 residents at radius of 800m. Research variables included $H_2S$ concentrations in Medan Industrial Area, body weight, height, respiratory rate, length of day exposure time, body surface area, weight of white mice, body surface of white mice, highest dose of toxin without effect on experimental animals (NOAEL), factor Km in animal (Animal Km), factor Km in human (Human Km) and Reference of Concentration si (RfC).

The result showed that $H_2S$ concentrations at a radius of 300 m was 0.022 ppm and at an radius of 800 m is 0.0064 ppm. This value is above the Threshold Limit Value according to ATSDR provision of 0.0005 ppm. Concentration of $H_2S$ RfC in this study was 0.001 mg/kg; which is smaller than that of released by EPA 2003. The results of the RfC in this study is safe for humans. However, $H_2S$ gas around residential areas was close to NAB. This can increase at any time and can have a negative influence on public health. Therefore, control measures need to be carried out, including by installing additional air monitoring devices in several locations by waste management agencies. In addition, recording is also needed for all complaints of odor felt by the community, including nature, location, time and frequency of complaints. With these measures, air quality, exposure level, and health effects can be controlled.

**Keywords:** RfC, Hydrogen sulfide, Industrial area

**Introduction**

Hydrogen Sulfide ($H_2S$) is a colorless, highly toxic, flammable gas that has the characteristic odor of rotten eggs. The main absorption of $H_2S$ is through the inhalation pathway. When air containing Hydrogen Sulfide is inhaled, it will be absorbed into the bloodstream and distributed throughout the body. Humans can usually smell $H_2S$ at low concentrations in the air, between 0.0005 and 0.3 ppm.
Hydrogen sulfide can be formed naturally like gas from volcano, sulfur springs, swamp, in crude oil and natural gas or as a result of human activities such as gas from sewage treatment plants, manure fertilizer handling operations, petroleum refinery industry, and petrochemical plants. At low concentrations, H$_2$S can cause dizziness, nausea, feeling of drifting, coughing, anxiety, drowsiness, dryness, pain in the nose, throat and chest and olfactory sensory paralysis.

In determining the safe limits of toxin concentrations in the work environment, determining the Reference of Concentration (RfC) toxin in the human body is one of the important steps. Analysis of the risk of toxins in the work environment in Indonesia often uses RfC issued by researchers or institutions abroad, such as America and Europe. In fact, environmental conditions (air pressure and temperature) and human physical conditions (body surface area) differ between Europe and America and Indonesia. It is advisable to determine the risk analysis of toxins using RfC based on research results in Indonesia.

Based on previous research on the Analysis of the Risk of Hydrogen Sulfide Exposure in Communities around Industrial Areas in Medan, the risk level of exposure to Mercury (Hg) through consumption of fish and drinking water in the community has not been performed. In this study, RfC was obtained based on the principle of dose response and toxicity test for determining the highest dose without causing effects on experimental animals or also called No Observed Adverse Effect Level (NOAEL).

The purpose of this study is to determine the RfC of H$_2$S in the communities around Medan Industrial areas that the results can be used as a reference to estimate the amount of exposure each day that can be accepted by the community without causing harmful effects during their lifetime.

**Material and Method**

This research was conducted around an industrial area in Medan, Medan Labuhan sub-district, Indonesia. This study was an observational cross-sectional. The population in this study was housewives who lived around industrial estates at a radius of 300 m and a radius of 800 m. The sampling technique used cluster techniques. The number of samples needed for the subject group was 52 people for each radius so the total sample was 104 people.

The data used are primary data including the measurement results of H$_2$S concentration, intake rate, duration of exposure, and body weight. H$_2$S concentration measurements used the SNI 19-7119.7-2005 method with a photometer spectrometer.

The variables in this study included the highest dose of toxin without causing effects (NOAEL) on H$_2$S experimental animals, weight of experimental animals (W animals), body surface of experimental animals (BSA experimental animals), community weight (W), human height (h), respiratory rate (BR), length of day exposure time (t), community body surface area (BSA), and reference concentration (RfC) of toxins in the human body. Data analysis in this study was carried out by using manual quantitative analysis to determine Rfc in the community.

**Result**

A. Characteristics and Body Surface Area of Experimental Animals (White Mice): Toxicity test was carried out using experimental animals of white mice. In general, human response to toxicity is qualitatively similar to that of animals. This fact is the basis of extrapolation from animal data to humans.

<table>
<thead>
<tr>
<th>Research Object (White Rats)</th>
<th>W (kg)</th>
<th>BSA (m$^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>3</td>
<td>0.141</td>
<td>0.024223</td>
</tr>
<tr>
<td>4</td>
<td>0.141</td>
<td>0.024223</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.02405</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
</tr>
<tr>
<td>Total</td>
<td>0.844</td>
<td>0.144991</td>
</tr>
<tr>
<td>Average</td>
<td>0.140666667</td>
<td>0.024165167</td>
</tr>
</tbody>
</table>

Based on data from table 1, the body surface area of white mice is calculated using the following formula.

$$\text{BSA} = 0.09 \times W^{0.67}$$

Where

BSA: Body Surface Area (m$^2$)
W: Weight (kg)
B. Characteristics, Surface Area and Respiratory Rate of the Residence: The community characteristics in this study included the weight and exposure time of 104 respondents around Medan Industrial Areas at a radius of 300 m and 800 m. Based on Tables 2 and 3, the highest body weight is 79 kg with an average of 68 kg. The duration of the exposure, especially housewives who are exposed to H₂S gas at a radius of 300 m in a day was 18 hours and 15 hours at a radius of 800 m in a day. The height used was the average height of Indonesian adult women’s height of 153 cm.

Based on data on body weight and height, BSA and respiratory rate were calculated using the following formula:

1. The surface area of a community’s body

\[
BSA = \sqrt{\frac{W \cdot h}{3600}}
\]

Where:

- BSA: Body Surface Area (m²)
- W: Weight (kg)
- h: Height (cm)
- Breathing Rate

\[
BR = \frac{5.3 \ln W - 6.9}{24}
\]

Where:

- BR: Breathing Rate (m/jam)
- W: Weight (kg)

Table 2: Distribution of Characteristics, Body Surface Area and Respiratory Rate on the Community around Medan Industrial Areas (Radius 300 m)

<table>
<thead>
<tr>
<th>Resident</th>
<th>Wb (kg)</th>
<th>h (cm)</th>
<th>BSA (m²)</th>
<th>t (hour/day)</th>
<th>BR (m³/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>69</td>
<td>153</td>
<td>1.71</td>
<td>15</td>
<td>0.65</td>
</tr>
<tr>
<td>2</td>
<td>76</td>
<td>153</td>
<td>1.80</td>
<td>14</td>
<td>0.67</td>
</tr>
<tr>
<td>3</td>
<td>63</td>
<td>153</td>
<td>1.64</td>
<td>16</td>
<td>0.63</td>
</tr>
<tr>
<td>4</td>
<td>67</td>
<td>153</td>
<td>1.69</td>
<td>18</td>
<td>0.64</td>
</tr>
<tr>
<td>5</td>
<td>75</td>
<td>153</td>
<td>1.79</td>
<td>12</td>
<td>0.67</td>
</tr>
<tr>
<td>Etc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>78</td>
<td>153</td>
<td>1.82</td>
<td>15</td>
<td>0.67</td>
</tr>
<tr>
<td>Average</td>
<td>68</td>
<td>153</td>
<td>1.69</td>
<td>15</td>
<td>0.6</td>
</tr>
</tbody>
</table>

The average body surface area and community respiratory rate according to tables 2 and 3 are 1.71 m² at a radius of 300 m and 1.69 m² at 800 m. The average community respiratory rate is 0.6 m³/hour.

C. Hydrogen Sulfide Concentration (H₂S): The measurement results of H₂S concentrations in the Industry Medan Area are different at 6 measurement locations in 2 radius, both in the industrial area (300 m) and outside the industrial area (800 m) which is 0.03 mg/m³ and 0.0093 mg/m³, each.

Based on the results of measurements, the concentration of hydrogen sulfide around Medan Industrial Area (radius 300 m) was 0.022 ppm with the highest concentration of 0.4 mg/m³ (0.029 ppm) and the lowest of 0.2 mg/m³ (0.01 ppm). H₂S concentration outside Medan Industrial Area (radius 800 m) was 0.0064 ppm, with the highest concentration of 0.2 mg/m³ and the lowest 0.002 of mg/m³ (0.001 ppm).

D. Animal KM and Human KM: Calculation of Animal KM and Human KM is the first step in determining the safe limits of toxin doses for the community.

1. Animal KM

\[
\text{Animal Km} = \frac{W_{\text{animal}}}{\text{BSA}_{\text{animal}}}
\]

Where:

- Animal km: Km factor on animal
- W : Weight of experimental animal
- BSA : Body Surface Area of experimental animal
Table 4: Animal Km in White Mice

<table>
<thead>
<tr>
<th>Research Object (White Rats)</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
<th>Animal km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.8141941</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.8141941</td>
</tr>
<tr>
<td>3</td>
<td>0.141</td>
<td>0.024223</td>
<td>5.820914</td>
</tr>
<tr>
<td>4</td>
<td>0.141</td>
<td>0.024223</td>
<td>5.820914</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.02405</td>
<td>5.8004158</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
<td>5.8555762</td>
</tr>
</tbody>
</table>

Average: 0.1406, 0.024165, 5.81

Based on the calculation of Table 4, the average Animal Km in white animals is 5.81.

2. Human KM

\[ \text{Human Km} = \frac{W \text{ human}}{\text{BSA human}} \]

Where:

- Human Km : Km factor on human
- W : Human weight
- BSA : Body Surface Area of human

Table 5: Results of Human Km Calculation in Communities around Medan Industrial Areas (300 m)

<table>
<thead>
<tr>
<th>Resident</th>
<th>Human KM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40.29</td>
</tr>
<tr>
<td>2</td>
<td>38.50</td>
</tr>
<tr>
<td>3</td>
<td>36.30</td>
</tr>
<tr>
<td>4</td>
<td>40.87</td>
</tr>
<tr>
<td>5</td>
<td>40.00</td>
</tr>
<tr>
<td>etc</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>37.26</td>
</tr>
<tr>
<td>Average</td>
<td>40.263</td>
</tr>
</tbody>
</table>

Table 6: Results of Human Km Calculation for Communities Beyond Medan Industrial Areas (800 m)

<table>
<thead>
<tr>
<th>Resident</th>
<th>Human KM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>39.11</td>
</tr>
<tr>
<td>2</td>
<td>42.29</td>
</tr>
<tr>
<td>3</td>
<td>38.50</td>
</tr>
<tr>
<td>4</td>
<td>39.70</td>
</tr>
<tr>
<td>5</td>
<td>42.01</td>
</tr>
<tr>
<td>etc</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>42.84</td>
</tr>
<tr>
<td>Average</td>
<td>39.959</td>
</tr>
</tbody>
</table>

E. NOAEL: Determination of safe limit of the concentration of a chemical begins with toxicity test determining the highest dose without causing effects on experimental animals or No Observed Adverse Effect Level (NOAEL). According to U.S. Environmental Protection Agency (EPA), NOAEL from H₂S is 1 mg/m³ (0.0074 mg/kg). Calculation of the conversion from mg/m³ to mg/kg is as follows:

\[ \text{NOAEL} \text{ H}_2\text{S} = \frac{1 \times 0.00138}{0.1405} = 0.0074 \text{ mg/kg} \]

F. Reference of Concentration (RfC): According to Saridewi and Tualeka (2017) the calculation of RfC is done using a formula from Shaw et al.⁷

\[ \text{RfC} = \frac{\text{NOAEL}}{\text{Animal KM} \times \text{Human KM}} \]

Where:

- RfC: Reference of Concentration (mg/kg)
- Animal Km: Km factor on experimental animal
- Human Km: Km factor on human

Results of Reference of Concentration (RfC) obtained from NOAEL, Animal km averages, and Human Km averages are as follows:

1. Radius 300 m

\[ \text{RfC} = 0.0074 \times \frac{5.821035}{39.496} = 0.001090627 \text{ mg/kg} \]

2. Radius 800 m

\[ \text{RfC} = 0.0074 \times \frac{5.821035}{39.198} = 0.001098926 \text{ mg/kg} \]

Discussion

Based on the measurement results, the concentration of H₂S around the industrial area (radius 300 m) is 0.022 ppm, while the concentration of hydrogen sulfide outside the industrial area (radius 800 m) is 0.0064 ppm. At a radius of 300 m and 800 m H₂S concentrations are above the Threshold Value (NAB) of 0.0005 ppm according to ATSDR provisions regarding the Odor Threshold.
Value of Hydrogen Sulfide. According to KepMenLH No.KEP-50/MENLH/1996 regarding the standard level of smell the value of the Threshold Limit Value (NAB) is 0.02 ppm. At a radius of 300 m with a concentration of 0.02 ppm above the Threshold Limit Value (NAB). The concentration of air at a radius of 300m is greater than the concentration of air at a radius of 800m, this is due to differences in the distance from the source of pollutants. The closer the location of the study to the source of pollutants the greater the H2S concentration received by the body.

The results of this study indicate that the average value of the respondent’s body weight is 68 kg, with the lowest weight of the respondent is 54 kg and the highest body weight is 79 kg. In this study, the respondent’s body weight greatly influenced the intake rate where the greater the respondent’s weight, the greater the intake rate of the respondent himself. This is in accordance with the theory which states that the greater a person’s weight, the greater the volume capacity of a person’s lung, which allows more air to enter the body. The finding of the Laila’s study (2018) showed that respondents with the greatest weight had lung volume capacity that big also that allows more air into the body, thereby increasing the potential for breathing air containing pollutant gases such as H2S so that it impacts on health.

According to EPA, NOAEL (No Observe Adverse Effect Level) or the highest dose without effect on animals is an experiment in determining doses that do not show an indication of a statistically significant effect on toxic effects or biological functions. Based on the results of calculations, NOAEL hydrogen sulfide of 1 mg/m3 is equivalent to 0.72 ppm. This NOAEL result is smaller than the 2016 ATSDR of 2.5 ppm for medium exposure respiratory systems.

After the NOAEL value of H2S is determined, the calculation of RfC on H2S exposure in the Medan Industrial Area area was carried out. The RfC value was sought from the risk agent of gas, which uses the reference dose of the chemical species inhalation pathway. The calculation of Inhalation Reference Concentration (RfC) used NOAEL from the U.S. Protection Agency (EPA) by 0.00109 mg/kg (radius 300m) and 0.00109 mg/kg (radius 800m). This value is greater than the H2S RfC found in the previous study on Risk Analysis of Hydrogen Sulfide Gas Levels (H2S) in the Community Around the Bioethanol Plant by 0.000571 mg/kg.

According to IRIS US-EPA the value of hydrogen sulfide RfC gas is 0.000571 mg/kg/day. Although the results of this study indicate that H2S levels is still safe in accordance with the exposure limits of hydrogen sulfide in the air established by the EPA, the effects of low level exposure or long-term hydrogen sulfide at levels of less than 1 ppm in the air are more difficult to predict because the mechanism of chronic toxicity is has not been further studied.

Preventive measures to avoid the chronic effects of H2S gas exposure include routine waste management and air quality monitoring to see air quality conditions due to the production process. The relevant party needs to inform the people living around the Medan and surrounding Industrial Estates regarding H2S concentrations. Installation of additional air monitoring equipment in several locations by the waste management agency is also needed to record all odor complaints that are felt by the community, namely the nature, location, and frequency of complaints so that air quality, exposure level, and health effects can be controlled.

Conclusion

1. NOAEL of H2S around Medan Industrial Area is 0.0074 mg/kg.
2. The average value of Human KM at a radius of 300 m is 40.3 and in a radius of 800 m is 39.9.
3. The value of RfC of H2S in Medan Industrial Area at a radius of 300 m is 0.001090627 mg/kg and at a radius of 800 m is 0.001098926 mg/kg.

Conflict of Interest: All authors have no conflicts of interest to declare.

Source of Funding: This is an article “determination of reference of concentration (RfC) from hydrogen sulfide (H2S) exposure in the community based on weight in industrial area in Medan Indonesia” of Occupational Health and Safety Department that was supported by Faculty of Public Health, Airlangga University.

Ethical Clearance: The study was approved by the institutional Ethical Board of the Public Health, North Sumatera.
REFERENCE


Sexual Risk Behaviour of Men Who Have Sex with Men (MSM) in an Urban Society of West Sumatera Province of Indonesia

Hardisman Dasman1, Firda Firdawati1, Yantri Maputra2, Ilma Nuria Sulrieni3, Faiz Nur Hanum3
1Department of Public Health and Community Medicine, Andalas University, Indonesia, 2Department of Psychology, 3Commission of HIV/AIDS Prevention of West Sumatera, Indonesia

ABSTRACT

Background and Aim: The cases of HIV/AIDS have increased in Indonesia in the last decade, especially in Padang Municipality of West Sumatera Province. The cases are consistency higher in high risk population groups, including men who have sex with men (MSM). The study examines sexual behaviour of MSM, which becomes a potential risk of HIV transmission.

Method: We have conducted a qualitative research by interviewing 44 MSM and three HIV/AIDS prevention commissioners and two health workers. The data was analyzed using content thematic analysis approach, which presented narratively and semi-quantitative features.

Result: The result shows that most of MSM are very sexual active and have multi sex partners. On the contrary, most of the sexual contacts are unprotected with low consistenency of condom use. They also have limited knowledge of HIV/AIDS and lack of awareness of its transmission. Voluntary of HIV testing is very low due to personal and access barrier, such as feeling shameful to be recognized by other people and perceive healthy and free from HIV/AIDS risk.

Conclusion: The sexual behavior of MSM becomes a potential risk of HIV transmission. Our findings indicate that there is a need of improvement of health promotion to decrease the risk of HIV transmission, including health education and special access to HIV testing to reach this community.

Keywords: Sexual behavior, MSM, HIV/AIDS

Introduction

The cases of HIV/AIDS have increased significantly in Indonesia over the last two decades.1 In Province of West Sumatera especially, the cases have also increased within the last five years.2 Even, the cases rate was higher in the province than a national rate, which was 24.04 compare to 19.1 per 100,000 inhabitants in 2015. Among districts and municipalities in the province, Padang municipality, the capital city of the province has the highest number of the cases, which consisted more about 50% of the HIV cases in the province were in Padang.

National Comission of HIV/AIDS Prevention of Indonesia also reported that HIV/AIDS cases consistently higher in high risk population groups, such as sex wokers, MSM and injecting drug users (IDU). The data show that the cases of HIV/AIDS more than 5% in those group.3 Specifically, the Comprehensive Surveillance Biological Behaviors in Indonesia reported that the HIV/AIDS cases increased in the MSM groups by 7% within five years, which was 5% in 2007 became 12% in 2011.4 Many studies suggested that MSM is a potential risk of HIV transmission.5-10

Province of West Sumatera is well-known as a religious society in the country, which predominantly belong to Moslem faith and Minangkabau ethnic. Superficially, the society strictly prohibits MSM practice. On the contrary, the Comission of HIV/AIDS Prevention and Department...
of Health of Padang Municipality reported that there was significantly increase of MSM in the area,\textsuperscript{11,12} which was recorded less than 300 in 2012 and more than 1,500 in 2017.\textsuperscript{12} This study aimed to explore the behavior of MSM that became risk of HIV transmission. The study also explored how the MSM perceive on their social norm and values towards their behavior.

\textbf{Method}

The study has been conducted in Padang Municipality, the capital city of West Sumatera Province of Indonesia. The data was collected between June and September 2018. We used a qualitative study design by interviewing 44 MSM, three HIV/AIDS prevention commissioners and two health workers. We obtained MSM from the information of HIV/AIDS prevention commissioners and as well as snow ball from the previous participant. These participants were chosen base on appropriateness and adequacy principles by using data sources triangulation approach.

A qualitative inquiry was very relevant with the problem being investigated and the objectives of the study because the problem is hidden and taboo in the society. Also, the phenomena of the problem being studied was not clearly understood previously. A thematic framework analysis was used to analyze the data and to draw the conclusion.

\textbf{Result}

The main participants of the study, MSM distribute across all occupation and level of education, with the youngest 16 years and the oldest 46 years. Interestingly, about half of them have high education, who has graduated or currently a student at a university. Their occupations vary from laborer, driver, students, and employee.

In average, our participants admitted that they have been as MSM for about 4.77 years, with 13 years as the longest. Most of them is relatively sexual active with the frequency of sexual contact 2.7 times a week. They also tend to have multi sex partner with 2.05 in average (see table 1), with nearly half of them admitted having two or more sex partners concurrently.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
\textbf{Variables} & \textbf{Min.} & \textbf{Maks.} & \textbf{Mean (±SD)} \\
\hline
Length as MSM (year) & 0.7 & 13 & 4.77 (2.70) \\
\hline
Number of partner (people) & 1 & 5 & 2.05 (1.49) \\
\hline
Weekly Sexual Contact (times) & 0.5 & 15 & 2.75 (3.05) \\
\hline
\end{tabular}
\caption{Descriptive features of MSM sexual behavior}
\end{table}

However, most of the sexual contact is unprotected, with only on third of them use condom consistently. Even, about 6.82\% of them never use it (table 2). Information from participants reveals that there are various reasons that they don’t use condom. They do not use condom because of sexual pleasure reasons and access to condom [P9, 11, 12, 17, 26, 29, 31]. As mentioned by the participants:

“I don’t use condom sometimes, ...what we are lookin for in sexual contact is a pleasure, ... if we use condom, in some extend will minimize the aim” [P11].

“We don’t always use condom, because we don’t always have it. Sometimes I can buy it, sometimes I get it from HIV prevention volunteer. If want to by it I feel ashame...” [P12].

Additionally, some of them do not use condom because they believe that they are free from any risk of diseases transmission if they see that their partner is healthy and do ot have any symptoms of any diseases, such as HIV/AIDS or genital diseases [P11, 18, 26, 29, 33, 41].

“I think we don’t always need to use condom, because I trust my partner, he is only with me... and I see him doesn’t have any diseases. I am safe” [11].

“Ya... we use condom, but not always... you know..., we know our body, we wknow our partner, we don’t have a disease that can transmit to each other” [P29].

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|}
\hline
\textbf{Variable} & \textbf{f (n-44)} & \textbf{\%} \\
\hline
Condom Use & & \\
Consistent (Always) & 17 & 38.64 \\
Inconsistent (Sometimes) & 24 & 54.54 \\
Never & 3 & 6.82 \\
\hline
\end{tabular}
\caption{Condom use and HIV testing among MSM}
\end{table}
Despite they say that they and their partner healthy and free from diseases transmission including HIV, majority of them (79.55%) do not really know their HIV status because they never been done a HIV test. The participants explained that there are various factors hinder them to do HIV test. Although they know that they can have a test in health centers and hospitals in Padang municipality, they are reluctant to do so. Similar reason for not using condom, they do not have a test because they perceive that they are healthy and nothing to worry about because they do not feel any symptoms of the diseases.

Few of them, also explain that do not have a test because feeling shameful to be recognized by other people. They perceive that the stigma from public is very strong, which will undervalue them [P17, 18, 24, 31, 35]. As mentioned by the participant:

“I cannot do a test in health centers... people will recognize us, you know there is a stigma, that people think that a man who does HIV test is a prostitute customors or MSM. I am afraid my identitity to be revealed” [P24].

**Discussion**

Most of MSM in Padang Municipality of West Sumatera Province do not aware of the HIV risk, in which they do not eager to have the test. Voluntary of HIV testing is very low due to personal and access barrier, such as feeling shameful to be recognized by other people and perceive healthy and free from HIV/AIDS risk.

Our study also reveals that there are two factors that become risks of HIV/AIDS transmission, namely multi sex partners and inconsistence condom used.

**Multi Sex Partners:** Our study indicates that MSM tend to have multi-sex partner, which indicates that they are very sexual active. Our study is similar to Cempaka and Kardiwinata (2012)\(^{13}\) ini Bali, that reported about 77.8% of MSM had multi sexual partner. The study by Nugroho (2012)\(^{14}\) in Jakarta Timur even reported that multi-sex partner within MSM as high as 78.1%.

Our study reveals that MSM is relatively very sexual active, which also related to their young age. In average, they have sexual contact 2-3 times weekly (43.2%). The study indicates that same sex partner is mostly intended for having sexual contact instead of intimate personal psychological relationship.

**Inconsistence of Condom Used:** Despite the MSM are very sexual active and had multi-sex partner, the consistent condom used was very low (38.6%). Our finding is also similar to study in Bali, which was only 37.8%, as reported by Cempaka and Kardiwinata.\(^{15}\) The rate of condom used is not very much different to National Report of Commission of HIV/AIDS of Indonesia, which mentioned about 36%.\(^{11}\) Even, in Dominica,\(^{6}\) where anti HIV/AIDS campaign was slightly better, the consistency of condom used among MSM only reached 43%.

This finding indicates that with most of HIV status of our participants are unknown (79.55%) that could be positive, may lead to a substantial risk of HIV/AIDS transmission among MSM community, in addition to low consistent used of condom.

Lack of Knowledge and their perception of HIV/AIDS influence them to use condom with their intimate partner. They perceive that they are healthy and free from the risk of the diseases when they do not have any symptoms. They are very reluctant to use condom because their main desire to have MSM relationship are mostly for sexual pleasure. They explained that using condom are very unppleasant and will hinder them to gain their aim. The study is also confirmed by Rokhmah dan Khoiron study\(^{15}\) on MSM community in Jember of East Java Province, where the consistency used of condom is very low due to similar reason. Herlani et al\(^{5}\) also reported the condom use by MSM was not a priority, because the same sex behavior is as a sexual adventure for gaining sexual pleasure for them.

Both sexual risk behaviors, multi sex partners and inconsistence condom used have been also a global concern as HIV/AIDS transmission.\(^{8,9,16}\) In China, for example, there has been a growing trends of HIV epidemic among MSM in all Chinese provinces, municipalities, and autonomous regions. The MSM
were also very sexual active, which approximately 90% of them had anal and oral sex within the past six months of the research time. They also had low condom used due to the preference of better sexual sensation, which was only 19.9% with their regular intimate partner and 30.4% with noncommercial casual partners.17

Conclusion

The study reveals that MSM sexual behavior become risks of HIV/AIDS transmission, which lack of knowledge and awareness of the disease. Most of their HIV status is unknown, whe they are reluctant to do a voluntary testing. The consistency of condom used is alo very low due to their perception of the disesease and their sexual willingness. On the contrary, the MSM are very sexual active with their regular and casual sex partners, in which they tend to have multi sex partners.

Conflict of Interest: The authors declare that there is no conflict of interest.

Ethical Clearance: Formal permission was obtained from the Board of Nation and Public Protection of Padang Municipality. The participants (MSM) were voluntary invited to participate in the study, and they were informed that their participation would remain anonymous.

Source of Funding: The research is funded by Faculty of Medicine of Andalas University Grant under Ministry of Research and Higher Education of Indonesia.

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An Exploration of Health Beliefs Related to Fluid-Restricted in Patients Undergoing Hemodialysis

Inda Rian P1, Nursalam2, Ninuk Dian Kurniawati3
1Master Nursing Student, 2Professor, 3Lecturer, Faculty of Nursing, Universitas Airlangga, Surabaya

ABSTRACT

Background: Adherence to the therapeutic regimen is important for patients undergoing hemodialysis. The problem of non-compliance with fluid management is still a major problem for patients undergoing hemodialysis. Health-related beliefs on patients undergoing hemodialysis are one of the factors that influence their adherence to the diet, but how is the confidence level of hemodialysis patients in Indonesia especially regarding fluid restriction still unclear. The aimed of this study was to explore the adherence of fluid restriction and health-beliefs related to fluid restriction in patients undergoing hemodialysis.

Method: A cross-sectional study was conducted among 115 patients undergoing hemodialysis with a simple random sampling technique. Data were collected through an information form, the belief about fluid adherence scale including four subscales: perceived threat (susceptibility & seriousness), perceived benefit, perceived barrier, and self-efficacy. Descriptive statistic was used for data analysis.

Result: The result showed that the majority of patients were less adherence to fluid restrictions (53.9%). The prevalence of patients who have perceived barrier was higher (53%) than the result of belief in the perceived benefits (51%). Most patients have negative self-efficacy values against fluid restrictions.

Conclusion: Non-adherence with fluid restriction was a problem among hemodialysis patient. High levels of non-adherence are associated with greater ‘perceived barriers’. A better understanding of health beliefs related to fluid restriction is needed by patients and to facilitate the implementation of tailored interventions.

Keywords: Health belief, Hemodialysis, Fluid restriction, Adherence, End-stage renal disease.

Introduction

Chronic kidney disease is increasing globally. Therapy to replace kidney function in patients with end-stage renal failure includes hemodialysis, peritoneal dialysis and kidney transplantation 1, currently, hemodialysis is the main choice for patients who experience end-stage chronic renal failure. Patient compliance with treatment regimens, including restrictions on fluid intake, diet, treatment, and control schedules are factors that influence the success of hemodialysis. Studies report that many patients undergoing hemodialysis do not adhere to restrictions on fluid intake 2. Nurses use various methods of providing health education, one of which is by speaking directly to patients, but it has not been able to improve compliance with fluid restrictions in patients undergoing hemodialysis. The study reported a high rate of non-compliance of hemodialysis patients, especially against restrictions on fluid intake and dietary restrictions, namely between 30-81.4% 3. According to 4 the prevalence of noncompliance with fluid restriction in patients undergoing hemodialysis is between 3.4-74%. Chronic kidney disease (CKD) was the 27th cause of death in the world in 1990 and increased to 18th in 2010. Based on the Indonesian Renal Registry (IRR) in 2016, 98% of patients with kidney failure undergo hemodialysis therapy 5. Based on monthly report data obtained at Sidoarjo Hospital, Indonesia, it was found that in August to October 2018 the average number of patients with CKD who underwent hemodialysis was 192 patients, with 52% of patients have problem with excess fluid volume.
Non-adherence of patients to fluid restrictions can cause chronic excess fluid which leads to serious consequences for hemodialysis patients, including excessive circulation burden, edema to severe cardiovascular disorders, impaired cognitive function, increased risk of hospitalization, and even death threats (2). Hemodialysis patients are patients with special chronic conditions, who need effective education for their self-care; several issues associated with the process raise barriers that make learning difficult. Computer-based education can reduce these problems and improve the quality of education. This study aims to develop and validate a theory-based multimedia application to educate Persian patients on hemodialysis. The study consisted of five phases: (1) and hemodialysis nurses have an important role to play in it. Development of effective methods is needed to help patients manage fluids. This study uses the theory of the Health Belief Model (HBM) approach as a theoretical framework. HBM was a theory that focuses on individual attitudes and beliefs in explaining and predicting health behavior. The main construction of HBM has perceived susceptibility and perceived severity that is a perceived threat, perceived benefit, and perceived barrier as well as other constructions that have been added namely modification factors, cues to action, and self-efficacy. HBM focuses on the perception of threats and evaluating health-related behaviors as the primary aspect of understanding how a person presents healthy actions.

Health belief of patients undergoing hemodialysis was one of the factors that influence patient adherence to diet (3-9). The method of patient education and self-monitoring effectively improves compliance with hemodialysis patients with restrictions on fluids and diet (10). Therefore, this study wants to assess health belief related to fluid restriction in patients undergoing hemodialysis in Sidoarjo, Indonesia. The objective of this study was to describe the patient’s characteristic of hemodialysis patients which included; age, gender, marital status, and to examine health-belief related to fluid restriction in Sidoarjo, Indonesia patients on hemodialysis.

Method

This research uses descriptive explorative with a cross-sectional approach. The subjects in this study were 115 hemodialysis patients selected with simple random sampling. The inclusion criteria in this study were: patients undergoing regular hemodialysis twice a week; patients over the age of 21 years; patients who had undergone hemodialysis for at least 3 months; were able to communicate in Indonesian. Patients who have severe cognitive impairment and critical conditions were the exclusion criteria of this study. Information obtained from 115 patients who met the inclusion criteria, for the participation rate was 100%.

Individual beliefs are measured through a health belief questionnaire conceptualized based on HBM (perceived threat, benefit, barrier, self-efficacy), questions are modified from previous assessments of themes in the HBM construct (11). The questions in this questionnaire are 21 items. Patient responses were assessed with a 4-point Likert scale starting from “1” (strongly disagree) and “4” (strongly agree). The questionnaire was tested for validity and reliability and declared valid and reliable with Cronbach’s alpha value of 0.808 and the validity level of 21 questions was 0.505-0.886 (> 0.444 with N = 20), so all questions were valid and reliable. fluid restriction measures were assessed using a questionnaire that had been tested for validity and reliability and declared valid and reliable.

Result

Data collection was conducted in February-April 2019 in the hemodialysis installation of Sidoarjo hospital, Indonesia. One hundred fifty people underwent hemodialysis at the time of data collection. Based on the inclusion and exclusion criteria a sample of 115 people completed the questionnaire until the end of the study. The results of the research shown in table 1 represent the characteristics of respondents in terms of gender, age, marital status, recent education, employment status and length of time undergoing hemodialysis.

<p>| Table 1: Demographic and characteristic of participant (N = 115) |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>70</td>
<td>60.9</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>45</td>
<td>39.1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>115</td>
<td>100</td>
</tr>
<tr>
<td>2.</td>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>21-25 years</td>
<td>3</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>26-35 years</td>
<td>9</td>
<td>7.8</td>
</tr>
<tr>
<td></td>
<td>36-45 years</td>
<td>39</td>
<td>33.9</td>
</tr>
<tr>
<td></td>
<td>46-55 years</td>
<td>33</td>
<td>28.7</td>
</tr>
<tr>
<td></td>
<td>56-65 years</td>
<td>31</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>115</td>
<td>100</td>
</tr>
</tbody>
</table>
Based on table 1, out of 115 patients, male patients (n=70) and female patients (n=45), it can be seen that most patients undergoing hemodialysis (61%) are male. Most of the patients (34%) in the group of aged 36-45 years. Most respondents were unemployed (73%) due to their dialysis condition, and more than half of the respondents (52%) had senior high school education.

Table 2: Beliefs and adherence of respondents (N = 115)

<table>
<thead>
<tr>
<th>Variabel</th>
<th>Sub Variabel</th>
<th>Parameter</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat</td>
<td></td>
<td>Positive</td>
<td>61</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative</td>
<td>54</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>115</td>
<td>100</td>
</tr>
<tr>
<td>Benefit</td>
<td></td>
<td>Positive</td>
<td>59</td>
<td>51.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative</td>
<td>56</td>
<td>48.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>115</td>
<td>100</td>
</tr>
<tr>
<td>Barrier</td>
<td></td>
<td>Positive</td>
<td>61</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative</td>
<td>54</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>115</td>
<td>100</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td></td>
<td>Positive</td>
<td>51</td>
<td>44.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative</td>
<td>64</td>
<td>55.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>115</td>
<td>100</td>
</tr>
<tr>
<td>Fluid restriction</td>
<td></td>
<td>Good</td>
<td>33</td>
<td>28.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enough</td>
<td>20</td>
<td>17.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less</td>
<td>62</td>
<td>53.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>115</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on table 2 above, it can be seen that in the evaluation of beliefs, some respondents had positive beliefs related to perceptions of susceptibility and severity/perceived threat (53%). From the perceived benefit variable, half respondents showed positive beliefs about the benefits of adhering to fluid restrictions (51%), and on the perceived barrier, most of the respondents (53%) showed confidence in the barrier of fluid restriction. Most respondents have negative self-efficacy (56%), self-efficacy is about belief in self that individuals are able to limit fluids. From the table above, it was found that the adherence of most respondents to fluid restrictions was still lacking (54%).

Discussion

This study sought to investigate adherence to fluid restriction in patients undergoing hemodialysis and patient confidence in fluid restriction measures. This study has added evidence that non-adherence of patients undergoing hemodialysis is still a problem. Overall the high levels of non-adherence were reported in this study. This is probably due to the possibility of subjective estimates of patients, measurements of the level of adherence were carried out with a questionnaire without clinical measurements such as weight. Most of the patients undergoing hemodialysis are male and married. In this study, most of the HD patients were in the age group of 36-45 years (33.8%), this result is in contrast to the study conducted 12 where the most age of group were 60-69 years. this shows a finding that all ages are at risk for developing the end-stage renal disease (ESRD). In this study most of the patients had a high school education, this was different from the study conduct to 13 that most patients have a bachelor’s degree.

The belief of respondents in this study there is 4 main components based on health belief model construction, namely perceived threat (susceptibility & seriousness), perceived benefit, perceived barrier, and self-efficacy. The participants in this study were most knowledgeable about the benefits associated with the recommended fluid restrictions. This can be caused by health education about the benefits of fluid restriction is effective. Patients know about certain benefits obtained from following fluid restriction recommendations, for example recognizing that limiting fluid can keep them from swelling and shortness of breath.

The results of this study also highlight the belief in barriers to high fluid restriction. More than half of patients reported difficulties in following fluid restriction recommendations. This was in accordance with 8 which also reported similar issues regarding salt restriction.
It is important for patients undergoing hemodialysis to know the general obstacles that are felt because they can have adverse consequences for patients. In this study, researchers examined perceptions of benefits and barriers following fluid restriction as factors that might be related to the compliance of patients undergoing hemodialysis. It found a positive and significant relationship between adherence to sodium restrictions and perceived benefits thus indicating an increase in the level of adherence associated with an increase in perceived benefits. While a weak negative relationship was found between adherence to sodium restriction and perceived benefit. In this study, the level of confidence in barriers is higher than the level of confidence in the benefits, this shows that the higher the confidence in the obstacles, the lower the action in limiting fluid.

Most of the respondents had confidence in positive susceptibility and seriousness, although there were still some respondents who had negative beliefs. Individual belief in the susceptibility of the disease is related to symptoms that occur due to excess fluid volume. Individual beliefs about the seriousness of the disease, especially the risk of complications that occur can be shown by the patient’s knowledge of the disease. The patient’s knowledge of the disease will help the patient understand the prognosis of the disease including recommendations for action by health workers to prevent the prognosis of the disease towards a worse. In the belief in benefits, the majority of respondents had positive beliefs, but the level of confidence in the perceived barrier was higher. This shows that respondents’ beliefs/ perceptions of the barrier are greater than the benefits that will be obtained from fluid management behavior. Most of the respondents in this study had negative self-efficacy. Self-efficacy is an individual’s trust in himself that he is able to carry out an appropriate behavior to achieve the desired results of natural individuals facing their conditions.

Based on the evaluation of adherence behavior, it was obtained partly in the low adherence category. Behavior adherence here was defined as the actions taken by respondents in managing fluids. Indicators in adherence include monitoring input and discharging fluid, as well as fluid consumption as recommended. Most patients do not pay attention to urine output or input fluids every day, because urine production is low or even many experience anuria. Input and output of fluid should be considered as a basis for determining the amount of fluid intake every day. Previous studies have shown that individuals who see higher barriers have greater interdialytic weight gain, this indicates low compliance. A lack of motivation is observed by the patients as a barrier to adherence because the patients think that this restriction was not necessary to maintain their condition while having dialysis. Having a sense of self-confidence allows a person to be involved in health-promoting behavior, avoiding health-threatening behavior, and affecting all aspects of life. It takes a high degree of confidence to be able to change lifestyles before being made possible through change.

**Conclusion**

The results of this study corroborate previous studies which showed that rates of non-compliance with fluid restriction were clearly seen in the ESRD population. In addition, the results of this study indicate that participants in this study had a positive perception of the benefits felt in following fluid restrictions, but also reported feeling a number of high barriers. On the other hand, compliance in fluid restriction measures is in a low category. This association shows that increasing patient perceptions about the benefits of fluid restriction compliance, and reducing barriers increases the likelihood that the patient will perform the desired behavior. The perceived benefits and perceived barriers contribute to the increased understanding of compliance behavior in this study. This indicates by increasing patient perceptions of the benefits of fluid restriction compliance, while at the same time reducing barriers will allow patients to carry out the desired behavior, in this case adhering to fluid limitation recommendations.

**Conflict of Interest:** None

**Source of Funding:** This study is a self-funded research project

**Ethical Clearance:** The study protocol was approved by the ethics committees (KEPK) in Sidoarjo Hospital, Indonesia, number. 893.3/0484/438.6.7/2019.

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Determination of Dosage Reference (RfD) of Mercury Based on NOAEL and Characteristics of Workers in the Area of Unlicensed Gold Mining (PETI) Maluku Province Indonesia

Vaninda Eka Pridianata¹, Abdul Rohim Tualeka¹, Bacrudin Lain², Pudji Rahmawati³, Syamsiar S Russeng⁴, Atjo Wahyu⁴, Ahsan⁵

¹Department of Occupational Health and Safety, Faculty of Public Health, Airlangga University, 60155 Surabaya, East Java, Indonesia; ²Department of Environmental Health, Health, Health Polytechnic Ministry of Health Maluku, 97233 Negeri Lama, Ambon, Indonesia; ³Department of Development of Islamic Society, State Islamic University Sunan Ampel, Surabaya, Indonesia; ⁴Department of Occupational Health and Safety, Faculty of Public Health, Hassanuddin University, Makassar, Indonesia; ⁵Faculty of Nurse, University of Brawijaya, Malang, Indonesia

ABSTRACT

Mercury (Hydrargyrum/Hg) is one of the metals that are hazardous and toxic (B3), liquid, silver white-colored, and easily evaporate at room temperature. In Indonesia, mercury is one of the environmental contaminants caused by illegal gold mining or Unlicensed Gold Mining (PETI). This study aims to determine the reference dose (RfD) of mercury in accordance with the characteristics of workers in Indonesia in order to be able to calculate and predict the risks to their health. This is an observational research by using a dose response approach and NOAEL in experimental animal of white mice (Rattus norvegicus). The subjects in this study were the illegal mining workers in Kayeli Village. The sample used was 67 workers, while the object of this research was the concentration of mercury in wells water and Polymesoda eros shells which are frequently consumed by workers.

Mercury concentration in drinking water in the area of illegal Gold Mining (PETI) was still within safe limits for consumption of 0,0005 mg/l, while the mercury concentration in Polymesoda eros shells was not safe for consumption by 0.756 mg/kg. Safe daily exposure dose of mercury in Kayeli Village Gold illegal mining area is 0,033 mg/kg with a NOAEL value of mercury of 0.23 mg/kg. The RfD value can be used as a reference in predicting the risks to the health of workers in the area of Illegal Gold Mining (PETI) in Maluku Province of Indonesia.

Keywords: Mercury (Hg), Gold Mining, Reference of Doses (RfD), Workers

Introduction

According to WHO, mercury is a metal element that is formed naturally and is classified into 3 main groups of liquid and gas, inorganic mercury (Hg⁺) such as mercury chloride, mercury acetate, mercury sulfide, and organic mercury (Hg²⁺).¹ In Indonesia, mercury is one of the environment contaminants caused by illegal gold mining (PETI). One of the provinces in Indonesia with an increase in mobility and population migration due to gold mining activities is Maluku Province, Kayeli Village, Buru Regency.² Contaminants mercury in the area is caused by the amalgamation method used by workers in an effort to bin gold metal from ore and tailings waste results.³ Without prevention and control, exposure to mercury can cause health impacts. In general, elemental and methylmercury mercury is very toxic and can affect central and peripheral nervous system, whereas organic

Corresponding Author:
Abdul Rohim Tualeka
Department of Occupational Health and Safety, Faculty of Public Health, Airlangga University, 60155 Surabaya, East Java, Indonesia
Phone: +62 81 333 519 732
Email: abdul-r-t@fkm.unair.ac.id
mercury has an impact on kidney disorders and irritation of the eyes, skin and digestive tract. Health problems due to exposure to mercury can occur after various forms of mercury are inhaled, swallowed, or even absorbed by the body. Based on research conducted by Hasyimi et al (2014), gold mining in Kayeli Village has a negative impact on public health in the form of diseases that have never previously reported.

Reference of dose (RfD) is a safe concentration of mercury recommended for humans. In several studies, Indonesia still uses the reference results of RfD in America and Europe, thus, it cannot be used as a reference in determining and predicting safe risks for the health of Indonesian workers. Health risk analysis in the Kayeli Village Gold Permit (PETI) area has been carried out in Lain et al. (2016) and the dose reference value (RfD) of mercury was 0.042 mg/kg/day, which is the US EPA reference dose. In addition, the determination of the mercury dose reference in Pahruddin’s (2017) study also uses RfD as determined by USEPA (1997) of 0.0003 mg/kg. In this study, RfD was obtained based on the principle of dose response and toxicity test for determining the highest dose without causing effects on experimental animals or NOAEL. Toxicity test carried out by using experimental characteristics of Indonesian white mice (Rattus norvegicus) and workers in the illegal mining area (PETI) of Kayeli Village.

The research to be carried out in this article is to determine RfD of mercury by using the characteristics of experimental animals and workers in the area of illegal Gold Mining (PETI) Maluku Province Indonesia. The purpose of this article is to calculate and predict the risks to the health of the right gold mining workers. The risk estimates for the health of the right workers in Kayeli Village can determine appropriate control and prevention efforts to overcome the effects of existing mercury pollution and can be used as material for decision-making by the parties concerned, both the regional government and the environment and health in Indonesia.

Material and Method

This study aims to determine the value of RfD as the determination of safe limits of toxin dosage for workers with non reactive research using the dose response approach and NOAEL. The subject of this study is the population of Kayeli Village as many as 558 people with a sample of 67 people. The object of this study consisted of samples of dug well water and samples of shellfish that were often consumed by the people of Kayeli Village. Data analysis was performed by using descriptive analysis on each research variable to describe the characteristics of each sample and quantitative analysis in determining RfD of toxins for workers. Determination of RfD for workers is determined by calculation by formula:

\[
\text{RfD} = \frac{\text{NOAEL}}{\text{Animal Km} / \text{Human Km}}
\]

Result

A. Characteristics of Experimental Animals, Surface Area of Experimental Animal, and Surface Area of Experimental Animal Bodies: Toxicity tests on experimental animals are based on the theory of extrapolation from animal testing data to humans. The following is the formula used in calculating the surface area of the tested animal body:

\[
\text{Animal BSA} = 0.09 \times W^{0.67}
\]

Where:

- BSA : Body Surface Area (m²)
- W : Weight (kg)

Table 1: Characteristics of Experimental Animals, Surface Area of Experimental Animals, and Surface Area of Experimental Animal Bodies

<table>
<thead>
<tr>
<th>Experimental animal</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024050</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
</tr>
</tbody>
</table>

B. Characteristics, Surface Area, and Body Surface Area of Experimental Animal: The characteristics of workers’ body weight and body surface area of the worker are used in the analysis. Based on Table 2, workers’ body weight ranged from 52 kg to 89 kg with an average weight of 70 kg and a median value of 71 kg, the average height was 159 cm.

The calculation of the average surface area of the worker’s body is performed by using the following formula:

\[
\text{BSA} = 0.09 \times W^{0.67}
\]
Human BSA = \( \sqrt{\frac{W \times h}{3600}} \)

\[ = \sqrt{\frac{71 \times 159}{3600}} = 1.77 \text{ (m}^2) \]

Where:

- BSA : Body Surface Area (m²)
- W : Weight (kg)
- h : Height (cm)

**Table 2: Workers’ Characteristics and Body Surface Area**

<table>
<thead>
<tr>
<th>Number of sample</th>
<th>W (kg)</th>
<th>h (cm)</th>
<th>BSA (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>67</td>
<td>71</td>
<td>159</td>
<td>1.77</td>
</tr>
</tbody>
</table>

Based on the distribution of Table 2, the average body surface area of workers in Illegal mining of Kayeli Village is 1.77 m².

**C. Mercury Concentration**

1. **Concentration of Mercury in Drinking Water**: Measurement of mercury concentrations in drinking water was carried out in 3 excavated wells consumed by the community who live closer to the amalgamation process. Based on the distribution of Table 3, the result of laboratory measurements at 3 points of the dug wells of Kayeli Village shows an average mercury concentration of 0.0005 mg/l.

**Table 3: Concentration of Mercury in Drinking Water of Kayeli Village**

<table>
<thead>
<tr>
<th>Location</th>
<th>C (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0005</td>
</tr>
<tr>
<td>2</td>
<td>0.0005</td>
</tr>
<tr>
<td>3</td>
<td>0.0005</td>
</tr>
<tr>
<td>Average</td>
<td>0.0005</td>
</tr>
</tbody>
</table>

2. **Concentration of Mercury in Polymesoda erosa shells**: Measurement of mercury concentration in Polymesoda erosa shells was carried out at 3 tailings disposal sites directly to the beach and each location was measured 3 points, so that the total sample of shells measured was 9 points. In gold mining, the tailings resulting from gold mining contain inert minerals (inactive) and one or more toxic hazardous materials including mercury.³

**Table 4: Mercury Concentration in Polymesoda erosa Shells**

<table>
<thead>
<tr>
<th>Location</th>
<th>C (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>0.3438</td>
</tr>
<tr>
<td>1.2</td>
<td>0.5481</td>
</tr>
<tr>
<td>1.3</td>
<td>0.6133</td>
</tr>
<tr>
<td>2.1</td>
<td>0.3563</td>
</tr>
<tr>
<td>2.2</td>
<td>0.4929</td>
</tr>
<tr>
<td>2.3</td>
<td>0.5955</td>
</tr>
<tr>
<td>3.1</td>
<td>0.3930</td>
</tr>
<tr>
<td>3.2</td>
<td>0.7244</td>
</tr>
<tr>
<td>3.3</td>
<td>2.7406</td>
</tr>
<tr>
<td>Average</td>
<td>0.756</td>
</tr>
</tbody>
</table>

Based on Table 4, the result of laboratory test of mercury concentration in the lowest shells at 1.1 was 0.3438 mg/kg, while the highest mercury concentration in shells at location 3.3 was 2.7406 mg/kg. The average value of mercury concentration in Polymesoda erosa shell was 0.756 mg/kg.

**D. Animal Km and Human Km**

1. **Animal Km**: Calculation of Animal Km is one of the first steps prior to determining the safe dose limit for toxins for workers.⁹ Animal Km can be calculated by using the formula below:

\[ \text{Animal Km} = \frac{W_{\text{animal}}}{\text{BSA}_{\text{animal}}} \]

Where:

- Animal Km : Km factor
- W : Weight (kg)
- BSA Animal : Body surface area (m²)

**Table 5: Results of Calculation of Animal Km in Experimental Animals (White Mice)**

<table>
<thead>
<tr>
<th>Experimental animal (white mice)</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
<th>Animal Km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.814194082</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.814194082</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
<td>5.820914007</td>
</tr>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.024223</td>
<td>5.820914007</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024050</td>
<td>5.8004158</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
<td>5.855576247</td>
</tr>
<tr>
<td>Average</td>
<td>0.1407</td>
<td>0.024165</td>
<td>5.82</td>
</tr>
</tbody>
</table>
Based on Table 5, the calculation of the average value of Animal Km in white mice is 5.82.

2. Human Km: The Human Km calculation is the next calculation that must be done before determining the safe dose limit for toxins for workers.9 Human Km can be calculated using the formula below:

$$\text{Human Km} = \frac{W_{\text{human}}}{\text{BSA}_{\text{human}}}$$

Where:

- Human Km : Km factor
- W : Weight (kg)
- BSA Animal : Workers’ body surface area (m$^2$)

Table 6: Average Human Km Calculation Results

<table>
<thead>
<tr>
<th>Number of sample</th>
<th>W (kg)</th>
<th>BSA (m$^2$)</th>
<th>Human Km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>67</td>
<td>71</td>
<td>1.77</td>
<td>40.11</td>
</tr>
</tbody>
</table>

Based on Table 6, the results of calculating the average Human Km value of workers in the area of Unlicensed Gold Mining (PETI) is 40.11.

E. NOAEL (No Observed Adverse Effect Level): NOAEL is one of the information that can be used to estimate the safety/risk of chemicals for the human body and also become one of the environmental quality criteria main indicators.9 According to EPA10 and WHO1, NOAEL value of mercury is 0.23 mg/kg.

F. Reference of Dose (RfD): Mercury exposure through the ingestion pathway, the type of safe dose determination for toxins for the body of the worker uses RfD.11 Determination of RfD can be calculated using the formula below:

$$\text{RfD} = \frac{\text{NOAEL}_{\text{Animal}}}{\text{Human Km}}$$

Where:

- RfD : Reference of Dose (mg/kg)
- NOAEL : No Observed Adverse Effect Level
- Km factor (Rattus norvegicus)

Based on the formula, mercury exposure RfD is 0.033 mg/kg through the following calculations:

$$\text{RfD} = \frac{0.23}{40.11} = 0.033 \text{ mg/kg}$$

Discussion

Mercury exposure to workers in the illegal Gold Mining Area in Kayeli Village occurs through ingestion pathways. Based on observations, the average mercury concentration in drinking water in the area of Unlicensed Gold Mining (PETI) is 0.0005 mg/l and is still below the maximum value of mercury permitted and determined by Minister of Health Regulation No.492 of 201012 concerning Drinking Water Quality Requirements and WHO13 of 0.001 mg/l in The Guidelines for Drinking-water Quality. The average mercury concentration in Polymesoda erosa shells in is 0.756 mg/kg and exceeds the maximum limit value of 0.01 mg/kg4 and the minimum risk level value is 0.002 mg/kg determined by Agency for Toxic Substances and Disease Register.14

The value of NOAEL is toxicity test for determining the highest dose without causing any effects on experimental animals and is based on the theory of extrapolation of doses from experimental animals to humans.15 By determining the characteristics of workers in the area of Kayeli Illegal Mining (PETI), the average body weight is 71 kg and height is 159 cm, NOAEL value of mercury is 0.23 mg/kg.10 This value is lower than the NOAEL value of mercury obtained in the Branco study in 2017 is 10 mg/kg in a mother’s hair.16 From the various NOAEL values obtained from several predetermined references, NOAEL is an experimentally determined dose and there is no statistically or biologically significant indication of the toxic effect in question.15

RfD is a non-carcinogenic quantitative toxicity in the form of estimates of daily exposure doses that are not expected to cause adverse health effects even though the exposure lasts for life.5 The mercury RfD value in the area of Unlicensed Gold Mining (PETI) in Kayeli Village is 0.033 mg/kg. Mercury RfD value is bigger than the mercury RfD value set by USEPA (1997)8 and has been used in Pahruddin’s research (2017)7 at 0.0003 mg/kg. In addition, according to the Agency for Toxic Substances and Disease Register the value of mercury RfD in Kayeli Village is also bigger than the ATSDR RfD value of 0.0004 mg/kg.14 RfD values obtained through NOAEL calculations and experimental toxicity tests are inversely proportional to Km factors in humans/workers. This is supported by Safitri’s research (2015) which states that the greater a person’s weight, the less likely the risk is to experience health problems because human
body weight reflects a person’s nutritional status. If a person’s nutritional status is bad it can affect the decline in endurance.\textsuperscript{17} When the immune response decreases, there has been an effect or effect of a chemical/dangerous heavy metal in the body. The integrity of the immune system is needed to defend against microorganisms and toxic products produced.\textsuperscript{18}

**Conclusion**

The concentration of mercury in drinking water contained in the wells digging in the area of Unlicensed Gold Mining (PETI) is still within safe limits for consumption by workers with an average mercury concentration of 0.0005 mg/l, while the average value of mercury concentrations in Polymesoda erosa area shells Unlicensed Gold Mining (PETI) of 0.756 mg/kg is not safe for consumption by workers. If there is no attempt to control mercury concentrations in the shell intake per day, adverse health effects on workers in the Gmining area area of Kayeli Village can emerge. In addition, the daily exposure dose of mercury that is not expected to have a detrimental effect on health in the Kayeli Village Gold Permit area of 0.033 mg/kg with NOAEL value of mercury of 0.23 mg/kg.\textsuperscript{10}

**Recommendation**

Recommended control related to mercury exposure in the Kayeli Village Ilegal Gold Mining Area (PETI) is administrative controls in the form of actions to develop policies related to licensing gold mining activities in the area by the Kayeli Village government. If the policy is enforced and can be implemented properly, it can reduce mining activities that pollute the waters of the Kayeli Village. In addition, technical control in the form of handling mercury pollution can be carried out using the role of microorganisms or bioaccumulation, bioremediation and bioremoval processes.

**Conflict of Interest:** All authors have no conflicts of interest to declare

**Source of Funding:** This is an article about “Determination of Dosage Reference (RfD) of Mercury based NOAEL and Characteristics of Workers in Unlicensed Gold Mining Areas (PETI) Maluku Province, Indonesia” of Occupational Health and Safety Departement thas was supported by Faculty of Public Health, Airlangga University

**Ethical Clearence:** The study was approved by the institutional Ethical Board of the Public Health, Diponegoro University

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Using of Blended Learning in Improving Collaboration Skill of Nursing Students

Musrifatul Uliyah¹, Luthfiyah Nurlaela², Mustaji³, Abdul Aziz Alimul Hidayat⁴
¹,²,³Universitas Negeri Surabaya, 60231, Indonesia; ⁴University of Muhammadiyah Surabaya, 60113, Indonesia, Jl. Sutorejo No. 59 Surabaya, (031) 3813096

ABSTRACT

Background: An issue of collaboration between nurses and doctors can be caused by the lack of learning process which contains the element of collaboration in nursing education. Therefore culture and attitude to collaborate are lacking among nursing students.

Aim: This research is aimed to analyze the use of blended learning in enhancing the skill of collaboration of nursing students.

Method: The research is conducted by way of non-systematic type of literature review. Data in the form of articles were collected from several databases which includes PROQUEST, Science Direct, Elsevier, BMJ, Google Scholar and PubMed by searching several keywords search namely “e-learning”, “blended learning”, “Nursing Education”, “collaborative nursing”, “IPE”, “IPC”, “Professional Collaboration”, “Interprofessional Education” using boolean “AND”. In addition to keywords search, the researcher also used inclusion and exclusion criteria in filtering the articles reviewed confining to articles published in 2013-2018.

Results: Blended learning can improve nursing students’ collaboration skills through increasing the elements of cooperation, assertiveness, responsibility, communication, autonomy, coordination, understanding of general goals, mutual respect and trust.

Conclusion: Blended learning can be adopted in nursing education. Blended learning can increase motivation, improve learning outcomes, instill good character values, encourage critical thinking and enhance the collaboration skills of the students.

Keywords: Blended learning, Nursing Education, Collaboration

Introduction

Nursing is professional service which forms an integral part of the health services in the form of comprehensive biopscosocial and spiritual services aiming at individuals, families and communities. Nursing is a service-oriented profession by helping patients to overcome their health problems. One of the characteristics of this profession is to have the skills of collaboration namely establishing cooperation among various health professions in diagnosing health problems and helping to resolve them.

The skill in collaborating is currently considered to be lacking in the nursing profession. According to the research finding of Rumanti, it was stated that the practice of collaboration between nurses and doctors was lacking and most of them were still in the stage of negotiating. Likewise, Reni’s research finding stated that the collaborative implementation between nurses and doctors in one of the Sumedang district hospitals was still not effective. This shows that the spirit of collegiality among the nurses and the doctors has not been formed. The hierarchical interaction between nurses and doctors can still be seen in the interdisciplinary...
relationship among physician nurses. Collaboration problems were also experienced by nurses in Turkey according to Durmus’ research and collaboration. It also happens to nurses in China where the level of collaboration between nurses and doctors was in the medium category in respect of effective communication, perceived respect and willingness to collaborate.

The problems of collaboration between nurses and doctors were caused by various factors including a less positive attitude. According to Tang’s research which stated that doctors view that the collaboration of nurses is less important but assess the quality of collaboration to be higher as compared to the nurses. Besides that, it is also influenced by other factors including communication, respect, trust, unequal strength, understanding professional roles and assigning priority tasks.

The collaboration problem between nurses and doctors can be attributable to the problem of learning process in nursing education and lacking of the application of learning methods that contain element of collaboration which resulted the lacking of culture and attitude to collaborate among the nursing students. The skill of interprofessional cooperation is not easy but yet it can be honed by all nurses provided that they must be trained in the early stage through the process of collaborative learning in interprofessional education. Likewise Foote’s research stated that interprofessional education with collaborative learning approaches can enhance the collaboration skill of interprofessional team, defining roles and responsibilities and increasing trust in nursing skills.

However, various efforts can be made to the learning process in order to resolve the problems of collaboration of nursing students such as the use of clinical instructors to improve the learning experience of the nursing students. Other than that, preceptorship programs can also improve the learning outcomes of nursing students. Besides that, learning with concept maps and blended learning is also able to enhance collaboration. The purpose of this research is to study the utilization of blended learning in improving the collaboration skills of nursing students.

Method

This research is conducted by way of non-schematic type of literature review. Data in the form of articles were collected from several databases which include PROQUEST, Science Direct, Elsevier, BMJ, Google Scholar and PubMed. Data by searching several key words namely “e-learning”, “blended learning”, “Nursing Education”, “collaborative nursing”, “IPE”, “IPC”, “Professional Collaboration”, “Interprofessional Education” using boolean “AND”. In addition to keywords search, the researcher also used inclusion and exclusion criteria in filtering the articles reviewed confining to articles published in 2013 - 2018 in Indonesian as well as English with realiable sources.

Results and Discussion

There are two reasons for adopting blended learning model especially in universities where there are for students and lecturers or referred to as differentiated instruction and the presence of comfort and presence list or referred to as pacing and attendance.

Differentiated instruction means that lecturers can determine the contents of the curriculum, environment, online learning activities, face-to-face depending on the level of difficulty, interest, learning style and are able to determine the time of the students working in groups and to provide additional materials that are not available in online module. Meanwhile, pacing and attendance means that students can independently determine when they want to study. As such, there will be no issue even if the students do not not present during the lecture, they are still able to access the learning materials online so that they will not be left behind.

In addition to the above reasons, blended learning has validity, practicality and effectiveness in learning. Validity can be seen from the elements in blended learning, namely there were elements of application and tutorial had a role in improving the procedural abilities needed by the learning process. Collaboration skill can be honed from the e-learning process of blended learning as there is element of collaboration among the students in solving problems in a given case.

The practicality and effectiveness in blended learning can be seen from planning and implementation. Planning using e-learning facilities of blended learning consists of ease of obtaining subject identity, learning outcomes, learning objectives, materials, time allocation, learning methods, learning activities, assessment of learning outcomes, learning resources, completeness.
of learning tools, presence of face-to-face learning, independent learning, collaboration, assessment and learning material support.

In the implementation of blended learning model, it is practical and effective in orientation, organization, investigation, presentation, analysis and evaluation such as learning preparation, delivery of learning objectives, introduction of materials, introduction of problems related to materials, assigning tasks, related problems to be studied by students, independent and group investigations, gathering information related to the problem to be studied, solution to the problem studied, developing work and presentation of works and evaluating learning outcomes. Likewise, the effectiveness of blended learning is able to make students to be more active and increasing the interest of students in learning as it is not boring.

Some research findings have proven the advantages of blended learning. For example, Ali’s research stated that the implementation of blended learning could increase the motivation of the students and improve learning outcomes15. Susana’s research also stated that blended learning is able to instill good character values in learning among the students16. Likewise in Fitriani Research and Ikhsan, it was stated that blended learning is able to improve students’ critical thinking17.

In nursing education, the application of blended learning also has an impact in improving the learning skills of nursing students in which the Mean et.al study stated that blended leaning is more effective than face-to-face learning in the ability of meta-analysis18. Likewise, Campbell et al.’s research stated the application of discussion in blended learning has better results as compared to face-to-face discussions19.

In the development of blended learning model, it had been carried out by using various approaches such as the development of moodle-based blended learning in microbiology courses20. Development of blended learning design by using assure approach21. Development of blended learning in aspects of learning design by using online social media platforms as supporting lectures 22 and the integration of collaborative problem based learning with blended learning 23.

Blended learning as a learning method has several criteria where Rosenberg has identified the three basic criteria in e-learning:

1. e-learning is a network that can make, improve quickly, save or reappear, distribute and share learning materials and information;
2. e-learning is accessible by all users who have access to internet;
3. e-learning focuses on broader learning where learning solutions can be superior to the training paradigm. 24, 25.

Collaboration according to Orchard (2005) is a joint communication and decision-making process with the aim of meeting health care needs or it can also be defined as a partnership between a team of health professionals with a participatory, collaborative and coordinated approach to share decision making communication about health issues. 26. Collaboration is needed by nurses as there are various elements associated with collaboration which include cooperation, assertiveness, responsibility, communication, autonomy, coordination, general purpose, mutual respect and trust 27.

Collaboration is the first element in building collaboration. Through collaboration one will respect the opinions of others, willing to trust and to accept other opinions. Assertiveness is the second element in building collaboration. Assertiveness means the skill of collaborative team members to offer information, appreciate the scientific approach and share experience they have, and to ensure the opinions of each team are accepted and that consensus can be achieved. Responsibility is the third element in building collaboration which means that each team member must take responsibility based on the consensus, both as a member of the team and the profession. Communication is the fourth element in collaboration which means that each member of the team must share important information about patient care or various information related to clinical decisions. Autonomy is the fifth element in collaboration which means that each team member would have scientific independence or autonomy within the limits of his competence and the freedom to apply knowledge and manage patients in accordance with their fields or professional competencies. Coordination is the sixth element in collaboration which means that each joint decision-making is decided through coordination among team members and at the same time to reduce duplication of decisions making for organizational efficiency. General goals is the seventh element in collaboration which means that collaboration is based on
general-purpose concepts, emphasizing mutual respect and a professional approach to solving problems. Mutual respect and trust are the eighth element in collaboration which means that relationships are dynamic to achieve mutual satisfaction or a relationship that facilitates a dynamic process characterized by a desire to advance and achieve satisfaction for collaborative team members while trust could determine success in collaboration goals. Therefore the element of collaboration could be developed through blended learning.

**Conclusion**

Blended learning is one of the learning models that can be used as an alternative learning model in nursing education in the era of information technology. Blended learning is easy to use and it can increase motivation, improve learning outcomes, instill good character values, encourage critical thinking and enhance the collaboration skills of the students through increasing of the elements of collaboration, assertiveness, responsibility, communication, autonomy, coordination, understanding of general goals, mutual respect and trust

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**Ethical Clearance:** Taken from Institutional Ethical committee

**Conflict of Interest:** Nil

**Source of Findings:** Self

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Maternal and Fetal Determinants of Stillbirth among Women Who Attending Maternity Departments of Basra Central Hospitals

Nadeem R Shiaa¹, Sajjad S. Issa², bd AL Kareem H Subber³

¹Department of Medical Operations and Emergency, Basra Health Office, Iraq; ²Department of Fundamental of Nursing, College of Nursing, University of Basra, Basra, Iraq; ³Department of Gynecology and Obstetric, Delivery and Children Hospital, Basra Health Office, Iraq

ABSTRACT

The cross-sectional case control study was carried out in the Basra over a period of six months. The aim of the study is to assess maternal and fetal determinants, incidence of stillbirth in Basra. We also evaluate the prevalence of stillbirth in Basra during previous five years. The women (n=114) who delivered stillbirths whether fresh or macerated at 28 weeks gestation or more were considered in this study. In the control group, women (n=228) who delivered a live baby were considered. In the study period, 26211 numbers of deliveries were reported, out of which about 346 were stillbirths. While, around 410,733 births was reported in last five years and 5,456(1.33%) were found to be stillbirths. The incidence of stillbirths were 13.2 per 1000 births during the period of the study, most of them were males, preterm and macerated stillbirths. The study concluded that woman with these maternal and fetal determinants were more liable to develop stillbirth, and encourage public health education regarding these determinants.

Keywords: Stillbirth, Cross-sectional case control study, Birth weight, Fetus, Iraq

Introduction

Loss of a child is a very difficult life experience to the parents which can often cause complicated grief for them[1-2]. It is a hurtful event even when the parents have not make a relationship with their infant[3-4]. It is always associated with post-traumatic stress, shame, feeling of guilt, depression, anxiety, sleeping disorders, etc.[5-8]. Improving health system makes prevention of most stillbirths possible[7-8]. Women with a history of previous stillbirths are 2-10 time more likely to have another one in subsequent pregnancies[9-10]. However, not all women show this problem[11].

Stillbirth is a death of a fetus that has reached a birth weight of 500g, or if birth weight is unavailable, gestational age of 22 weeks or crown-to heel length of 25cm[12-13]. According to United States stillbirths a birth of a baby, which shows no sign of life like breathing, heartbeats, pulsation of the umbilical cord, or definite movements of voluntary muscles[14, 15]. The Iraqi ministry of health defines stillbirth as the fetal death that occurs after 28 weeks of gestation, which shows no sign of life[16].

From 2000 to 2015 stillbirths rate had declined by 19.4% with several interventions, this means a yearly decline of 2%[19] and 98% of these deaths recorded in the developing countries[20,12]. Half of the stillbirths in developing countries happened during labor, because of a lack of skilled birth assistants and facilities for delivery[21].

The rate of stillbirth in Iraq according to WHO estimates in the year of 2009 was 8.6/1000 total deliveries[22]. The stillbirth rate in Basra Al Zubair was 5.5/1000, while in Basra Abu Al Qaseeb was 15.3 according to the survey done by the ministry of health of Iraq in May 2012, highest stillbirth rate recorded in Halabja (Sulaimanyha) 27.1/1000[23]. While the incidence of stillbirth was 20.4/1000 total births as reported by the study done by Shahlaa AbdAlrahman in Maternity Teaching Hospital in Erbil city, Kurdistan region, Iraq at 2011[24].

There are two types of stillbirth viz. Fresh (death occurs within 12hr of birth) and macerated (death occurred more than 12-24hr)[25-26]. Pre-existing HT, GHT, and PE are a common cause of stillbirth, these hypertensive disorders cause placental insufficiency, fetal growth restriction, and stillbirth[27]. Women with
pre-existing diabetes mellitus (DM) have an increased risk of second and third-trimester stillbirth compared to women without diabetes\cite{28,29}.

The fetal causes of the stillbirth were congenital anomalies\cite{34}, fetal growth restriction\cite{32,33}, chromosomal and genetic abnormalities\cite{34-35}, multiple gestation\cite{36,37}, placental disorders\cite{27} and unexplained stillbirth\cite{38-40}. Risk factors are race and socioeconomic factors\cite{41}, advanced maternal age\cite{42}, obesity\cite{43} and multiple gestations\cite{44-45}.

**Method**

**Study Design:** A cross-sectional study aimed to determine prevalence of stillbirths in Basra central hospitals during the period of study, and case control study was used to determine maternal and fetal determinants of stillbirth. The study was carried out in the city center of Basra governorate over the period of six months started from January to June 2017. The studied sample included 342 women. Women who delivered stillbirths had been taken as cases and women who delivered a live birth were taken as controls.

**Study Tools:** The data were collected from cases and controls by direct interview using special designed close ended questionnaire (Supplementary Data 1). The investigator collected the data regarding the total number of live births and stillbirths of previous five years from (2012-2016). This data was obtained from the biostatistics section of the Basra health department.

**Statistical Analysis:** Statistical analysis of the data was carried out using SPSS program (version 20), Chi-square test of association was used to compare between proportions and to show the significance of the association between the disease (stillbirth) and different factors.

**Results**

The reported deliveries during the study period was 26,211, out of which 346 were stillbirth. So, the incidence of stillbirth in the study center was 13.2/1000. In past five years (2010-2016), about 410,733 births occurred and about 5,456 was found to be stillbirths (13.1 cases per 1000 births).

**Study of different variables in the studied group:** According to Sociodemographic characteristics, the number of mothers reported to age above 19, 20-29, 30-39 and below 40 were 37, 207, 82, 16, respectively. The enrolled urban and rural resident subjects were 210 (61.4) and 132 (38.6%), respectively. Out of 342 cases, active and passive smokers were reported to be 22 (6.4%) and 122 (35.7%), respectively. While, reported educational level as illiterate (45), primary school, secondary school and higher education were 45 (13.2), 32 (38.6), 114 (33.3) and 51 (14.9), respectively. The parity was categorized as 0 (125), 1-4 (160) and ≥5 (57).

About (n=298, 87%) of mothers had no chronic medical illness before pregnancy. The number of cases with pre-existing HT and DM was around 12 (3.6%) and 7 (2%), respectively. Around 13 cases (3.8%) had sickle cell disease. The cases for epilepsy (1.8%), cardiac disease (0.9%), diabetes mellitus with hypertension (0.6%) and Systemic lupus erythematos were found to be 6, 3, 2 and 1, respectively.

About 212 cases (62.1%) had no maternal morbidities during pregnancy. While, GDM, fever and rash history, GHT, PE, antepartum hemorrhage, anemia, PE with GDM, antepartum hemorrhage with anemia, Antepartum hemorrhage with PE was reported to about 12 (3.5%), 10 (10), 11 (3.2%), 20 (5.8%), 14 (4.1%), 51 (14.9%), 4 (1.2%), 7 (2.0%) and 1 (0.3%), respectively.

Around 55 (16.1%) child showed congenital malformation. The number of male and female child birth was reported to be 161 (47.1%) and 181 (52.9%), respectively. Around 294 (72.8%) participant was on folic acid-Iron supplementation. The fetal parameter is depicted in the Table 1.

| Table 1: The fetal parameter among study group |
| Parameter | Variables | No. |
| Gestational age at delivery | ≥37 | 201 (58.8) |
| | 32-36 | 82 (24.0) |
| | 28-31 | 59 (17.2) |
| Singleton/multiple | Singleton | 313 (91.5) |
| | Multiple | 29 (8.5) |
| Birth weight (gm) | ≥2500gm | 184 (56.6) |
| | 1500-2499gm | 51 (15.7) |
| | 1000-1499gm | 38 (11.7) |
| | <1000gm | 52 (16.0) |
| | Missing | 17 |
| Antenatal care | No | 28 (8.2) |
| | Inadequate | 102 (29.8) |
| | Adequate | 212 (62.0) |

Most of the fetuses delivered by normal vaginal delivery (56.7%). While, induction of labor and
cesarean section mode of delivery was found to be about 92(26.9%) and 56(16.4), respectively. Around fresh and macerated types of stillbirth was reported to about 28(24.6%) and 86 (75.4%), respectively. The data for blood group was missing for 13 cases. Antenatal care visit as primary health care, private clinic and both were reported to be 79(25.2), 148(47.1) and 87(27.7), respectively. The blood group of enrolled participants were given in the Table 2.

### Table 2: Estimated blood group of enrolled participants

<table>
<thead>
<tr>
<th>Blood Group</th>
<th>A</th>
<th>B</th>
<th>AB</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rh factor</td>
<td>Rh+ve</td>
<td>Rh-ve</td>
<td>Rh+ve</td>
<td>Rh-ve</td>
</tr>
<tr>
<td>Number (%)</td>
<td>59(17.9)</td>
<td>63(19.1)</td>
<td>109(33.1)</td>
<td>54(16.4)</td>
</tr>
</tbody>
</table>

**Associations between stillbirth and different variables:** There was an association between advanced maternal age and stillbirth, about (33.3%) of cases were in age groups (30-39) years as compared to (19.3%) of controls. About 60%(n=69) of cases lived in rural areas compared to 27.6%(n=63) of controls, while 72.4%(n=165) of controls lived in urban areas compared to 40%(n=45) of cases (p<0.05).

The obstetric determinants such as past obstetric history, antenatal care visit and their type, folic acid-Iron supplementation, gestational age (week) is depicted in the Table 3.

### Table 3: Distribution of cases and controls regarding obstetric determinant

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Obstetric characteristic</th>
<th>Cases (%)</th>
<th>Control (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetric history</td>
<td>History of miscarriage</td>
<td>26(22.8)</td>
<td>31(13.6)</td>
</tr>
<tr>
<td></td>
<td>History of stillbirth</td>
<td>33(28.9)</td>
<td>26(11.4)</td>
</tr>
<tr>
<td></td>
<td>Both are non</td>
<td>55(48.3)</td>
<td>171(75.0)</td>
</tr>
</tbody>
</table>

Cases (114) and control (n=228); p=0.0001 in each group

Most of the cases (81.6%) and controls (96.5%) had singleton pregnancy (0.0001), but the percentage of multiple pregnancies was higher among cases (18.4%) compared to controls (3.5%) (Table 4).

### Table 4: Distribution of cases and controls regarding fetal outcome

<table>
<thead>
<tr>
<th>Fetal parameter</th>
<th>Types</th>
<th>Cases (%)</th>
<th>Control (%)</th>
<th>Test of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
<td>72(63.2)</td>
<td>89(39)</td>
<td>p = 0.0001</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>42(36.8)</td>
<td>139(61)</td>
<td></td>
</tr>
<tr>
<td>Birth Wight (g)</td>
<td>≥2500</td>
<td>16(14.4)</td>
<td>168(78.5)</td>
<td>p=0.0001</td>
</tr>
<tr>
<td></td>
<td>1500-2499</td>
<td>28(25.2)</td>
<td>23(10.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000-1499</td>
<td>26(23.4)</td>
<td>12(5.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;1000</td>
<td>41(36.9)</td>
<td>11(5.1)</td>
<td></td>
</tr>
<tr>
<td>Congenital malformation</td>
<td>No</td>
<td>80(70.2)</td>
<td>207(90.8)</td>
<td>p=0.0001</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>34(29.8)</td>
<td>21(9.2)</td>
<td></td>
</tr>
</tbody>
</table>
The percentage of cases that had maternal morbidities during pregnancy were (57%) compared to (28.5%) of controls. PE was higher (12.3%) among cases (n=14) compared to controls (n=6,2.6%). In the cases (n=114), GDM, fever and rash history, GHT, Antepartum hemorrhage, anemia, PE with GDM, Antepartum hemorrhage with anemia, PE with GDM, Antepartum hemorrhage with anemia, PE was 6(5.3%), 4(3.5%), 6(5.3%), 4(3.5%), 21(18.4%), 2(1.8%), 7(6%), 1 (0.9%) which was significantly higher (p=0.0001) as compared to control i.e. 6(2.6%), 6(2.6%), 5(2.2%), 10(4.4%), 30(13.2%), 2(0.9%), 0(0.0%) and 0(0.0%), respectively.

Table 5: The recorded blood group of the participants

<table>
<thead>
<tr>
<th>Blood Group</th>
<th>A</th>
<th>B</th>
<th>AB</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rh factor</strong></td>
<td>Rh+ve</td>
<td>Rh-ve</td>
<td>Rh+ve</td>
<td>Rh-ve</td>
</tr>
<tr>
<td><strong>Cases (%)</strong></td>
<td>10(9.1)</td>
<td>6(5.5)</td>
<td>14(12.7)</td>
<td>4(3.6)</td>
</tr>
<tr>
<td><strong>Control (%)</strong></td>
<td>49(22.4)</td>
<td>2(0.9)</td>
<td>49(22.4)</td>
<td>5(2.3)</td>
</tr>
</tbody>
</table>

Higher percentage of cases (47.4%) and controls (61.4%) were delivered by normal vaginal delivery, while induction of labor was higher among cases (41.2%) versus to controls (19.7%) and the difference was statistically significant so induction of labor considered as risk factor. About 13(11.4%) were reported to have cesarean section as compared to control (43, 18.9%). C/S rate was higher among controls so it was protective factor. The statistical significance between the cases and control was 0.0001.

**Conclusions**

The incidence of stillbirths in central hospitals of Basra were 13.2/1000 births. From this study we concluded that elderly women with poor ANC, visiting primary health care, of low educational level, lived in rural area, being AB+ blood group, being active or passive smoker, had history of medical disease and pregnancy with some disease like hypertension, diabetes mellitus, cardiac disease, sickle cell disease, PE, anti partum hemorrhage, febrile illness or infection, not taking folic acid iron-supplementation during pregnancy, had multiple gestation, and past history of pregnancy loss inform of miscarriage or stillbirth, carrying male baby, with congenital anomalies, were more liable to have stillbirth.

**Ethical Clearance:** Ethical clearance were taken from Basra central hospitals.

About 20.2% of cases had a chronic medical illness compared to 9.2% of controls. The pre-existing hypertension, diabetes mellitus, cardiac disease, sickle cell anemia, epilepsy, diabetes mellitus with hypertension and systemic lupus erythromatous condition were 5(4.4%), 3(2.6%), 3(2.6%), 6(5.3%), 4(3.5%), 1(0.9%) and 1(0.9%) in the cases as compared to control i.e. 7(3.1%), 4(1.8%), 0(0.0%), 7(3.1%), 2(0.9%), 1(0.4%) and 0(0.0%), respectively. The increase in the cases was significant (p=0.027) as compared to control group. The recorded blood group of the participants was given in the Table 5.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**REFERENCES**

23. Congenital birth defects in Iraq –WHO EMRO


SPIRITUAL-BASED FAMILY CARE MODELS TO IMPROVEMENT FAMILY HEALTH WITH LEPROSY AT JOMBANG REGENCY OF EAST JAVA INDONESIA

Nasrudin1, Ah Yusuf2, Rachmat Hargono1, Tjipto Suwandi1

1School of Public Health, Airlangga University, Surabaya, Indonesia; 2School of Nursing, Airlangga University, Surabaya, Indonesia

ABSTRACT

Leprosy contributes to the occurrence of stress in the family, demand of the role for caring, and maintaining the health of the family. In this case the strengthening of family spiritual value will impact on the strength and the ability of the family in overcoming the leprosy. The purpose of this research was to make caring model of family spiritual based to enhance the health of the family of lepers’ patient.

Design used in this study was analytical observational. The population was 174 leprosy families in 21 endemic Leprosy public health centers or Puskesmas in Jombang regency of East Java. Total sample used was 120 families with lepers. Data were collected by questionnaire and it was analyzed by using Smart PLS 3.0.

The result shows that: 1. Family factor gives the family with lepers spiritual based family nursing model of care and improving the strength of the family to overcome the stress and their health as well. 2) Individual and environmental factors gave contribution to the occurrence of family stigma, but they did not directly impact on family stress. 3) Family stigma (separation) impact on family stress. 4) Family stress contributed to the use of caring spiritual based. 4) There has been influence or impact of caring spiritual based on the improving the health of the family.

The conclusion is that Family caring model in nursing practice spiritual based impact on the health of the family with lepers.

Keywords: Nursing model of care, Spiritual nursing, Health of the family, Leprosy

Introduction

The family of leprosy patients has the important role for the treatment of leprosy patients and which has the greatest impact due to family members suffering from leprosy, resulting in a situation full of stress and family health problems.

The results of the previous research conducted in 2017 shows that in 39 leprosy patients in Jombang Regency, East Java, 10% of patients experienced physical disability, 30% psychological disorders and 60% experienced psychosocial. Family support for lepers in treatment was found to be 75% low, concealment of 47% patients, families experiencing 80% stress. This condition was influenced by the family’s ability to carry out the function of caring for and enduring the family in overcoming stressful conditions.

Family needs a resource, support and strengthening family resilience in carrying out the family functions of caring for family members who suffer from leprosy and keeping the family for a healthy condition. Furthermore, strengthening family resilience includes three major components, namely: strengthening the family belief systems, strengthening the structure and function of the family, strengthening communication patterns and family power systems in overcoming problems. Spiritual family is the basis of of family values and beliefs.
Individual and family spiritual and religious beliefs are at the core of all family coping and adaptation. The family’s spiritual concept consists of family religious coping, family interdependence, family togetherness and personal spiritual \(^{(1,2)}\).

Family nursing care models in *Family Centered Nursing (FCN)* which is in line with family problems with leprosy sufferers are used for a family approach to caring for and strengthening families as a system. However, they have not got into the strengthening of family values and beliefs as the main resource for strengthening family health. Spiritual-based family nursing models with approaches family centered nursing (Friedman, 2003) are expected to illustrate family care models in improving family health of leprosy patients. This model was developed based family centered nursing theory \(^{(3)}\), spiritual family theory \(^{(1,2,4)}\), stress-coping theory \(^{(5)}\), ABC-X model \(^{(6)}\).

### Material and Method

This cross-sectional design research was conducted on 2018 – 2019. The study population was a leprosy family in 21 endemic leprosy community health services in Jombang regency of East Java, consisted of 174 families of leprosy patients and they had been diagnosed with leprosy and recorded in a public health center or puskesmas data registration. The sample was 120 families taken by using Multi-Stage Random Sampling. Data was collected by questionnaires. Respondent from each family was represented by a family member who cares directly for lepers in the family. The questionnaire was used to measure family factor, individual factor, family stigma environment factor, family stress, spirituality-based care and the family health of leprosy patients. Meanwhile, *Smart PLS 3.0.* was used for analyzing inferential data.

### Findings

The result of path analysis is presented in table 1 of outer weight test shows that all indicators were statistically significant. They have a correlation to used as a measurement tool for the model. Indicators of family factors, individual factors, environmental factors, family stigma, family stress, spiritual family-based family care have a value of loading factors > 0.5 and values composite reliability > 0.6.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Indicator</th>
<th>Loading original</th>
<th>Composite Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family factor</td>
<td>Perception of families</td>
<td>0.770</td>
<td>0.915</td>
</tr>
<tr>
<td></td>
<td>Family Support</td>
<td>0.886</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Socio-Economic of family</td>
<td>0.953</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Expenses Family</td>
<td>0.956</td>
<td></td>
</tr>
<tr>
<td>Individual factors</td>
<td>Time of sick</td>
<td>0.777</td>
<td>0.941</td>
</tr>
<tr>
<td></td>
<td>Self-concept</td>
<td>0.809</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disability rate</td>
<td>0.846</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Self stigma</td>
<td>0.855</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quality of life</td>
<td>0.864</td>
<td></td>
</tr>
<tr>
<td>Environmental factors</td>
<td>Community stigma</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Separating</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Families stress</td>
<td>Depression</td>
<td>0.969</td>
<td>0.917</td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
<td>0.732</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Somatic</td>
<td>0.863</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inadequate</td>
<td>0.852</td>
<td></td>
</tr>
<tr>
<td>Spiritually based family care</td>
<td>Family religious coping</td>
<td>0.821</td>
<td>0.936</td>
</tr>
<tr>
<td></td>
<td>Family support and togetherness with spiritual</td>
<td>0.914</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Family interdependence in the healing process</td>
<td>0.908</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spiritual family member</td>
<td>0.899</td>
<td></td>
</tr>
</tbody>
</table>
Furthermore, it was followed by inner weight test to analyze the correlation between latent variables as shown in table 2.

Table 2: The Inner weight test on Family Nursing Model-based Spiritual to Improve Family Health Status

<table>
<thead>
<tr>
<th>The relationship between latent variables</th>
<th>Coef Path Original</th>
<th>(Bootstrap n = 500) T Statistics</th>
<th>Ket</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Factors - Family stress</td>
<td>0.687</td>
<td>13,778</td>
<td>Valid</td>
</tr>
<tr>
<td>Family factors - Spiritual base family Care</td>
<td>0.568</td>
<td>7.248</td>
<td>Valid</td>
</tr>
<tr>
<td>Individual Factors - Family stigma</td>
<td>0.402</td>
<td>2,861</td>
<td>Valid</td>
</tr>
<tr>
<td>Environmental factors - Family stigma</td>
<td>0.277</td>
<td>1974</td>
<td>Valid</td>
</tr>
<tr>
<td>Family stigma - Family stress</td>
<td>0.230</td>
<td>3,559</td>
<td>Valid</td>
</tr>
<tr>
<td>Family stress - Spiritual base family care</td>
<td>0.216</td>
<td>2,738</td>
<td>Valid</td>
</tr>
<tr>
<td>spiritual base family care - Family Health</td>
<td>0.374</td>
<td>5.646</td>
<td>Valid</td>
</tr>
</tbody>
</table>

Based on value inner weight in table 2, indicators have a correlation coefficient > 0.05 and T values statistic > 1.96. Hence it can be concluded that there is a significant relationship between latent variables. Family factors have the strongest relationship in improving family health.

From the results of path analysis, a spiritual-based family care model in improving the family health of leprosy patients can be seen in Figure 1.

![Figure 1: Family-based family nursing model in improving the health of families of leprosy patients](image-url)

From Figure 1 shows the value of T statistic > 1.96. : 1) There are influences of family factors (perception, support, socio-economic, and family burden) on family-based spiritual care and family stress resistance. 2) There
are influences of individual factors (duration of leprosy, disability, self-concept, self-stigma, and quality of life) to the family stigma. 3) There is an influence of environmental factors (community stigma) on the family stigma. 4) There is a stigma effect of family (separation) to stress the family. 5) There is an influence of family stress on spiritual-based care. 6) There is an influence of spiritual-based care on family health. 7) There is an influence of a spiritual-based family care model on family health.

Discussion

The effect of family factors on family stress: The results showed that t value of 13,778. This means: there is an influence of family factors (perception, burden, support and family socio-economic) on family stress. Meanwhile, family stress is influenced by the ability of the family to understand problems due to leprosy (perception of problems), assessment of family burden due to leprosy. The success of the family in the primary assessment will increase family confidence and family resilience in facing stressful situations due to leprosy. The second assessment by the family of family resources including family support and socio-economic benefits in determining the choice of coping strategies based on existing resources.

The results of family factor research on indicators of family perceptions of leprosy family members found that perceptions were good at only 25%, lack of knowledge. This wrong perception can have an effect on family coping, the emergence of family stigma and impact on the process of care for leprosy patients and family health as a system. Effect of family factors on spiritual-based family care: The results showed that t value of 7.248, this means: there is an influence of family factors (perception, burden, support and family socio-economic) on spiritual-based family care. The existence of leprosy patients in the family affects the family as a system and the family as a collection of family members and creates its own stressors for the family. The biggest problem of leprosy is the social and psychological problem of the impact of stigma for individuals, families and society.

Strengthening families in facing stressful conditions through Walsh’s three basic components of family reinforcement, namely: strengthening the system of family beliefs and (systemfamily belief systems), strengthening the structure and function of the family as an organization, strengthening communication patterns and family power system in overcoming problems (communication/problem-solving) is expected to improve the health of families of people affected by leprosy. The family’s ability to carry out family duties in spiritual-based care is to make the family spiritual as the basis for carrying out the role of family nursing in caring for family members suffering from leprosy.

Effect of leprosy patient factors on family stigma: The results showed that the individual factors included the duration of leprosy. Most of the respondents were found to suffer from 6-12 months of leprosy, a small proportion of respondents had a good self-concept (positive), and even though there was a change in ADL ability only a small number of respondents (20.8%) Independent in ADL, more than half of respondents did not experience disability, for the occurrence of severe self-stigma in a small proportion of respondents (23.3%) the rest experienced moderate and mild self-stigma, and the quality of life of patients who were good and moderate. Stigma also affects family life, both psychologically or emotionally, socially, interpersonally, family functions and structures result in loss of family support in leprosy patients and reduce the quality of life for patients and all family members. The effects of this internal stigma are disruption of self-concept, fear, and mental disorders and a decrease in interest in treatment and activities with social groups. The inability of individuals to adapt physically, socially and spiritually psychologically will reduce the quality of life of leprosy patients. and add to the negative family assessment which results in the stigma of the family.

Effect of environmental factors on family stigma: The results showed that influence of environmental factors on the family stigma (t = 0.974). Stigma in society occurs because of the factors of knowledge and perception that are wrong, social factors, values and beliefs, and factors of values (norms, values and spiritual-religious beliefs) towards leprosy patients and families. Health policy factors can lead to stigmatizing situations, which can be in the form of service procedures, service providers, service regulations or services that distinguish between recipients of stigma and general social groups. The activeness of leprosy
officers in the discovery of leprosy cases, in the treatment and counseling of family and patient counseling, collaboration with leprosy cadres, coordination with community leaders, government and health service health policy holders caused families to still make leprosy officers in health centers as the best social support resources family.

Effects of family stigma on family stress: The results showed that t value of 3.559. This means that there is an influence of family stigma against family stress. The results also showed a separating incidence of 70 (58.3%) moderate. Discrimination obtained by patients from families is still 30 (25%) heavy and labeling families 73 (60.8%) are moderate.

Negative assessments of leprosy patients and their families in the community have an impact on the inability of families to choose a good coping method so that they stand on the behavior of isolating patients, and inhibiting treatment. The family is the entry point in the provision of health services in the community, the potential and involvement of the family becomes even greater, when one member of his family needs continuous assistance because his health problems are chronic, such as in leprosy patients (3).

Effects of family stress on spiritual-based family nursing: The results showed that t value of 2.738. This means that there is an influence of family stress on spiritual-based family nursing. Family resistance to stress is very influential on family resilience. Family resilience is a capacity to recover from difficulties. This is an active process of family resilience to stressors, self-righting, and growth in responding to crises and challenges (2).

Primary appraisal is very influential on the ability of the family to consider whether this is considered a threat, whether the family is able to overcome stress, if the family’s resistance to stress is good then the family will be able to choose coping strategies that focus on the problem rather than focusing on emotions (5,13). Secondary (appraisal) family assessment of family resources will show individual and family self-confidence in overcoming situations and stressors as a result of family members suffering from leprosy. The ability of families to conduct primary appraisal (primary assessment) and secondary appraisal (secondary assessment) to conditions that are full of stress due to leprosy will be very effective in determining coping strategies due to individual changes and changes in social environment (5,13).

Effect of family-based spiritual nursing on improving family health: The results showed that t value of 5.646. It means that there is a family spiritual based nursing influence on family health improvement. In other words, spiritual can be a significant resource in the resilience of individuals and families and it is able also to increase endurance and the recovery process. Therefore, we have to understand the important process and its effects on individuals and families.

The result data of the study reveals that adaptation ability 46 (38.6%) lack, partnership ability 38 (31.7%) lack, mutually reinforcing capabilities and growth (36), 46.7%) lack, ability to care for each other and affection (Affection) 67 (55.8%) lacking, and resolving abilities less 37 (30.8%). Above result of the study was obtained by using APGAR family scores. Friedman (2003) defines healthy families as strong families, a balance of relationships between family members and adaptability which is shown by good communication among family members (3).

Conflict of Interest: There is no conflict of interest for every author

Source of Funding: This research was funded by Directorate for Research and Community Service, Directorate General of Development and Research Enhancement, The Ministry of Research, Technology and Higher Education.

Ethical Clearance: All procedures performed in studies involving human participants had gotten ethical approval from the Health Research Ethics Committee, Faculty of Public Health Airlangga University

Informed Consent: Informed consent was obtained from all individual participants included in the study.

REFERENCES


Determining Mercury Safe Concentration in Shells in the Unlicensed Gold Mining Area of Kayeli Village, Buru Regency, Maluku Province, Indonesia

Nesya Eka Ramadhani¹, Abdul Rohim Tualeka¹, Bacrudin Lain², Pudji Rahmawati³, Syamsiar S Russeng⁴, Atjo Wahyu⁴, Ahsan⁵

¹Department of Occupational Health and Safety, Faculty of Public Health, Airlangga University, 60115 Surabaya, East Java, Indonesia; ²Department of Environmental Health, Health, Health Polytechnic Ministry of Health Maluku, 97233 Negeri Lama, Ambon, Indonesia; ³Department of Development of Islamic Society, State Islamic University Sunan Ampel, Surabaya, East Java, Indonesia; ⁴Department of Occupational Health and Safety, Faculty of Public Health, Hasanuddin University, Makassar, East Java, Indonesia; ⁵Faculty of Nurse, University of Brawijaya, Malang, Indonesia

ABSTRACT

Mercury is one of the metals in the environment which naturally occurs and is classified as a hazardous material. Mercury is a silver white heavy metal and has persistent properties. It is liquid, volatile, bioaccumulation and harmful to health and the environment. This study aimed to determine the safe concentration of mercury exposure in the community in the area of unlicensed gold mining areas (PETI) in Kayeli Village, Buru Regency, Maluku Province, Indonesia. This study was an observational study with an environmental health risk analysis approach. The sample of this study was 67 people and the object of this study was Polymesoda erosa shells. The variables were the No Observed Adverse Effect Level (NOAEL), Reference Dose (RfD), mercury concentrations in the shells, body weight, shell consumption rate and safe concentrations of mercury in the shells. The result showed mercury concentration in Polymesoda erosa in 9 different sample locations was 0.756 mg/kg and the safe concentration of mercury exposure was 0.71 mg/kg. It was less than the Indonesian National Standard of the maximum limit of heavy metal contamination in food. It can be concluded that the safe concentration of mercury in the shells of illegal gold mining areas in Maluku province of Indonesia is safe and can be used as a reference for the community.

Keywords: mercury, gold mining, safe concentration, community

Introduction

Mercury is one of the metals in the environment which is naturally formed and is classified as a hazardous material. Mercury is a silver white heavy metal and has persistent properties. It is liquid, volatile, bioaccumulation and harmful to health and the environment.¹ Mercury is formed naturally and consists of three forms, namely elemental, inorganic and organic.² Some people are exposed to mercury in daily basis through activities like inhalation, consumption of contaminated food and beverages and skin contact.³

Most of the mercury in the environment comes from human activities, one of which is gold mining.³ Gold mining in Indonesia is mostly unlicensed gold mining (PETI). This kind of gold mining process is a traditional one as it uses mercury in the amalgamation process.

The gold beans obtained from this mining will be milled with a jumble tool and added with mercury to make it into sand powder. After that, the powder will be mixed with mercury for one more time. The mercury waste from this process will contaminate the soil. This process
also produces waste in the form of tailings which will be discharged into the river and pollute the environment.  

According to the Agency for Toxic Substances and Disease Registry, mercury can bring negative effect to human health. It can damage brain and kidney function. Inhaling mercury vapor in the form of methyl mercury causes mercury to go to the brain and affect the nervous system, while consuming mercury-contaminated foods will cause accumulation of mercury in the kidneys which later can harm the kidneys.

Broussard (2002) stated that the digestive tract is the main route of methyl mercury into the body. However, methyl mercury can also be absorbed through the lungs and skin. More than 90% of methyl mercury absorbed by the body enters erythrocytes and binds to hemoglobin, while the rest of 10% is found in the brain and slowly undergoes demethylation which causes neuronal necrosis and becomes toxic to the cerebral cortex.

Mercury not only affects adult health, but also children’s health. Mercury exposure, which can be in the form of contaminated food such as fish and shellfish, can affect children development process. Children who are exposed to mercury can experience decreasing brain ability, mental retardation and inability to move. Mercury is also dangerous for pregnant women. Women who are exposed to mercury during pregnancy have a risk of blindness, seizures and inability to speak.

The safe concentration of mercury exposure through inhalation is 0.1 mg/m³. In Indonesia, it has been set that the safe concentration of mercury exposure is 0.001 mg/L for drinking water and 1 mg/kg for shellfish. There are in approximate 85.57% of workers in the area of Unlicensed Gold Mining (PETI) who consume mercury-contaminated shellfish in a daily basis. Yet, the mercury concentration in the shellfish is still unknown.

A previous study analyzed the health risk of mercury exposure in the community of unlicensed gold mining areas (PETI) in Maluku Province of Indonesia. However, it only calculated consumption intake and estimated risk quotient (RQ) and didn’t calculate the Reference Dose (RfD) and safe concentration of mercury exposure in shellfish. Therefore, this study is aimed to calculate the Reference Dose (RfD) and safe concentration of mercury exposure in the shells using No Observed Adverse Effect Level (NOAEL).

### Material and Method

This study was an observational study using an environmental health risk analysis approach. The context of this research was the community of illegal gold mining areas. They were people living in Kayeli Village, Teluk Kayeli Subdistrict, Buru District, Maluku Province, Indonesia.

The sample was 67 out of 588 people living in the area. The object of this research is *Polymesoda erosa* shells which were taken from three different locations of tailing discharge around the beach. Three shells were taken as the sample for every location, with total of 9 sample shells.

The variables of this study were No Observed Adverse Effect Level (NOAEL), Reference Dose (RfD), mercury concentration in shells, body weight, shellfish consumption rate and safe concentration of mercury in the shellfish.

The measurement result analysis was conducted at the Makassar Health Laboratory Center. To determine the safe concentration of mercury exposure, quantitative data analysis was carried out manually.

The research was started by determining the NOEAL in the experimental animal and followed by calculating the Reference Dose (RfD) and safe concentration of mercury in the shellfish. The calculation using the following formula (Tualeka, 2019).

\[
c_{safe} = \frac{\text{RfD} \times \text{D} \times \text{Wb}}{\alpha \times \text{R}}
\]

Annotation:
- \(c_{safe}\): safe concentration (mg/kg)
- \(\text{RfD}\): reference dose (mg/kg)
- \(\alpha\): % substance absorbed by lung
- \(R\): consumption rate (kg/day)

### Findings

#### A. Characteristics and Body Surface Area of Experimental Body:
The toxicity test was carried out using experimental animals, namely white rats. This was due to the similarity of biochemical systems of experimental animals to the mechanism of the human biology system, so that white rats have qualitatively a similar response to humans.
Table 1 shows the characteristics of experimental animals, its body weight and body surface area.

### Table 1: Distribution of Experimental Animal Characteristic (White Rats)

<table>
<thead>
<tr>
<th>Experimental Animal (White Rats)</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.024223</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024050</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
</tr>
</tbody>
</table>

To calculate the body surface area of the experimental animal, the following formula is used:

\[
BSA = 0.09 W^{0.67}
\]

Annotation:

BSA : Body Surface Area (m²)
W : Weight (kg)

### B. Characteristic of Workers and Shellfish Consumption Rate:

The characteristics of 67 samples of workers in communities in the gold mining area without permission from Kayeli Village, Buru Regency, Maluku Province, Indonesia are shown in table 2. It was found that the average body weight was 71 kg, the average height used was Indonesian average of 159 cm, the consumption rate of shellfish was 0.284 kg/day and the average working time is 7 hours/day.

Body surface area and consumption rate was calculated using the body weight and height.

1. **Workers Body Surface Area:** Body surface area was calculated using the formula of Tualeka and Saridewi as shown below:

\[
BSA = \sqrt{W \cdot h / 3600}
\]

\[
= \sqrt{71.159 / 3600}
\]

\[
= 1.77 \text{ m}^2
\]

Annotation:

BSA : Body Surface Area (m²)
W : Weight (kg)
h : Height (cm)

2. **Laju Konsumsi:** According to Tualeka (2013), the consumption rate is 0.284 kg/day.¹⁰

### Table 2: Distribution of Characteristics of Workers, Body Consumption Rate and Body Surface Area in Kayeli Village, Buru Regency, Maluku Province

<table>
<thead>
<tr>
<th>Sample</th>
<th>W (kg)</th>
<th>h (cm)</th>
<th>R (kg/day)</th>
<th>BSA (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>67</td>
<td>71</td>
<td>159</td>
<td>0.284</td>
<td>1.77</td>
</tr>
</tbody>
</table>

### C. Mercury Concentration

Tabel 3: Mercury concentration in *Polymesoda erosa* shells in Kayeli Village, Buru Regency, Maluku Province

<table>
<thead>
<tr>
<th>Location</th>
<th>Concentration (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>0.3438</td>
</tr>
<tr>
<td>1.2</td>
<td>0.5481</td>
</tr>
<tr>
<td>1.3</td>
<td>0.6133</td>
</tr>
<tr>
<td>2.1</td>
<td>0.3563</td>
</tr>
<tr>
<td>2.2</td>
<td>0.4929</td>
</tr>
<tr>
<td>2.3</td>
<td>0.5955</td>
</tr>
<tr>
<td>3.1</td>
<td>0.3930</td>
</tr>
<tr>
<td>3.2</td>
<td>0.7244</td>
</tr>
<tr>
<td>3.3</td>
<td>2.7406</td>
</tr>
<tr>
<td>Rata-rata</td>
<td>0.756</td>
</tr>
</tbody>
</table>

The measurement results of the safe concentration of mercury exposure in shells in the unlicensed gold mining area in Kayeli Village, Buru Regency, Maluku Province, Indonesia was to 0.756 mg/kg, below the limit of the Indonesia National Standard of 1 mg/kg.

### D. NOAEL (No Observed Adverse Effect Level):

The purpose of researches in the field of industrial toxicology is to be able to evaluate the safety of a substance. No Observed Adverse Effect Level (NOAEL) is the highest dose without causing effects on experimental animals, which later is used to determine the safe limits of a chemical. World Health Organization (2005) stated that NOAEL from mercury is 0.23 mg/kg.¹¹

### E. Reference Dose:

Tualeka (2013) stated that the Reference Dose is calculated using the following formula.¹⁰
\[ \text{RfD} = \frac{\text{NOAEL}}{100} = \frac{0.23}{100} = 0.0023 \text{mg/kg} \]

Annotation:
- **RfD**: Reference Dose (mg/kg)
- **NOAEL**: No Observed Adverse Effect Level (mg/kg)

Using the formula above, the reference dose of mercury in the shellfish is 0.0023 mg/kg.

**F. Safe Concentration of Mercury**: The calculation of mercury concentration in the illegal gold mining area in Kayeli Village, Buru Regency, Maluku Province, Indonesia used the formula (Tualeka, 2013) as follows.\(^6\)

\[ C_{\text{safe}} = \frac{(RfD)(Wb)}{(\alpha)(R)} = \frac{(0.0023)(71)}{(81\%)(0.284)} = 0.71 \text{ mg/kg} \]

Annotation:
- **C safe**: safe concentration (mg/kg)
- **RfD**: reference dose (mg/kg)
- **\(\alpha\)**: % substance absorbed by the lung (percentage of mercury is 80%)\(^{13}\)
- **R**: consumption rate (kg/day)

Based on the above calculations, it can be seen that the safe concentration of mercury exposure to shellfish in the illegal gold mining area of Kayeli Village, Buru Regency, Maluku Province, Indonesia is 0.71 mg/kg.

**Discussion**

The measurement of mercury on concentration of *Polymesoda erosa* shells in Kayeli Village, Buru Regency, Maluku Province were carried out from three different locations of tailing discharge around the beach. Three shells were taken as the sample for each location, so the total was 9 sample shells.

The result of NOAEL calculation is 0.23 mg/kg. This result is in line with the limit value set by the World Health Organization and the Agency for Toxic Substances and Disease Registry which stated the NOAEL of mercury to be 0.23 mg/kg. Then, it can be said that the value of No Observed Adverse Effect Level (NOAEL) is safe for the community.

Reference Dose (RfD) in the illegal gold mining area of Kayeli Village, Buru Regency, Maluku Province, Indonesia was 0.0023 mg/kg/day. It is below the RfD of the Environmental Protection Agency in Broussard (2002) of 0.3 mg/kg/day.\(^6\) It can be said that the reference dose (RfD) of mercury in the illegal gold mining area in Kayeli Village, Buru Regency, Maluku Province, Indonesia is safe for the community.

The measurement result of safe concentration of mercury exposure in shellfish in the illegal gold mining area of Kayeli Village, Buru Regency, Maluku Province, Indonesia was 0.71 mg/kg. It is below the standard of regulations set by other bodies. According to the Food and Drug Administration in Broussard (2002) the safe concentration of mercury is 1 mg/kg.\(^6\) Regulation of the Head of the Republic of Indonesia Drug and Food Control Agency Number HK.00.06.1.52.4011.3 concerning Determination of the Maximum Limit of Microbial and Chemical Contaminants in Foods also mentioned that the safe limit of mercury in shellfish is 1 mg/kg.\(^12\) In addition, the Indonesian National Standard regarding the maximum limit of heavy metal contamination in food also mentioned that the safe concentration of mercury exposure to shellfish is 1 mg/kg.\(^13\) Therefore, it can be said that the safe concentration of mercury in shells in the unlicensed gold mining area in Kayeli Village, Buru Regency, Maluku Province, Indonesia is safe and can be used as a reference for the community.

**Conclusion**

The concentration of mercury in shellfish measured at 9 points in the illegal gold mining area in Kayeli Village, Buru Regency, Maluku Province, Indonesia was 0.756 mg/kg. The calculation results of safe concentration of mercury exposure to shellfish using No Observed Adverse Effect Level (NOAEL) and Dose Reference (RfD) was 0.71 mg/kg. So, it can be concluded that the safe concentration of shellfish in the illegal gold mining area in Kayeli Village, Buru Regency, Maluku Province, Indonesia is safe for the community because it is less than 1 mg/kg.
To control mercury exposure to shellfish consumed by the community in the area of gold mining without permission in Kayeli Village, Buru Regency, Maluku Province, Indonesia, some efforts can be taken. We recommend mapping the mercury-contaminated areas, providing information for public about the concentration and types of shellfish that are safe for consumption and periodic health checks from local health services.

**Conflict of Interest:** All authors have no conflicts of interest to declare.

**Source of Funding:** This is an article “Determining Mercury Safe Concentration in Shells in the Illegal Gold Mining Area of Kayeli Village, Buru Regency, Maluku Province, Indonesia” of Occupational Health and Safety Department that was supported by Faculty of Public Health, Airlangga University.

**Ethical Clearance:** The study was approved by the institutional Ethical Board of Diponegoro University.

**REFERENCE**


7. ACGIH. TLVs and BEIs: based on the documentation of the threshold limit values for chemical substances and physical agents & biological exposure indices. 2010. 1–110 p.


Synapsin-I Expression in the *Rattus norvegicus* Pup’s Brain from Rat’s Maternal Death Model

Nur Maziyah Hurin’in,1 Hermanto Tri Joewono2, Widjiati3

1Postgraduate Student of Reproductive Health Science, Faculty of Medicine, 2Department of Obstetric and Gynecology, Faculty of Medicine, 3Department of Embryology, Faculty of Veterinary Medicine, Airlangga University, Surabaya, Indonesia

ABSTRACT

Maternal mortality could be a neonatal stressor that activated the HPA axis to secret glucocorticoids as a marker of stress. Brain development took place rapidly in the first 1,000 days of life. Synapsin-I was involved in the early development of the brain’s nervous system. The purpose of this study was to analyze the impact of separation of Rat’s pup and mothers as a maternal death model on the expression of synapsin-I in the cerebrum and cerebellum of 3 days old *Rattus norvegicus* pups. The control group (K1) consisted of newborn *Rattus norvegicus* which remained with the mother, while the treatment group (K2) consisted of newborn *Rattus norvegicus* which was separated from the mother. After 3 days of observation, *Rattus norvegicus* pups from each parent were taken with the heaviest, medium, and lowest weights to be sacrificed and examined by immunohistochemical of synapsin-I expression. Analysis of the Mann Whitney test for synapsin-I expression in *Rattus norvegicus* cerebrum showed a significant difference between the control group and the treatment group with a value of *p*=0.000 (*p*<0.05). Independent T test analysis of synapsin-I expression in *Rattus norvegicus* cerebellum also showed a significant difference between the control group and the treatment group with a value of *p*=0.000 (*p*<0.05). Synapsin-I expressions in the cerebrum and cerebellum of *Rattus norvegicus* pups that separated from the mothers were lower than those that not separated from the mothers.

Keywords: maternal death model, synapsin-I, cerebrum, cerebellum

Introduction

Maternal Mortality Rate (MMR) was an indicator of assessment of maternal health programs. The case of maternal mortality, also called maternal death, occurs in pregnant women on a number of certain days starting during pregnancy until after the termination of pregnancy or 42 days after delivery. This could be due to causes that were related or exacerbated by pregnancy, handling pregnancy, and/or handling labor. Accidents or incidental events were not the cause of maternal death. Many maternal deaths occur during labor and postpartum.1,2

In 1990-2015, the Maternal Mortality Rate (MMR) globally decreased by 44%, from 385 cases to 206 cases per 100,000 live birth rates. The decline was still far from the Millennium Development Goal 5 a target. This number also did not meet the objectives of the 2030 Sustainable Development Goals (SDG’S) program which targeted maternal mortality rates are 70 of 100,000 live births.3 Since 1991 to 2007, Based on the Indonesian Health Profile (2016), the number of MMR in Indonesia has decreased, from 390 to 228 from 1991 to 2007. According to the Bureau of Communication and Community Services of the Health Ministry of Republic Indonesia, the maternal mortality rate in Indonesia was 4,999 in 2015 to 4,912 in 2016 and 2017 (first semester) decreased to 1,712 cases. Based on the East Java Health Office, the maternal mortality rate in East Java Province on 2015 reached 89.6 of 100,000 live births and on 2016 it increased to 91 of 100,000 live births.

Maternal mortality at the beginning of a child’s life could result in loss of contact between mother and
baby and disruption of breastfeeding which would affect the child survival. Interaction between mother and baby could occur through touch, skin contact, and eye contact which provided a calm effect. Reduced or even lost contact between mother and baby due to maternal death could result in babies having higher cortisol levels than babies who were directly treated by their mothers. Therefore, this might be a cause of neonatal stress at the beginning of a child’s life.

Child’s brain growth and development took place quickly starting in the womb, which was on the first 1,000 days of the children life up to 3 years old. Some important developmental processes include neuron proliferation, synaptic formation, myelination, and axons and dendrites growth. A good brain development and growth would affect cognitive, social, and emotional abilities as the foundation and the development of future generations. The brain consisted of the cerebrum which plays a role in cognitive and affective functions as well and the cerebellum which played a role in motor, cognitive, emotional, and behavioral development. Synapsin-I was the main isoform in neurons which were phosphoproteins that bound to synaptic vesicles. Synapsin-I played a role in synaptogenesis and neuronal plasticity, including synapses development, terminal nerve formation, and neurotransmitter expenditure. Reduced Synapsin-I would result in disruption of axon differentiation, neurit growth, inhibition of formation and synapses, and allowed nerve disorders in the brain.

Neonatal stress could occur due to maternal death which caused the hypothalamus-pituitary-adrenal (HPA) activation to secrete glucocorticoids which were the initial sign of stress. Synapsin-I was involved in the critical development initial process of the nervous system. The stress impact on early neuronal development in the brain could reduce cognitive function with symptoms of dendritic atrophy and loss of synapses. The thought of the maternal deaths impact should not only be on ways to reduce maternal mortality. Maternal health was also an important thing to note, not just for the mother survival, but it was also important for the continuity of brain growth during the golden age in the first 1,000 days of the child’s life as a preparation to face the future changes challenges. Based on this background, this study was conducted to the impact of maternal separation as a maternal death model on the cerebrum and cerebellum synapsin-I expression of 3 days old Rattus norvegicus.

Material and Method

This study was true laboratory experimental designs with randomized post test only control group design. The study was conducted from February to May 2019 at the Laboratory of the Veterinary Medicine Faculty, Airlangga University. The samples of this study were Rattus norvegicus mother and the unit samples were 3 days old Rattus norvegicus. All animals try to be acclimatized before being pregnant. Superovulation of female rats was done by injecting 10 IU of PMSG (Folligon™, Intervet Boxmeer, Holland), 48 hours later, the injection 10 IU of HCG (Chorulon™, Intervet Boxmeer, Holland) was carried out and the mother was immediately mated monomating. 17 hours after monomating, a vaginal plug examination was performed to ensure pregnancy. Pregnant female Rat was taken randomly into 2 groups, each group consisting 18 pregnant female Rat.

The maternal mortality model study group was divided into 2 groups, the control group (K1) consisting of newborn Rattus norvegicus which remained with the mother until the 3 days old and the treatment group (K2) consisting of newborn Rattus norvegicus separated from mother to 3 days old that were given animal milk formula (Esbilac® Powder, Pet-Ag Inc, Hampshire). From each parent, Rattus norvegicus pups were taken with the heaviest, medium and lowest weights.

Imonohistochemical examination with synapsin-I antibodies was assessed semi-quantitatively on the scale of Rammelen-Stegner using the Immuno Reactive Score (IRS). Statistical analysis uses IBM SPSS Statistic 20. Data with normal distribution was tested by Independent T test. If the data was not normally distributed, the data was tested by the Mann Whitney test. This study uses a significance level of 0.05 with a confidence level of 95%.

Findings

Table 1: The mean and standard deviation of the Cerebrum synapsin-I expression

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Synapsin-I Expression (IRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean ± Standard Deviation</td>
</tr>
<tr>
<td>K1</td>
<td>18</td>
<td>4,08 ± 1,45</td>
</tr>
<tr>
<td>K2</td>
<td>18</td>
<td>2,35 ± 1,22</td>
</tr>
</tbody>
</table>

The results showed a mean of cerebrum synapsin-I expression in the treatment group was 2,35 ± 1,22 and a control group was 4,08 ± 1,45.
Table 2: Mann Whitney Analysis Results of Cerebrum Synapsin-I expression

<table>
<thead>
<tr>
<th>Group</th>
<th>p Value</th>
<th>Different test analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>0.000*</td>
<td>Mann Whitney Test</td>
</tr>
</tbody>
</table>

*Significantly different \( p<0.05 \)

Analysis of the Mann Whitney test showed that there were significant differences in the synapsin-I expression between the control and treatment groups with a value of \( p=0.000 \) (\( p<0.05 \)).

![K1](image1)

![K2](image2)

Figure 1: Comparison of synapsin I expressions represented by chromogen brown color on the cerebrum tissue, yellow arrows showing the maximum expression area using immunohistochemical staining, 400x magnification; Miconos microscope MCX50LED; Optilab Plus camera

Table 3: Mean and standard deviation of Cerebellum synapsin-I expression

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Synapsin-I Expression (IRS)</th>
<th>Mean ± Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>18</td>
<td>3.80 ± 1.21</td>
<td></td>
</tr>
<tr>
<td>K2</td>
<td>18</td>
<td>2.22 ± 1.00</td>
<td></td>
</tr>
</tbody>
</table>

The examination results of the cerebellum Synapsin-I expression showed a mean and standard deviation in the treatment group was \( 2.22 \pm 1.00 \) and the control group was \( 3.80 \pm 1.21 \).

Table 4: Results of Independent T Analysis of Cerebellum Synapsin-I expression

<table>
<thead>
<tr>
<th>Group</th>
<th>p Value</th>
<th>Different test analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>K2</td>
<td>0.000* Independent T</td>
</tr>
</tbody>
</table>

*Significantly different \( p<0.05 \)

The results of the Independent T test showed that there was a significant difference in the synapsin-I expression between the control and treatment groups with a value of \( p=0.000 \) (\( p<0.05 \)).

![K1](image3)

![K2](image4)

Figure 2: Comparison of synapsin I expressions represented by chromogen brown color on the cerebellum tissue, yellow arrows showing the maximum expression area using immunohistochemical staining, 400x magnification; Miconos microscope MCX50LED; Optilab Plus camera
**Discussion**

The results of this research indicate the mean expression of cerebrum and cerebellum Synapsin-I 3 days old *Rattus norvegicus* with maternal separation was lower than without maternal separation. The results of the examination used microarray analysis for stress at the beginning of life was carried out by maternal separation on day 14-21, while still providing water and feed nutrients, indicating that separation from the parent reduced synapsin-I mRNA gene expression in the Rat pup’s amygdale. Maternal separation in animals shows an increase in high expression of corticotrophin-releasing-hormone (CRH) and glucocorticoid receptors. Glucocorticoids could directly reduce the expression of synapsin-I and EGR-1 transcription in the hippocampus. The results of examination on 9-months-old babies who separated from their mothers for 30 minutes showed an increase in glucocorticoids levels compared to 30 minutes when babies interacted and played with mothers. Maternal separation increases glucocorticoids and ACTH in animals. 9 and 12-days-old rodent show high ACTH and corticosterone. Therefore, the timing and quality of interaction with mother plays a role in the development of the Axis HPA. If there was a maternal death, the contact interaction between the parent and child would be lost then causing early life stress.

The most rapid brain neuron development in the first 1,000 days of life. Synapsin-I is a protein that plays a role in synaptic transmission and plasticity in the presynaptic mechanism. The combined action of synapses that work in different areas of the brain eventually forms brain functions such as learning and memory. Synapsin-I was associated with axon growth and regulation of synaptic vesicles kinetics fusion. Both synapsin-I isoforms function in synapse formation and minimize depletion of neurotransmitters in synapse inhibition by contributing to the retention of synaptic vesicles. Synapsin-I also plays a role in synaptogenesis and modulates the release of neurotransmitters. Changes in synaptic vesicles in the presynaptic terminal could result in reduced release of neurotransmitters and delayed recovery of synaptic transmission after depletion of neurotransmitters.

Immunoreactivity examination of synapsin-I was performed as a direct marker of the synapses presence in the central nervous system. Cerebrum acted in cognitive and affective function. Synapsin-I in the cerebrum was expressed in neurophil, whereas in neurons and dendrites there was little synapsin-I expression. Cerebellum played a role in motor, cognitive, emotional, and behavioral development. In the cerebellum, synapsin-I could be expressed in the molecular layer of the cerebellum cortex, i.e. in the nucleus and cytoplasm of the granular and granular layers of the synaptic complex.

Early life stress which was induced by glucocorticoids caused a decrease in cognitive abilities, including damage to work and nonverbal memory, mental flexibility, and information processing. Symptoms included dendritic atrophy and loss of synapses in neurons. Glucocorticoids mediated cellular or molecular effects on synapses and dendrites through glucocorticoid receptor (GR) and mineralocorticoid receptor (MR). In the brain, GR which had been activated by GC could directly bound to BDNF/CREB in response to stress and would reduced BDNF expression. BDNF bound to TrkB (Tropomyosin related kinase B) in postsynaps and presynaps which caused activation involving 2 pathways, namely phospholipase (PLC)-Ca²⁺-CaMKII and Ras-Raf-MAPK for regulation of synapsin-I expression. When stress and glucocorticoid increase occured, the MAPK activation stimulated CAMKII to reduce transcription of EGR-1 and lower synapsin-I expression. Synapsin-I regulation could also pass IGF-1, IGF-1 pathway (Insulin like growth factor-1) which would bound to IGF1R and activated two signaling pathways similar to BDNF to regulate the regulation of synapsin-I expression directly. If there was an increase in GC and activation of GR, IGF-1 inhibition would resulted in a lower expression of synapsin-I.

Early life stress in the brain was also related to oxidative stress due to an imbalance between ROS and antioxidants. ROS results in GC receptor translocation from the cytoplasm to the nucleus which disrupted the receptor function. Imbalance in mitochondria produces NADPH oxidase (NOX). ROS in the brain was caused by NOX enzymes according to cellular stressors. In addition, many stress signaling pathways such as ERK1, p38 MAPK were activated following NOX stimulation which would affected cell damage which might directly result in lower synapsin-I expression. Apart from this pathway, synapsin-I expression could be directly affected by glucocorticoids via EGR-1. Decreases synapsin-I expression which included several pathways, namely EGR-1, BDNF, IGF-1, and could also be affected by oxidative stress.
Conclusion

Cerebrum and cerebellum Synapsin-I expression of 3 days old *Rattus norvegicus* with maternal separation as maternal death model was lower than 3 days old *Rattus norvegicus* without maternal separation as maternal death model.

Ethical Clearance: Ethical clearance of this study was taken from Ethical Committee of the Faculty of Veterinary Medicine, Airlangga University Surabaya Indonesia. Number: 2.KE.041.04.2019.

Source of Funding: This study was self funding by authors.

Conflict of Interest: The authors have no conflicts of interest.

REFERENCES


ABSTRACT

Toluene is one of the BTX compounds with a strong and distinctive aroma. When inhaled, this can affect the nervous system and body coordination and cause headaches. At constant exposure, toluene compounds can cause more serious health risks that can cause death. This study aims to determine the safe concentration of toluene in Kebun Jeruk toll gate officers, Jakarta. The population in this study were all 20 Kebun Jeruk toll gate keepers divided into two area points of toll gate 1 and toll gate 2. This study used manually calculated quantitative data analysis through safe concentration calculation in environmental toxicology concepts. Safe concentration data in Jakarta Kebon Jeruk toll gate keepers were obtained from experimental animals’ body weight (W animals), body area (BSA animals), workers’ characteristics including body weight (W), height (h), body surface area (BSA), breathing rate (BR) and working duration (t). In addition, data on the concentration of benzene (C), animal km, human km, NOAEL and the safe dose of toxin were also used.

The concentration of toluene in air that enters the workers body through inhalation measured at two average points was 0.00125 mg/m³ (0.00033 ppm). The value obtained is still far below the toluene threshold value determined by the Minister of Manpower and Transmigration Regulation Number Per.13/Men/X/2011 of 2011. The calculated safe concentration of toluene shows a result of 0.0922 mg/m³ (0.0245 ppm) which is still in the safe category. This level must be maintained to assure its level does not increase.

Keywords: toluene, safe concentration, toll officer

Introduction

Toluene is one of the BTX compounds that has a strong and distinctive aroma. When inhaled, this can affect nervous system and body coordination and cause headaches. At constant exposure, toluene compounds can cause more serious health risks that can cause death.¹,²

Safe toluene concentration is not a reference in determining toluene threshold value that it often has an effect on workers even though the concentration is below the Threshold Limit Value. Based on the previous research, exposure of 50 ppm toluene can significantly increase lipopolisakardic (LPS-induced) induction of mouse cell proliferation (Fujimaki, 2010), decrease in antioxidant enzyme activity significantly, and increase fat peroxidation and protein damage both in vivo and in vitro (Karabulut, 2009).³ A previous study found that toluene concentrations below the NAB had an effect on workers. Thus the revision of the Threshold Limit Value is needed regarding the safe limits of toluene concentration in the work environment.

DKI Jakarta is the capital of Indonesia. The pollution level in this city is the highest among other cities in Indonesia. The Directorate of Traffic of the Metro Jaya

DOI Number: 10.5958/0976-5506.2019.02614.7
Police Sub-Directorate of Vehicle Registration and Identification noted that the number of vehicles in Jakarta reached 16 million units in 2013. Air pollutants produced by motorized vehicles include carbon monoxide (CO), methane (CH4), nitrogen oxide (NO2), sulfur dioxide (SO2), and aromatic hydrocarbon compounds such as BTX (benzene, toluene, and xylene).4

Risk analysis research of Toluene on human activities have been mostly carried out at gas stations (Tunsaringkarn, 2012) and in urban areas (Singh, 2012).5 The researches were mostly carried out for researchers aimed to examine effects of toluene chemicals in humans’ health through inhalation. The level of pollution on highways, especially in big city toll roads such as in Jakarta and the length of exposure experienced by toll road officers makes the toll road officers have a greater risk of exposure to chemicals, especially toluene. In Eko Handoyo’s (2015) study, the results of measurements of toluene concentrations at toll gate 1 and 2 of Kebun Jeruk Jakarta were 0.00121 mg/m³ and 0.00128 mg/m³, respectively.6 The study was conducted on 20 toll gate guards. In the previous research, the researchers did not calculate the safe concentration of toluene.

This study aims to determine the toluene threshold value – initiated by the determination of NOAEL toluene in white rats and RfC. Calculation of safe concentration is important to ensure the health of workers.7 The present research is beneficial as a reference in determining the toluene safe (NAB) limit in the work environment in Indonesia and the improvement of existing Threshold Value. Safe concentration was calculated using the Reference Concentration (RfC) formula with No Observed Adverse Effect Level (NOAEL) which is adjusted to the research data.

**Material and Method**

This study aims to determine the safe concentration of air toluene chemicals in the work area of Kebun Jeruk toll gate officers, Jakarta. The approach used was a cross sectional approach with observational descriptive research. The population in this study were 20 respondents. Population determination was carried out through total population of Kebun Jeruk toll officers, Jakarta.

The study was conducted in May 2019, initiated with the study of literature on the analysis of toxicological health risks which included calculation of intake, type of risk and value of dose response. Furthermore, secondary data from the literature study of the previous research was conducted to obtain anthropometric data of the officers of Kebun Jeruk toll gate, Jakarta. Data of supporting research was also taken which included the types of chemicals, the weight of the experimental animals, and the results of measurements of benzene in the air obtained through measurements of NIOSH 1501 (NIOSH, 2003) with activated carbon adsorbing pipes using the gas Chromatography (GC) technique.

The variables used in this study include the characteristics of the experimental animals in the form of weight and surface area of the experimental animals (BSA experimental animals), worker characteristics including weight (W), body surface area (BSA), and worker breathing rate (BR). In addition, toluene concentration in the workplace was also obtained from previous research literature studies. Furthermore, variables were processed by calculating factor Km in animals (Human Km), No Observed Adverse Effect Level, RfC benzene in workers and calculation of safe concentration on workers is carried out.

**Result**

**A. Characteristics and Surface Area of Experimental Animal Bodies:** Toxicity testing of compounds requires animal testing as support. This is because animal response to a toxic substance resembles a human response. The experimental animals used in this study were white mice (*Rattus norvegicus*).8

<table>
<thead>
<tr>
<th>Experimental animal</th>
<th>W (kg)</th>
<th>BSA (m2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0,1405</td>
<td>0,024165</td>
</tr>
<tr>
<td>2</td>
<td>0,1405</td>
<td>0,024165</td>
</tr>
<tr>
<td>3</td>
<td>0,1410</td>
<td>0,024223</td>
</tr>
<tr>
<td>4</td>
<td>0,1410</td>
<td>0,024223</td>
</tr>
<tr>
<td>5</td>
<td>0,1395</td>
<td>0,024050</td>
</tr>
<tr>
<td>6</td>
<td>0,1415</td>
<td>0,024165</td>
</tr>
</tbody>
</table>

Where:

BSA : Body Surface Area (m²)
W : Weight (kg)

Body Surface Area on experimental animal was 0,024165 m².
B. Characteristics, Body Surface Area, and Worker’s Respiratory Rate: The characteristics of workers in this study include body weight, height and length of exposure in working hours per day. The total working population is 20 workers with an average body weight of 67.9 kg and height of 159 cm according to the average height of Indonesian adults. The duration of exposure is 8 hours per day according to the working hours of toll gate keepers. The body surface area and the respiratory rate of workers were calculated using the following formula.

1. Body surface area (BSA): The body surface area of workers was calculated by using the following formula

$$BSA = \sqrt{\frac{W \cdot h}{3600}}$$

Where

- $BSA$ : Body Surface Area (m$^2$)
- $W$ : Weight (kg)
- $h$ : height (cm)

$$BSA = \sqrt{\frac{67.9 \cdot 159}{3600}} = 1.73 \text{ m}^2$$

2. Breathing Rate: The breathing rate of workers is calculated using the following formula

$$BR = 5.3 \ln W - 6.9/24$$

where

- $BR$ : Breathing Rate
- $W$ : Weight (kg)

$$BR = 5.3 \ln 67.9 - 6.9/24 = 0.64 \text{ m}^3/\text{hour}$$

C. Toluene Concentration: Measurement of toluene concentration is carried out in two points, i.e. toll gate 1 and toll gate 2 Kebon Jeruk Jakarta. The average concentration was 0.00125 mg/m$^3$ (0.00033 ppm).

Based on the measurements carried out, the highest toluene concentration at toll gate 2 was 0.00128 mg/m$^3$ (0.00034 ppm) while the lowest was at toll gate 1 at 0.00121 mg/m$^3$ (0.00032 ppm). The toluene concentration value is still far below the threshold value set by the Minister of Manpower and Transmigration Regulation Number Per.13/MEN/X/2011 in 2011 concerning the threshold value of physical and chemical factors in the workplace of 188 mg/m$^3$.

D. Animal Km and Human Km: Determination of safe limits for toxic doses on Kebon Jeruk Jakarta toll door officers began with the calculation of Animal Km and Human Km.

1. Animal Km

$$\text{Animal Km} = \frac{W_{\text{animal}}}{BSA_{\text{animal}}}$$

where:

- $W_{\text{animal}}$ : Km factor on animal
- $BSA_{\text{animal}}$ : Body Surface Area (m$^2$)

Based on the Animal Km calculation, the Animal Km distribution is as follows.

Table 3: Calculation result of Animal Km on White Mice

<table>
<thead>
<tr>
<th>Experimental animal</th>
<th>$W$ (kg)</th>
<th>$BSA$ (m$^2$)</th>
<th>Animal Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0.024165</td>
<td>5.814194082</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.814194082</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.024223</td>
<td>5.820914007</td>
</tr>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.024223</td>
<td>5.820914007</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.024050</td>
<td>5.8004158</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
<td>5.855576247</td>
</tr>
<tr>
<td>Average</td>
<td>0.1407</td>
<td>0.024165</td>
<td>5.82</td>
</tr>
</tbody>
</table>

The average calculation of Animal Km according to the table above is 5.82.

2. Human Km

$$\text{Human Km} = \frac{W_{\text{human}}}{BSA_{\text{human}}}$$

where:

- $W_{\text{human}}$ : Km factor on human
- $BSA_{\text{human}}$ : Body Surface Area (m$^2$)
Table 4: Human Km Calculation for Workers

<table>
<thead>
<tr>
<th>Number of workers</th>
<th>W avg (kg)</th>
<th>BSA avg (m²)</th>
<th>Human KM avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>67.9</td>
<td>1.73</td>
<td>39.24</td>
</tr>
</tbody>
</table>

The average calculation results of Human Km on Kebun Jeruk toll gate keepers is 39.42

E. No Observed Adverse Effect Level (NOAEL):
To determine the safe limit of the concentration or dose of a chemical for human safety, the No Observed Adverse Effect Level (NOAEL) toxicity test was carried out. This is the determination of the highest dose of toxin without causing effects on experimental animals.

Schäper et al. 2003, 2004, 2008; Seeber et al. 2004, 2005; Zupanic et al. 2002 states that the No Observed Adverse Effect Level (NOAEL) toluene calculation is 3.8 mg/m³ (0.0281 mg/kg). The calculation of NOAEL in the present study can be obtained using the following formula.

NOAEL toluene = 3.8 mg/m³

NOAEL toluene = \[ \frac{3.8 \times 0.0013 \times 8}{0.1405} = 0.0281 \text{ mg/kg} \]

F. Inhalation Reference Concentration (RfC):
Shaw et al. (2007) in Saridewi and Tualeka’s study (2017) states that the calculation of the reference concentration on workers or the Inhalation Reference Concentration (RfC) can use the following formula:

\[
\text{RfC} = \frac{\text{NOAEL}}{\text{Animal KM \over Human KM}}
\]

Where

RfC : Inhalation Reference Concentration
NOAEL : No Observed Adverse Effect Level
Animal Km : Factor Km on experimental animal
Human Km : Factor Km on human

The calculation of RfC for Kebon Jeruk toll gate keepers in Jakarta is as follows:

\[
\text{RfC} = \frac{\text{NOAEL}}{\text{Animal KM \over Human KM}}
\]

\[
\text{RfC} = 0.0281 \frac{5.82}{39.24} = 0.00417 \text{ mg/kg}
\]

Based on the above calculation, the reference concentration or RfC in the Kebun Jeruk Jakarta toll gate officer is 0.00417 mg/kg.

G. Toluene Safe Concentration: In a study conducted by Saridewi and Tualeka (2017), the calculation of safe (C safe) concentration is calculated using a formula obtained from William (1985), Davis (1991) and Soemirat (2003). The value of Inhalation Reference Concentration (RfC), No Observed Adverse Effect Level (NOAEL), average duration of work, average body weight and breathing rate of workers were calculated by the following formula:

\[
\text{C safe} = \frac{\text{RfC} \times W}{a \times BR \times T} \text{ mg/m}^3
\]

Where.

C safe : The safe concentration of ctoxin in the air to workers (mg/m³ or ppm)
RfC : Inhalation Reference Concentration (mg/kg)
W : Workers’ weight (kg)
a : Percentage of substances absorbed by workers’ lungs (%)
BR : Breathing Rate (m³/jam)
T : Time (hour)

Calculation of toluene safe C for Kebun Jeruk toll officers is calculated by the following formula.

\[
\text{C safe (mg/m}^3) = \frac{\text{RfC} \times W}{a \times BR \times T} \text{ mg/m}^3
\]

\[
\text{C safe (mg/m}^3) = \frac{0.0281 \times 67.9}{5.82 \times 0.64 \times 8} = 0.283143 \text{ mg/m}^3
\]

\[
\text{C safe (mg/m}^3) = 0.0922 \text{ mg/m}^3
\]

Concentration (ppm) = \[ \frac{\text{C \times 24.45}}{\text{W Molekul}} \]

\[
\text{Concentration (ppm)} = \frac{0.0922 \times 24.45}{92.14} = 0.0245 \text{ ppm}
\]
Discussion

The toluene concentration at Kebon Jeruk toll gate is divided into 2 points, i.e. toll gate 1 at 0.00121 mg/m³ and toll gate point 2 at 0.00128 mg/m³. According to the Minister of Manpower and Transmigration Regulation Number Per.13/Men/X/2011 of 2011 concerning the Threshold Value of Physical Factors and Chemical Factors at Work, Threshold value of toluene concentration is 188 mg/m³. This shows that toluene concentration at Jakarta Kebon Jeruk toll gate is still far below the Threshold Value. Calculation of safe concentration at the Kebon Jeruk Jakarta toll gate is based on the calculation of Reference Concentration (RfC), and No Observed Adverse Effect Level (NOAEL). Test of experimental animals is used to calculate No Observed Adverse Level (NOAEL) or the highest dose of toxin without causing an effect. The No Observed Adverse Effect Level (NOAEL) is 0.0281 mg/kg. According to the Agency of Toxic and Substances, the NOAEL for exposure through inhalation is 3 ppm. Therefore, the value of toluene NOAEL is safe for workers.

Reference Concentration (RfC) of toluene through inhalation can be calculated through NOAEL, Animal Km, and Human Km values. The calculation results of Reference Concentration (RfC) value through inhalation on Kebon Jeruk toll gate keepers is 0.00417 mg/kg. Toluene Reference Concentration (RfC) value limit through inhalation based on U.S Environmental Protection Agency National Center for Environmental Assessment (2003) is 0.03 mg/m³. This shows that the value of RfC for Kebon Jeruk toll keepers is lower than that of Integrated Risk Information System Chemical Assessment Summary (2003).

The toluene safe concentration of officers of the Kebon Jeruk toll is to 0.0922 mg/m³ (0.0245 ppm). According to Minister of Manpower and Transmigration Regulation No. Per.13/Men/X/2011 of 2011 concerning the Threshold Value of Physical Factors and Chemical Factors in the Workplace, NAB from toluene concentration is 188 mg/m³. This shows that safe concentration is still below the NAB and is safe. In conclusion, the value of toluene safe concentration in Jakarta Kebun Jeruk toll gate keepers is considered safe and can be maintained.

Conclusion

Measurement of toluene concentration entering the body through inhalation at toll gate keepers at Kebun Jeruk is 0.00125 mg/m³ (0.00033 ppm). This level is safe and far from the Threshold Value set by the Minister of Manpower and Transmigration Regulation Number Per.13/Men/X/2011 in 2011 by 188 mg/m³.

The safe concentration of toluene of workers is 0.0922 mg/m³ (0.0245 ppm), meaning that air condition of Kebon Jeruk Jakarta toll gate is in a safe category. This condition must be maintained that the level of toluene in the air around the workplace does not increase. The control effort that must be carried out in addition to maintaining the environment is by using Personal Protective Equipment (PPE) on toll gate keepers that workers are not directly exposed to hazardous toluene substances.

Conflict of Interest: All authors have no conflicts of interest to declare.

Source of Funding: This is an article “Health Risk Assessment of the exposure of Benzene, Toluene, and Xylene in Toll Gate Keeper” of Occupational Safety and Health Department that was supported by Activity Budget Plans 2019, Faculty of Public Health, Universitas Airlangga.

Ethical Clearance: The study was approved by the institutional Ethical Board of Health Ministry of Tangerang City

REFERENCES


The Effect of Fermentation of Oyster Mushrooms on Millet Grain of Healthy Japanese Quail Diets on Some Productive and Physiological Traits

Ola H. Abdul Ameer¹, Yasser J. Jameel², Mahdi A. Ali²
¹Al-Zahrawi University College, ²Faculty of Veterinary Medicine, University of Karbala

ABSTRACT

The study was included two experiments. The first experiment is a laboratory stage of oyster mushroom pleurotus ostreatus was cultured on millet seeds. The analysis of the chemical components of the fermented millet grains showed an increase in the ratio of %CP, %fat and %Ash. While a ratio of fiber and carbohydrates were decreased. This experiment was carried out in the poultry farm of the Department of Animal Production/ Faculty of Agriculture/University of Kufa for the period from 13/11 to 25/12/2017. A 240 unsexed Japanese quail chicks were used; them raised in cages and subjected to the experiment treatments from age of 7 days to age of 42 days. Chicks were divided into five experimental treatments to is standard feed (control treatment). While T1, T2, T3 and T4 are feed contained mushroom fermented millet at percentage of 25, 50, 75 and 100%.

The results showed that the addition of fermented millet of P. ostreatus to the diet significantly or morally improved the percentage of percentage dissolution and internal organs consumed and the relative weight of the main and secondary carcass characteristics of all the treatments compared with the control treatment.

Keywords: Japanese quail, oyster mushrooms, millet.

Introduction

The quail of fast-flying birds is used as a test animal and as a result of improving its productivity through the use of modern methods of breeding, it occupies a good position in some countries of the world as well as other poultry species, especially chickens, as a source of meat and eggs. The wild quail lives in different regions of the world and there are many species. The most important of these is the Japanese quail. The Japanese quail is the smallest species of domestic poultry used in biological and genetic studies because of its small body size and resistance to diseases and rapid growth and handling easily and the possibility of using a large number of birds in a limited area. The female body is larger than males, unlike the other domestic birds. Male males weigh between 100 to 140 g, while adult females weigh 120 to 160 g for female body weight gain at 21, 28, 35 and 42 days compared to males. There was a significant increase in the percentage of the decay with the progress of life, noting that the proportion of The result was 69.84% for the European quail and 70.38% for the Japanese quail. The sex had a significant effect on the weight of the liver, noting that there was a significant increase in the liver in females compared with males. The aim was to improve the productive performance of poultry and raise their efficiency in the conversion of feed to meat and eggs, including the use of plants that contain effective compounds in their nutrition because of the effective compounds that improve the quality and productive qualities such as mushrooms. The fungus (pleurotus ostreatus) is more cultured than any other type of fungus. Mushroom is particularly important because of its high nutritional value and the medicinal properties of its compounds. As well as rich in vitamin B and C and oyster mushroom can grow at temperatures of 20-30 °C and humidity 50-70%. Millet is also considered one of the cereal crops used as concentrated feed stocks for poultry and waterfowl for its high nutritional value compared to barley and maize in its energy level, as well as the shortening of the plant’s
maturity\(^{11}\). In addition, millet grains are higher in protein content compared to other grains\(^{12}\).

### Materials and Method

The millet was obtained from the local markets. It was moistened with water up to 60\%. It was then filled in transparent plastic bags. 1 kg of millet was placed in each bag. The fungal vaccine was added by 5\%. The incubation bags were transferred to the incubation room. This room is equipped with a Split heating and cooling unit in the Plant Protection Department, Faculty of Agriculture, University of Kufa. The temperature was set at 25 ± 2 °C. The fungus was left to grow on the millet for 28 days. Complete the growth of the fungus on it was dried and mixed well and grinded using an electric mill and spread on a dry and clean ground for 24 hours with flipping between one time and another and use in the bush at 25\%, 50\%, 75\% and 100\%. This experiment was conducted in the field of the Animal Production Department, Faculty of Agriculture - University of Kufa for the period from 13 November 2017 to 25/in 2017, using 240 Japanese quail chickens brought from the Abu Ghraib Agricultural Research Center and raised in laboratory-sized cages of 60 x 70 x 60 cm with a plastic feeder.

#### Table 1: The percentage of feed materials in the installation of the Japanese quail bird

<table>
<thead>
<tr>
<th>Feed staff</th>
<th>Percentage of initiator and growth (6) weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkish yellow corn (crushed) 8.5% C.P</td>
<td>10.00</td>
</tr>
<tr>
<td>SBM Argentinean origin</td>
<td>34.50</td>
</tr>
<tr>
<td>Local grilled wheat</td>
<td>48.88</td>
</tr>
<tr>
<td>Premix Turkish origin</td>
<td>2.50</td>
</tr>
<tr>
<td>Corn Oil</td>
<td>2.60</td>
</tr>
<tr>
<td>Dual calcium phosphate</td>
<td>1.30</td>
</tr>
<tr>
<td>Lysine Industrial (L.Lysine)</td>
<td>0.10</td>
</tr>
<tr>
<td>DL-Methionine</td>
<td>0.12</td>
</tr>
<tr>
<td>Total</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Calculated chemical composition of the diet

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy represented (kcal)</td>
<td>3001.0</td>
</tr>
<tr>
<td>Raw protein</td>
<td>24.17</td>
</tr>
<tr>
<td>Total calcium%</td>
<td>1.02</td>
</tr>
<tr>
<td>Total phosphorus%</td>
<td>0.60</td>
</tr>
</tbody>
</table>

* According to recommendations [13]

The dietary conversion factor was calculated each week as indicated by\(^{14}\) using the following equation:

\[
\text{Food conversion coefficient} = \frac{\text{quantity of feed consumed during week}}{\text{weekly increase}}.
\]

Hemocytometer is used to count red blood cells. This method is a special glass slide for counting purposes after dilution with dilute solution\(^{15}\).

The percentage of the size of the blood cells was measured using a capillary tube containing a coagulation block, which was filled with blood to about one-third, then the tube was closed with artificial clay and the tubes were placed horizontally in the centrifuge for 15 minutes. The size of the blood cells was measured using a special ruler\(^{17}\). Authors contribution, both of Ola H. Abdul Ameer and Mahdi A. Ali are responsible for animal work and samples collection. Yasser J. Jameel is responsible for data analysis, writing correction and proof reading.

The data was statistically analyzed according to complete randomized desing to study the effect of different parameters in the studied traits and compared the averages using the test and the SAS statistical program using the following mathematical model\(^{18}\).

\[
\text{Yij} = \mu + \text{Ti} + \epsilon_{ij}
\]

where: \(\text{Yij} = \text{View value in transaction.} \ \mu = \text{the general mean of the studied character.} \ \text{Ti} = \text{transaction effect.} \ \epsilon_{ij} = \text{The experimental error effect of the transaction.}\)

### Results and Discussion

The results of the statistical analysis showed that there were no significant differences between the second, third, and fifth week, while there were significant differences at (P <0.01) for the fourth week between the coefficients and the control treatment, but they were not significantly different from each other. Food conversion coefficient 4.73, 3.13, 2.90, 2.76 and 2.80 g feed/g respectively, respectively. There were also significant differences (P <0.05) between the third treatment and the rest of the treatments for the sixth week with values 4.76,
4.66, 4.30, 4.73 and 4.53 g/fed respectively. There were also significant differences between the coefficients and the control treatment for the cumulative food conversion coefficient. The values were 3.4, 3.03, 2.93, 3.00 and 2.9, respectively, but the first, second, third, and fourth transactions did not differ significantly. Overall, the results showed that the cumulative food conversion coefficient in the cumulative values improved significantly numerically in favor of all the treatments compared with the control treatment. These results were consistent with the indicated, noting significant differences in the use of A. Niger fermented soybean powder by 0.5%. Moral improvement in the food conversion coefficient was due to the higher rate of increase of the experimental chicks relative to the control treatment. The improvement of the food conversion factor was due to the increase in the number of beneficial bacteria that act as the Probiotic, which in turn promotes the health of the birds. But did not agree with the results of the results, noting that there were no significant differences between the coefficients in the feed conversion coefficient when adding S. cerevisiae yeast to the paste of date nuclei and use in broiler diets.

Table 2: Effect of fermented millet with oyster mushrooms (P. ostreatus) on the feed conversion coefficient (g feed/g bodyweight) for the Japanese quail at different ages (means ± standard error)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Weeks</th>
<th>Feed conversion coefficient (g feed/g bodyweight)</th>
<th>Total FCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>2-3</td>
<td>1.90 ± 0.05</td>
<td>3.4 ± 0.01</td>
</tr>
<tr>
<td>T1</td>
<td>2-3</td>
<td>1.60 ± 0.10</td>
<td>3.03 ± 0.03</td>
</tr>
<tr>
<td>T2</td>
<td>2-3</td>
<td>1.73 ± 0.16</td>
<td>2.93 ± 0.12</td>
</tr>
<tr>
<td>T3</td>
<td>2-3</td>
<td>1.96 ± 0.21</td>
<td>3.00 ± 0.01</td>
</tr>
<tr>
<td>T4</td>
<td>2-3</td>
<td>1.86 ± 0.17</td>
<td>2.9 ± 0.1</td>
</tr>
<tr>
<td>Level of significant</td>
<td></td>
<td>NS NS ** NS</td>
<td>* *</td>
</tr>
</tbody>
</table>

Different letters within one column mean significant differences. *(P<0.05), ** (P<0.01).

Table 3 indicates that there were no significant differences in the number of red blood cells and the number of white blood cells. The values of the parameters were 4.40, 4.34, 4.46, 4.50 and 4.53 (million cells/mm³) 24.23, 24.3, 24.36, 24.33, and 24.33 (1000 cells/mm³), respectively. For PCV, the statistical analysis showed significant differences (P <0.05) for the second, third, and fourth treatment compared with control treatment. The first treatment did not differ significantly from the control treatment. This is due to the secretions and leachates of this fungus may increase the readiness of important elements, especially in the form of blood such as iron, rare metal elements, and some vitamins. The effect of fermented millet in the concentration of hemoglobin indicates significant differences (P <0.05) for all the first, second, third and fourth experiment coefficients compared with control treatment, with values 13.4, 13.50, 13.73, 13.70 and 13.73 (g/mm³) Take over. These results corresponded to the results obtained by the addition of the Aspergillus niger and Taraxacum officinale, as they showed a significant improvement in the volume of blood cells attached to the chicks. However, these results did not correspond with when fermented wheat bran was added to SC as they observed a significant reduction in the size of the blood cells and a decrease in hemoglobin concentration. There were no significant differences between the hemoglobin concentrations.

The characteristic content of folic acid (Folic acid) may be a catalyst for increasing the number of red blood cells (RBC) for the addition of oyster mushrooms to the diet. The increase in the number of red blood cells has led to an increase in the volume of blood cells (PCV) because there is a positive correlation between them. Table 3: Effect of fermented millet with oyster mushrooms (P.ostreatus) on blood cell characteristics (mean ± standard error)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Weeks</th>
<th>RBC Million cells/mm³</th>
<th>WBC (1000 cells/mm³)</th>
<th>PCV%</th>
<th>Blood glucose concentration (g/mm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>6</td>
<td>4.40 ± 0.10</td>
<td>24.23 ± 0.08</td>
<td>34.00 b ± 2.30</td>
<td>13.4 b ± 0.05</td>
</tr>
<tr>
<td>T1</td>
<td>6</td>
<td>4.34 ± 0.08</td>
<td>24.3 ± 0.05</td>
<td>35.3 b ± 0.88</td>
<td>13.50 ab ± 0.10</td>
</tr>
<tr>
<td>T2</td>
<td>6</td>
<td>4.46 ± 0.03</td>
<td>24.36 ± 0.06</td>
<td>37.00 ab ± 1.15</td>
<td>13.73 a ± 0.03</td>
</tr>
<tr>
<td>T3</td>
<td>6</td>
<td>4.50 ± 0.05</td>
<td>24.33 ± 0.03</td>
<td>39.00 a ± 1.00</td>
<td>13.70 a ± 0.11</td>
</tr>
<tr>
<td>T4</td>
<td>6</td>
<td>4.53 ± 0.08</td>
<td>24.33 ± 0.08</td>
<td>39.56 a ± 0.08</td>
<td>13.73 a ± 0.08</td>
</tr>
<tr>
<td>Level of significance</td>
<td></td>
<td>NS NS *</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Different letters within one column mean significant differences. *(P<0.05).
Different letters within one column mean significant differences. *(P<0.05). ** (P<0.01).

RBC= red blood cells, WBC= White blood cells, PCV= volume of blood cells

Conflict of Interest: This research is a personal non-profit work and there is no conflict of interest.

Source of Funding: None.

Ethical clearance: Ethical clearance was obtained from the Faculty Scientific Committee (Faculty of Agriculture, University of Kufa, Iraq) to study the The effect of fermentation of oyster mushrooms on millet grain of Japanese quail diets on some productive and physiological traits.

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Effect of Acylation, Esterification and Deamidation on Functional Properties of Camel Milk Caseins

Qausar Hamed ALKaisy¹, Jasim M. S. Al-Saadi¹
¹Department of Dairy Science and Technology, College of Food Sciences, University of AL-Qasim Green, Iraq

ABSTRACT

The impact of acylation, esterification, and deamidations on foaming, solubility, and emulsifying traits of camel milk caseins were studied. At pH above than 8, a solubility of control, acylated and deamided camel milk caseins were high. The solubility of esterified camel caseins was different. The solubility was high in acidic pH values and decreased with the increment of pH. Compared with control camel milk caseins, acylated and deamided camel milk caseins solutions produced more foam immediately after sparging, while esterification did not improve foaming properties of caseins. The highest EAI for control camel milk caseins was at pH 3, while the highest EAI for acylated camel milk caseins was at pH 4-5. Modification of camel milk caseins with esterification and deamination changed the highest EAI to 8 and 9 respectively.

Keywords: Acylation, Esterification, Deamidation, Camel Milk, Caseins

Introduction

The contents of Camel milk was 4.40% lactose, 3.50% fat, 3.40% protein, 0.79% ash, and 87.0% water. Milk proteins have high nutritional value, high sensory characteristics, and excellent surface properties [1]. Whey proteins and caseins were considered the main classes of milk proteins. Caseins was phosphoproteins condensed from raw milk and at 20°C and pH 4.6. They included around 80.0% of the whole proteid content in cow’s milk. Within caseins the fourth parts κ – CN, β – CN, αs 1 – CN and α2 – CN were distinguished based on the homology of the main composition. Casein was precipitated easily from milk mostly by renneting or at low pH 4.6 at 20 °C. Caseins content in the cow’s milk was almost 80.0% of the proteins. It was around 26.0 g/litre of milk. Casein was divided into 4 small content αs1-, αs2-, β-, and κ-casein [2].

The κ – casein, β – casein, α1 – casein and α2 – casein vary in the sequence, and number of amino acids. They contained 199.0, 207.0, 209.0, and 169.0 of amino acids, respectively. The αs and β- caseins are extensively phosphorylated and lack to organize secondary structure due to their high proline contents. Hence these proteins are capable of binding high values of calcium ions, which can drive to their precipitations [2]. The average whey and casein protein content in milk of camel changes from 0-7 and 1-0% and 2-3 and 1-9%, respectively. The amounts of casein N, wheys protein N, and noon-protein N (NPN) were stated as a ratio of the whole milk protein N. It was located in the ranges 71.0-76.0 %, 17.0-23.0 % and 5.0-8.0-4.0-6.0%, respectively. The food proteins resulted from chemical derivations were commonly used to increase the utilitarian characteristics and nutritional.

The reaction of the chemical which takes place on the groups of amino can be decreased the positive charge of a protein. It was as a result from substituting the positive charged of amino groups by negatively charged or neutral ones. Thus, a lower pl of the protein was achieved. Deamination was represented as a chemical reactions in which an amide utilitarian groups in the side chain of the amino acids asparagine or glutamine was removed or changed to aspartic acid and glutamic acid respectively. Reactions like esterification in which negatively credited carboxyl group of protein were stopped transfer the pl of protein across the alkaline region[3].

Corresponding Author:
Jasim M. S. Al-Saadi
Department of Dairy Science and Technology,
College of Food Sciences,
University of AL-Qasim Green, Iraq
Phone, 009647702163053
Email: jasim_salih@fosci.uoqasim.edu.iq
The aim of this paper for examining the influence of acylation, esterification and deamidation on functionalities characteristics of camel milk casein.

Material and Method

Camel Milks Source: Milk was collected from thirteen animals from Al-Najef desert -Iraq. Bulk camel were skimmed by centrifugation on 2400 g for 15 min at 4°C.

Preparation of camel milk casein: The skim milk of camel were acidified to pH 4.6 with HCL 1M through constant stirring at the heating degree 20ºC. The mix were re-solubilized and dried by the freeze-dried process was repeated again. Also, the resulting caseinate of NaOH until the pH attained 6.80. The precipitation was postponed in the cold methanol to provide a 1.0 % esters of camel milk casein were used. Camel acid casein was modified the procedure for esters of camel milk casein were used. Camel acid casein was used. 10% suspension of casein into distilled water was instant and, the pH was modified 8.5, utilising a 2 M sodium hydroxide. Acetic anhydride (0.9 g/mL protein) was combined to the solution and the pH were kept at 8.5 for 60 minutes. Acetylated casein solution was dialyzed versus distilled water for 24h, and freeze-dried.

Modification of camel casein

Acetylation: [5] the methods for the acetylation of camel milk casein was used. 10% suspension of casein into distilled water was instant and, the pH was modified 8.5, utilising a 2 M sodium hydroxide. Acetic anhydride (0.9 g/mL protein) was combined to the solution and the pH were kept at 8.5 for 60 minutes. Acetylated casein solution was dialyzed versus distilled water for 24h, and freeze-dried.

Esterification: [6] it was modified the procedure for esters of camel milk casein were used. Camel acid casein was postponed in the cold methanol to provide a 1.0 % suspension. However, the suspension of protein-alcohol was whiskered, then concentrated HCl was gently added to create the suspension 0.070 M into HCl. The mix was whiskered on the heat degree of 4.0 ºC for 24 hours. Then, the mixture was dialyzed using cold deionized water with ratio of 1:1. Also, it was dialyzed against 0.0010 M of HCl and freeze-dried.

Deamidation: Deamination of the camel casein was achieved following a modified version method which was defined by [7]. It was prepared 0.50 N of a dispersion casein with HCl ratio of 1:20. It was hydrolysed by heating process at the degree of 70 ºC for two hours using a water bath method. The cooling specimen rapidly in an ice was used to terminate the reaction. Also, it was adjusted a pH value to reach pH 4.6 then centrifuging on 3000.0g for 15.0 minutes. The pellet was neutralized (pH 6.7–7) with (1 N) of NaOH then freeze-dried.

Electrophoresis: Electrophoresis in decreasing conditions for samples were done using [8].

Functional properties of protein camel milk

Solubility: Stock solutions of 0.10% from 0.150 M NaCl and pH 7.0 of casein were modified to the suitable pH values ranged between 3.0 – 10.0 using 0.1 N of NaOH or 0.10 N of HCl. Then, centrifuging on 12000 g to 15.0 min on 25°C. The absorbance at 280.0 nm was specified the concentration protein of the conducting supernatant. Solubility were stated as the percentage of protein in solution. Minimum of three runs were used to measure the means [4].

Foaming: Foaming properties of casein were investigated and studied consuming the gas-sparging method which was proposed by [9]. Fifteen millilitres of specimens were put in the column size of 1.6 cm ×70 cm and it had 0.1% of 0.15 M from NaCl with equaled seven pH 7. In the flow rate 30.0 ml/min, Nitrogen gas were sparged from the bottom of the column for 2.0 minutes. The height of foam was calculated directly after stopping the flow of gas. Three observations were made of each sample.

The activity emulsifying: The method was defined the activity of emulsifying. The emulsion was triplicated for each specimen which contained as follow: (a) 0.10% in 0.150 M from NaCl and (b) modified pH to be in the range from 3.00 to 10.00 using (0.1 N) HCl or (0.1 N) NaOH[11]. It were arranged by utilizing 0.6 mL of corn oil and 10.0 mL of specimen. The emulsion preparation was finalized by mixing these constituents to 1.0 min at the temperature room using blinder. The emulsion process was as below:

1. “A 0.20-mL aliquot of emulsion was diluted using the ratio of 1/250 of the final dilution by applying 0.10% of sodium dodecyl sulphate (SDS) solution.

2. The emulsions turbidity were recognized spectrophotometrically to 500 nm.

3. The action or the activity of emulsion index (EAI) can measure the interface stabilized area for each unit weight of protein (m²/g). It was measured utilizing the equation as below:

$$EAI = \frac{(2.303)(2)(A_{500}(\text{dilution factor}))}{(c)(1\text{-oil volume})(10000)}$$

Where $A_{500}$ refers to the absorbance at 500 nm. Dilution factor is equal 250.0 and c equals g protein/mL of aqueous solution before the process of emulsion. The results were considered the means of three runs [9].
Results and Discussion

Effect of chemical modification on SDS-PAGE of camel milk caseins: Electrophoretic patterns of acylated, esterificated, deamidated and control camel milk caseins are presented in figure 1. The three main caseins of camel milk, α_s-CN, β-CN and κ-CN are shown as major dark-staining components in the control gel(1).

These components did not change substantially upon treatment with esterification acylation, and deamidation but the density of bands was changed. The higher change in bands density was noticed upon treatment with deamidation followed by esterification, while treatment with acylation cause less decrease in bands density.

Deamidated and esterified samples bands were faint. However, in SDS-PAGE, there were no evident molecular mass changes between modified samples and native protein. This is as a result of replacing ammonium cations by neutral acetyl groups through acetylation action, whereas esterification was converted carboxylic acid groups to ester derivative.

Solubility of camel milk caseins: The characteristics of solubility can be served as an index for optimizing the influences of adjustments on proteins. Also, it was indicated the possible disadvantages and advantages of utilizing the protein in question in specific foods. Moreover, assess the significance of free amino and, carboxyl groups in the solubility of camel milk caseins, acylation, esterification and deamidation were conducted for caseins.

At pH values higher than 8, the solubility of control, acylated and deamidated camel milk caseins was high refer to (Figure 2). A maximum protein solubility was observed on high pH values because in this condition, the protein’s positive and negative net charged molecules interact more with water[12]. At pH values lower than 5 the solubility of control camel milk caseins was higher than the solubility of acylated and deamidated camel milk caseins and this can be related to the fact that at low pH value the amino groups in proteins play the major role in their solubility and since that the modification in the case of acylated and deamidated targeted the amino groups in proteins the solubility became less [12]. In pH values between 5-to-7 the solubility of deamidated casein was the highest. This result was related to the fact which deamidation induced casein micelles dissociation that caused by increasing in the electrostatic repulsions between caseins and also it was due to breaking of salt bridges[13]. Also, figure 2 shown the solubility of esterified camel caseins was different. The solubility was high in acidic pH values and decreased with the increment of pH until it reached to 29% at pH 10 and this can explained by the role of esterification in modification of carboxyl group responsible of protein solubility at high pH values. The negative charges of carboxylate moieties in proteins during the Esterification can be neutralized by addition ester groups. The alcoholic groups can be attacked nucleophilic to the free carboxyl groups of a protein persuades significant changes in the net charge of protein. Thus, in its conformation, and hence in its functional characteristics[3].
lamellar phase. As a result of its large interfacial area of liquid-gas, the producing foam was required energy and it was essentially unstable \cite{14}. The foam was generally air and was categorized by low density, high surface area, high viscosity, and high surface energy. Compared with control camel milk caseins, acylated and deamided camel milk caseins solutions created more foam directly after sparging; see figure 3, while esterification did not improve foaming properties of caseins.

Control and esterified camel milk caseins foam volume immediately after sparging was 0.5 mL, while this volume increased to 5.5 and 5 mL after deamidation and acylation, respectively.

This variance may also be correlated to the chemical modification treatments, which changed hydrophobicity surface of proteins \cite{15}. Deamidation was induced dissociation of casein micelles as a result of increasing in the repulsions of electrostatic between caseins and breaking salt bridges. The analysis of observations size particles through transmission of electron microscopy approved that the de-structuration of casein micelles through viewing small size of the particles in highly deamidated of camel milk skim \cite{13}. A result of these physico-chemical changes, the improvement deamidation foaming properties of camel milk caseins was achieved.

Figure 3: Foam volume (mL) of 0.1% control, esterified, acylated and deamided camel milk caseins in 0.15 M NaCl

This result have a good agreement with the results of \cite{14}, who noticed that acylation developed the water-holding, oil-holding, and foam properties of glandless cottonseed flour.

Camel milk caseins emulsion activity: The characteristics of emulsification rely on the protein ability to spread to the interface of the water-oil, orient, and unfold in the fashion which the hydrophobic sets assistant by the oil. However, groups of hydrophilic were associated with the phase of water\cite{17}. Caseins readily form stable protein films and are used extensively in the food industry, particularly in frozen desserts, baked products, and meat emulsions. Caseins, because of their flexible structure and many hydrophobic and hydrophilic regions, spread out on the phase interface and interact with all phases to form stable film. Removal of some or most of the negatively and positive charges from casein by chemical modification alters its net protein charge and changes the flexibility of the modified protein structure. Therefore, the ability of a modified casein to form stable protein films in an emulsion or foam is a very important functional consideration\cite{17}.

The impact of pH in the (EAI) of camel milk caseins presents in figure 4. The highest EAI for control camel milk caseins was at pH 3.0, while the highest EAI for acylated camel milk caseins was at pH 4-5. Modification of camel milk caseins with esterification and deamination changed the highest EAI to 8.0 and 9.0 respectively. The enhanced emulsifying properties of modified camel milk caseins at different pH values can be indorsed to the modification process applied to produce it. It was resulted that, the previously hidden exposure of hydrophobic fields on the protein backbone\cite{18,19}.

Figure 4: pH effect on the (EAI) of 0.1% control (■), esterified (■), acylated (■) and deamided (■) camel milk caseins in 0.15 M NaCl

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Ethical Clearance: The project was approved by the local ethical committee in Al-Qasim Green University.

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Implementation Program of Child Under 5 Years’ Growth and Development Problems in Bangkalan, Madura

Qurnia Andayani¹, Toetik Koesbardiati², Windhu Purnomo³

¹Doctoral Student of Public Health, Faculty of Public Health, ²Lecturer of Social Science and Political Science Faculty, ³Lecturer of Public Health Faculty, Universitas Airlangga, Surabaya, Indonesia

ABSTRACT

There are high cases of child growth and development problems (CGDPs) and Bangkalan Regency as the highest rate of severe wasting and high stunted cases from Indonesian health survey in East Java Province (2013), but CGDPs early detection and intervention coverage are very low even though there are few programmes that have been made to tackle it. It’s aimed to assess the implementation of CGDPs programs to overcome it. This qualitative study is conducted with informants that’s consisted of head of health care, child nutrition coordinators and child growth development coordinators in each level (Regency and Subregency), Child growth development nurse in Hospital, 3 Midwives in village maternal health center, 3 Posyandu cadre and 25 mothers of child under 5 years. Data were collected by observation, in-depth interview and validated by the triangulation method. The result shows that there are prohibitions from all community-based program such as low participation of the community, lack competency of midwives to do early detection of CGDPs, lack participation of cadre. Besides that, if health provider finally tracks cases, unfortunately almost half of the mothers refuse to be referred. It’s happened because they feel ashamed of that condition and accepted it as a natural process. In the other side, there is no integrated CGDPs referred system means there is no strong commitment and coordination among stakeholders. There is a need for collaboration between practitioners and academic also multisectoral support for program planning until evaluation.

Keywords: child, child growth and development, intervention program

Introduction

The first years of life is an important period for the basis of further child growth and development. It is an important stage because there are many aspects that are growing rapidly and it’s the milestone of individual behavior¹. The age of the first 5 years is very sensitive to the environment and lasts so short, so that, it is called a critical period that wouldn’t happen again². Because of that, early detection for child growth and development problems (CGDPs) is a must for every child based on Indonesia Health Role Number 25 the Year 2014 section 21 point j and become the responsibility of government and community³.

CGDPs is a condition of a child under five years with malnutrition and developmental delay. It’s a source to the increasing of child morbidity and mortality rates, beside that it also gives impact for the quality of future generation.

In 2013, Bangkalan is a regency of the highest rate for severe wasting and the 8th highest stunting rate in East Java Province - Indonesia⁴. Growth delay such as severe wasting and stunted conditions have significance influence on development delay⁵. So, growth delay can be a warning to global growth and development delay.

Source Nutrition section 2012-2016⁶,⁷,⁸,⁹,¹⁰

Graph 1: The Coverage of Exclusive Breastfeeding in Bangkalan Regency
Graph 1 showed that there is low coverage of exclusive breastfeeding. The conventional nurturing belief about colostrum as bad milk that isn’t needed by baby still become one of breastfeeding practice in Bangkalan, the other things are babyborn feeding by honey, soft banana, young coconut, and many others.

Material and Method

A qualitative study conducted in Bangkalan Regency, Madura Island, East Java Province, Indonesia. The informants were consisted of head of PHC, nutrition coordinator and child growth development coordinator in each level (Regency and Subregency), Child growth development nurse in Hospital, 3 Midwives in Polindes (village maternal health center), 3 Posyandu cadre and 25 mothers of child under 5 years use list of question sheet.

Data collection technique of this study was aimed to collect primary and secondary data. Primary data were collected through in-depth interview uses the guideline to all informants. Bernard states there are four steps in the preparation of field notes. 1) Small notes or field jotting in a small notepad, 2) Diary recording, 3) Log for reference daily research activities, 4) The notes through descriptive recording through the recording obtained by researchers in the field. Secondary data were collected from Bangkalan health office profile, PHC profile, medical record, hospital and posyandu documents, then it’s triangulated.

Problem priority determination using Hanlon method, there are 4 criteria:
1. Magnitude of problem
2. Gravity or seriousness of problem
3. Ease of overcoming the problem
4. PEARL (appropriateness, economic feasibility, acceptability, availability, legality)

Findings

Bangkalan is one of four regencies for 1260.14 km² in Madura island where is lived Madura tribe as the majority. In terms of geographic location, Bangkalan Regency located on Madura Island, or to be exact is located on the west of Madura Island and the nearest regency to reach Surabaya as Metropolitan city that is connected by Suramadu bridge. In contrast, Bangkalan is still underdevelop regency based on Ministry of Village, Development, Transmigration publication Year 2016. Bangkalan Regency has few healthy facilities that still can’t fulfill all of the people need.

<table>
<thead>
<tr>
<th>Health Facility</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government hospital</td>
<td>1</td>
</tr>
<tr>
<td>Private hospitals</td>
<td>2</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>66</td>
</tr>
<tr>
<td>Primary Health Center/PHC</td>
<td>22</td>
</tr>
<tr>
<td>Mobile PHC</td>
<td>24</td>
</tr>
<tr>
<td>PHC auxiliary branches</td>
<td>69</td>
</tr>
<tr>
<td>Village health center</td>
<td>232</td>
</tr>
<tr>
<td>Village Maternity center</td>
<td>223</td>
</tr>
<tr>
<td>Posyandu for 281 villages</td>
<td>1091</td>
</tr>
</tbody>
</table>

Source: Bangkalan Health Office, 2016

Table 1 showed that the health facility quantity still couldn’t fulfill all the need of Bangkalan residents.

There are 876 midwives, 618 nurses, 11 nutritionists, 9 sanitarians, 12 pharmacists, 4 public health specialists, 49 doctors, 16 specialists. It showed that there are several lacks of specific health resources in Bangkalan regencys can lead to lower quality of services.

Program: There are programs that focus on child growth and development in Bangkalan Regency and still ongoing to be implemented. Such as:

1. **Posyandu**: Posyandu is one of community-based health effort by utilizing the potential and resources available in the community. There is total 1091 posyandu in Bangkalan. Problems of Posyandu activities in Bangkalan Regency as community empowerment effort are less active cadre to do 5 desk posyandu standard. The situation made less quality of health care because the health staff especially midwife has no time for providing health education about child nurturing & child growth development early detection and intervention in this event.

The participation of mother toddlers to attend posyandu is influenced by weather, season or trade and agricultural so that the parent’s presence becomes very low.
2. **Nutrition Post:** Nutrition Post is an activity for mothers of under 5 years old malnutrition group gathering. The objective of the programme is giving group intervention & promotive – preventive activities. Unfortunately, the programme doesn’t focus on whole problems of child growth and development but only the nutrition aspect.

Activities of nutrition post are health education about balanced nutrition, environmental health, family health planning. The second activity is cooking for 6 days in a row to develop recipes from local products and preventing nutrition loss while cooking conducted by PHC nutritionist. Then, eat together with their child after weighting and the last is giving substitute food (milk or biscuit) and multivitamin.

The problem is there are few of all mother don’t finish 6 days programme. It’s caused by mother’s working hours. Few of mothers are also the main worker for family. So, if the mothers don’t work, they can’t provide food. Beside of that, Health staff should be the one who provides food so the health staff needs to wait for the programme’s fee or use their own expense.

3. **Healthy Child Trip:** Healthy child trip is a fun trip. Every toddler from 6 Early Education Institution that has MoU with PHC come to visit Bangkalan subregency PHC and follow the route as the guide gave and lead them together with their teacher. They will go to nutritionist room to get nutrition assessment for their nutrition status based on their age in KMS (a kind of child growth graph in Indonesia), they got anthropometric measurement by Dacin as standard weighing tool, microtome to measure the height and also Lila meter to measure lipid mass and measuring tape to measure brain development. The next route, child continue their trip to visit midwife to get child growth and development early detection used questioner of child’s development pra screening (KPSP).

In 2017, Bangkalan Subregency as the only one PHC that held this programme has assisted 476 children 3-7 years old. The problems are no health staff that qualified to assess CGDP of early detection and intervention by certification improvement.

4. **Safari Posyandu:** Motivation and sharing activities by inviting all mothers in the remote area that is low participation for the *posyandu* activities (4 times per year in each random village). Coordination between health sector and farming department also National Family Planning department (NFPD). At first, leader of PHC will give motivation session about the importance of posyandu for maternal and child health, then, farming department share about how to make a productive small land near house and family planning information especially about contraception from NFPD.

5. **Severe Malnutrition Tracking:** Health Staff tried to track the severe malnutrition child under 5 years old that never contact to health services because of many factors. The problems are about parents’ work hour and health staff work hour that don’t match each other could make the loss of target tracking.

![Graph 2: Direct Causes of CGDPs in Bangkalan Regency 2013](image)

**Graph 2:** Direct Causes of CGDPs in Bangkalan Regency 2013

**Source:** Nutrition Section, 2013

Graph 2 showed that there are many factors which Bangkalan department has observed from the field as the main causes of CGDPs such as poverty as the highest (31.6%), low knowledge about nurturing (18.4%), nurturing practices (18.4%), also another sick (16.4%) and low birth weight (4.4%).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Total</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusive breastfeeding</td>
<td>547</td>
<td>28.3</td>
</tr>
<tr>
<td>Vitamin A for child 6-59 month</td>
<td>67205</td>
<td>86</td>
</tr>
<tr>
<td><em>Posyandu</em> participation</td>
<td>61469</td>
<td>78.7</td>
</tr>
<tr>
<td>CGDPs early detection 12-59 month</td>
<td>44462</td>
<td>63.33</td>
</tr>
</tbody>
</table>

**Sources:** Bangkalan Health Department, 2016
Table 2 showed that there are few of program indicators that can’t fulfill the target especially exclusive breastfeeding as one nurturing practices in society that still in the point of 28.3%.

“Mon lastarennah laher langsung eberri’ maddhu, ro’ merro’ ma’le sehat bhaji’eng -------- mon nanges langsung edhuleng pas omor 4 areh otabah 7 are ma’le ebo’eng olle lakoh”. (Ny.S)

This problem is increasing because mothers give food such as honey, young coconut to their babyborn beside of soft banana that they believe can be fast solution to keep baby calm when baby (0-6 months) is crying and then they can continue to work.

Problem Identification

1. Identification of problem based on primary data
   a. Identification of CGDPs intervention programme based on interview with programme coordinators in regency, subregency & village level: Mothers who have CGDPs won’t referre their child to intensive health care because of poverty aspect (not work means no income means no food), the belief that their child is healthy, mother feels shame if her child get intensive treatment in the health center because of neighbor who visit her child assume what’s her child disease. There is no health staff that has child developmental early detection instruments & trained to do it (including assessing nutrition status), midwives have overload tasks to do that also make low motivation situation.

   b. Identification of CGDPs intervention programme based on interview with posyandu cadre & mothers: Mother knows that their child never get development early detection/intervention by health staff, mother’s perception of CGDPs is healthy child that don’t need to referre to PHC can cause delay in intervention effort, Low knowledge and education about how to do nurturing based on child growth and development guidance (KMS) book. Economic problems to supply food including how to serve balance nutrition, stimulation and health services (only 56,67% have national health insurance). It supports the data about poor people number is 205,71 in Bangkalan or 21,41% while 2016 also the Human Development Index (HDI) in Bangkalan as number 2 lowest in East Java 2017 is 69.77%. Oleen as a condition of malnutrition and/or developmental delay that is most of people in the rural area believe as condition that people knew can be happened to Madurese child as natural process and only oleen shamans can cure it by specific massage, jamu or herbal drink, and amulet. Even some of oleen child’s mother try to find treatment from both of them (doctor and shamans). This phenomenon is only known by Madurese.

2. Identification of Problem based on secondary data: The situation of low coverage of CGDPs early detection can delay the intensive intervention effort, also low percentage of midwives with child growth and development certification and last certification workshop of child growth and development of health staff is 11 years ago but there is no refreshing material, programme that has been developed is only focused on growth problems.

Priority Problems and Identification of Problem causes: Mother’s perception of CGDPs is a healthy child that doesn’t need to be referred to PHC cause delay in an intervention effort. It’s caused by the perception of the susceptibility of CGDPs’ mother who feels her child is healthy, perception of CGDPs who referred to PHC is a shame thing, few mothers and family believe that the condition is only oleen and shaman will cure child by jamu and massage.

Alternative Problem Solving: Alternative problem solving for this situation is health education for mother of CGDPs to improve their knowledge about healthy child and child nurturing that consider cultural approachment and local wisdom, increasing the health promotion and improving health care facilities, community empowerment by involving cadre, religious and community leader to push up the issue & community awareness for CGDPs, assisting of CGDPs’ mother and family uses family approaches collaborated with Health Academy in Bangkalan.

Plan of Action: The general purpose of this plan of action is reduced the CGDPs under 5 years old to 50% in 2019 by early detection and intervention assistance by collaboration with Health Academy. The specific
purposes, such as the increased of cadre, religious and community leaders participation to find the CGDPs and persuade to seek health care, the increased of Posyandu participation, the increased of skillful health staff to do early detection and intervention for CGDPs, the increased of CGDPs early detection & intervention by health staff, the increased of mother and families about child-nurturing practices and concept of healthy child.

**Implementation:** There are few implementations, such as:

a. Collaboration with all sectors to do mapping of CGDPs in Bangkalan Regency.

b. Assisting healthy child under five years old family by Health Academy students collaboration

c. Early detection of child under five years using standard KPSP questionnaire

d. CGDPs intensive intervention by health staff by assessing growth and development then focus on specific problems of each child.

e. Mother seeks for health care to her CGDPs.

**Evaluation:** The evaluation process based on the aspect of continuing collaboration with all sectors, the record of child health increases better each year, the absence of CGDPs with a delay intervention because of cultural factor. All child under 5 years old, especially in rural area got assisted by Health Academy Students. Mother of a child under 5 years old know how to do nurturing practice better and there is a significant improvement of knowledge, attitude, and practice to do child nurturing.

**Conclusion**

CGDPs is the problem for Nation because it can reduce the quality of future generation. So, there is a need for collaboration between academics and practitioners also multisectoral stakeholders for CGDPs programme planning until evaluation especially implementation and also by involving the cultural approachment in each programme.

**Conflict of Interest:** The author have declared that there is no conflict interest

**Source of Funding:** Research and Technology Ministry of Republic of Indonesia

**Ethical Clearance:** Ethical was approved by the Ethical Committee of Public Health Faculty, Universitas Airlangga, Indonesia with the ethical certificate number 05/EKPK/2019

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Effect of Exercises Using Devices to Develop Some of the Motor Qualities and Offensive Basketball Skills

Rasha Talib dheyab¹, Omar Saad Ahmed¹

¹College of Physics Education and Sports Science, University of Diyala, Diyala, Iraq

ABSTRACT

Basketball has a great care and interest in being one of the most popular and exciting games in the world and wants to be seen by young people and adults and different levels of social and cultural. The basketball game is characterized by multiple skills and cohesion and the ability to control well all the skills of the game as well as the need for the ability to behave properly. During the game, you need dynamic abilities such as agility and motor compatibility of the game’s skills. The research problem seeks to achieve the maximum victories in the game of basketball through participation in various tournaments and so it is noticeable that it changes material efforts with or with In order to achieve this, the researcher can clarify his problem with the following question: The researcher chose the research sample in a deliberate manner to conduct the research and reached (14) players from the specialized basketball school in Diyala governorate. The researcher concluded that the exercises used positive effect in the development of fitness and motor compatibility, as well as the existence of differences of significant significance between agility and motor compatibility in the tests of tribal and remote.

Keywords: Basketball, Exercises, Kinetic qualities.

Introduction

The start of the trend of countries to take care of sport in terms of scientific progress in the formation of society and generations, whether physical, mental, psychological or social, as this trend came in various fields to show the level of development in the field of sports, which serves the achievement of sports in general and recording the best results.¹ And achieve the highest levels in international forums that draw the civilization of those countries participating, and the training process is the most important and fundamental aspects, which have been subjected to continuous efforts and large as a result of the use of new and innovative means and modern methods and interest in age groups began to take G by large stakeholders in the scientific reference and planning, which is based on sound scientific foundations on how to deal with these young lions and young.²

The researcher conducted different surveys for the trainers of the game and the teachers. He has found a weakness in some of the offensive skills that are the basis in achieving the goal in all the team members, including the skill of passing, dribbling and scoring as well as some of the kinetic qualities such as compatibility and agility, which is the gate or the basis for the development of the skills mentioned above.³ The most critical points noted by the researcher at Diagnosis of the problem is the occurrence of many mistakes in passing, scoring and dribbling skills that lead to a lack of appropriate exercises to develop skills and qualities also the lack of not using modern devices in training the players.⁴

The Research Goal: Identify the effect of exercise devices in the development of fitness, motor compatibility and some basketball offensive skills on the and pre and post tests.

Research Hypotheses: There are significant differences between the pre-test and post-test of the research sample in the development of fitness, compatibility and some offensive skills in basketball.
Research Methodology And Field Procedures:

Research Methodology: The researcher used the one-trial experimental approach to suit the nature of the research.

Community Sample Search: The selection of the sample is one of the most important and fundamental matters in the work process of the research. Therefore, the sample of the research should be representative of the primary community. It should be true. So the researcher pre-test the research community which was the specialized school in basketball in Diyala city, they were (20) members chosen carefully either the sample search conducted research and amounted to (10) players.

Research tools and means of collecting information: The search tools are how the researcher can collect data and solve the problem to achieve the objectives of the search, regardless of those tools of data, samples, and devices.

Machines and tools used in research: The mobile device for the developing fitness, Compatibility and some skills.


Movable character training device for the development of fitness and compatibility and some basic skills: This device is used to exercise and improve the motor qualities without the help of the coach or other players so the chances are equal for all players.

Measurements: Height 3 m, base 1.5 m, the characters each one 3 m long folded from the middle is made of plastic material and is foldable and harmless when collided by players and there are three speed in the device.

![Figure 1: Mobile Surface Propeller](image)
Mobile Surface Propeller: This device works at a near-ground-level and contains low barriers. The height can be controlled at a different speed, during which the difficulty of the exercise can be increased, and the safety conditions for the players are also available. The arms are made of plastic material and covered with sponge material.\(^{(7)}\)

Tests used in research:

Fitness and compatibility tests: The first test ran between the stands characters:

**Test Name:** jogging between stable characters 20 m.  
**The objective of the test:** measuring agility.  
**Tools used:** tape measure, license number (10), stopwatch, whistle.

**Performance:** When the whistle is heard, the player will run between the stable characters on two sides for a distance of 20 meters.

**Second:** The test of motor compatibility:  
**Test name:** Test numbered circuits.  
**The objective of the test:** Measuring the compatibility of both legs and eyes.  
**Tools used:** Stopwatch, drawing (8) circles on the ground each circle with a 60 cm circumstances, whistle.  
**Performance:** The player stands in circuit no. (1). When the signal is heard, the player jumps on both feet together into circle number (2) and turns to the second circuit until no. (8) as quickly as possible. The registry records the time it takes to move through the numbered circuits.

Skills Tests:

**First:** correction: Purpose of the test: Measure the accuracy of correct scoring.  
**Gadgets:** basketball court - basketball goal - whistle.  
**The number of attempts:** Allow each player ten attempts.

**Second:** the chest - passing test. (1)  
**Test Name:** Handling the wall from a distance of 3 m in 3 sec.

**Objective**

To measure the movement of lactic oxygen to the skill of chest passing.

**Measurement:** Calculate the number of times the ball touches the wall for 30 seconds.

**Third:** the high dribbling: (1): The name of the test starts from the high start point and of a high-speed dribbling for a distance of 20 m in the dominant arm.

**Purpose of the test:** Measuring the high speed dribbling for each player.

**Procedures:** Draw two parallel lines; the distance between them is 20 m. make a start and end lines.  
**Test performance:** The registrar calls the names to give the start signal first and record the results. Secured Timing as well as standing at the finish line b.

**Calculation of Degrees:** A score for each player is the time it takes to perform the test from the moment the starting signal is at line A until the finish line B.

**Exploration Experiment:** The time needed to implement the proposed vocabulary. Create an idea of how players receive training and testing. Overcoming mistakes and obstacles that may arise when implementing the main experiment. Find out the size of the assistant team and the primary team and confirm the validity of the tools used.. Ensuring the proper performance and implementation of tests. Provide special exercises (proposed).

The first exploratory experiment was conducted on Friday 10/8/2018 at 10:00 am on a sample of (5) samples from outside the main sample to determine the validity of the equipment and the prepared exercises.

The second exploratory experiment was conducted on Saturday, 11/8/2018, which coincides with the sample of the first experiment at ten o’clock in order to determine the validity of the tests used.

**Test Stability:** The method of stability through the test and repeated- test. The test was applied to a sample of (5) players on Saturday, 11/8/2018 at 10 am and then the tests were returned after a week and the members of the
first test themselves on Saturday, 18/8/2018 and under 
The same conditions, time and place. After processing 
the results using the simple correlation coefficient, all 
calculated values were less than (0.05).

Table 1: Shows the stability of the tests of the 
research variables in the test and retest method

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Stability Coefficient</th>
<th>Mistake Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitness test</td>
<td>0.857</td>
<td>0.002</td>
</tr>
<tr>
<td>Compatibility Test</td>
<td>0.878</td>
<td>0.001</td>
</tr>
<tr>
<td>Passing</td>
<td>0.822</td>
<td>0.004</td>
</tr>
<tr>
<td>Dribbling</td>
<td>0.938</td>
<td>0.000</td>
</tr>
<tr>
<td>Scoring</td>
<td>0.722</td>
<td>0.018</td>
</tr>
</tbody>
</table>

Objective of the test: It is meant to be free from bias 
and not to issue self-orders. Since the tests are based on 
conclusive evidence, i.e., numbers as a result of the main 
experiment results, the objectivity is high.

Exercise: The researcher prepared special exercises 
that performed on devices, and these exercises include 
the ability to motor as well as some offensive skills in 
basketball.

Pre-Tests: The researcher conducted the standard tests 
of the research sample on Friday, 24/8/2018 at ten 
o’clock in the morning at Diyala Sports Club room for 
the variables of the research and the researcher confirmed 
all the conditions.

The main experience: Exercises were prepared to 
develop motor skills and some offensive skills in basketball.

These exercises were applied in the main section of 
the training module (the physical-skill part) in a 
picular preparation.

The training time was 90 minutes, and the number of 
training units was 16 units. The total time of the 
training units was 80 minutes and 30-40 minutes in the 
main section of the unit.

The researcher adopted the method of high-intensity 
periodical training ranged from 80-90% as well as through 
the times the exercise performed and how many times the 
exercise repeated or implemented and the training curve 
within the training unit in partial intensity (2).

The researcher took care of the gradual speed of the 
deVICES that used and the regular exercise in terms of 
difficulty, performance and the level of difficulties that 
caused by increasing the speed of the training devices.

Remote Tests: After performing all repetitions and all 
exercises by the sample of the researcher, the researcher 
conducted the tests of the dimension on Saturday 
20/10/2018 at ten o’clock in the morning and observed 
the same conditions of pre- testing as much as possible.

Statistical Means: Statistical data were processed using 
SPSS.

Table 2: Shows the computational and standard deviations of the pre and post-test, the difference of the 
curves, the value of (v), the error ratio of the variables in question

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Error %</th>
<th>T.test</th>
<th>Std differences</th>
<th>Averages Differences</th>
<th>±std</th>
<th>avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>correction</td>
<td>0.000</td>
<td>11.00</td>
<td>0.86</td>
<td>2.75</td>
<td>0.89</td>
<td>7.83</td>
</tr>
<tr>
<td>Chest passing</td>
<td>0.000</td>
<td>7.21</td>
<td>3.8</td>
<td>7.91</td>
<td>4.08</td>
<td>24.83</td>
</tr>
<tr>
<td>Fitness</td>
<td>0.000</td>
<td>8.12</td>
<td>0.33</td>
<td>2.70</td>
<td>1.10</td>
<td>9.52</td>
</tr>
<tr>
<td>High dribbling</td>
<td>0.000</td>
<td>19.23</td>
<td>1.21</td>
<td>6.75</td>
<td>1.16</td>
<td>11.41</td>
</tr>
<tr>
<td>Compatibility</td>
<td>0.000</td>
<td>13.48</td>
<td>0.77</td>
<td>3.02</td>
<td>0.97</td>
<td>9.16</td>
</tr>
</tbody>
</table>

Discussion of Results

The researcher attributed the evolution in 
compatibility to the use of exercises devices, which had 
a positive impact in the development of this attribute; 
the researcher used the training devices in the training 
the players, which added competition between players 
and a development in the compatibility of motor. The 
player uses the ball on the device and the player was in 
contrast to the movement of the training device and with 
the ball. The researcher also attributed the effectiveness 
of the mobile surface propeller used in the search, where
the players were trained by jumping and gradient with the right and the left legs and backward. This device is working to develop the dynamic compatibility of the basketball player. Graduation of the development of this capacity by training from the public to the private, and this is what he pointed out (3) to develop the compatibility of the athlete occurs by training this level of mobility (compatibility) General and simple and easy and then compound in the start-up phase or establishment phase, As well as the gradual training of this kinetic ability (special compatibility during the two specialized training stages).

The repetition of the exercise and giving it sufficient time in explanation and performance helps the player to fully understand the details of the whole movement. This is confirmed by that sensations play an important role in the motor coordination of skill and coordination between the musculoskeletal system, The performance of the skill and the recognition of the treatment contributes to the ease and flow of motor performance of the skill.

Discussions of Offensive Basketball Skills

The researcher attributes the evolution and the significance of the differences in the tests of the technical variables to the use of exercises in the devices as the mobile movable characters device has had a significant impact in the development of skills through facing the player the different speeds and put in conditions similar to the conditions of real players and skill as well as the element of excitement and competition, which the device is adding for the players during the training and it has a significant impact in the players skills development. The treatment and correction of errors in according to a correct scientific and educational methods and allow players to perform the most number of correct repetitions and direct them towards the exact performance, which plays a prominent role in achieving the training goal. The training was natural and challenging in the course of the training units until you reach the compound exercises, which is confirmed by that the development of the level of technical performance of players by providing the opportunity to increase the number of repetitions as well as giving feedback to address errors during the performance and the teaching of motor skills lead to correct the player’s responses and guide his behavior towards the correct form that raises the level and accuracy of the performance of learning For skill.

The exercises in the devices within the curriculum of the training modules were the level of these exercises, where the skills performed on the movable character training device which consists of tow combined devices working on clockwise and anti clockwise. The player revolves around and can perform skills in several exercises positions on the device where it can perform, and the device is stopped and can also perform, and the device works As well as the principle of gradualism in the exercises where the player plays skills. The skill of the dribbling is not a skill alone, but collapsed skill that combines several things including speed, agility, deception and control of the ball, so not to unleash any choice of exercises that achieve the goal of training delays the arrival of the player to the level of performance required during the time period specified for training, which is also confirmed by that the gradual access to the best level of performance has become an essential rule in training and that hierarchy means achieving the training plan. The time of the intensity of the exercise, the gradualist of exercises from simple to composite to the most difficult of the devices under multiple circumstances. The central role contributing to the development of the level of skill performance where the complex exercise between the skills that used in the research a prominent role in the development of the skill of correction, The existence of a positive relationship between the types of skills as each skill performed by the player is the correction, and this is confirmed by both that carrying performance “is the ability of the player to bear the repetition of the performance of psychological skills for long periods without feeling tired”.

Conclusion

The results showed that the use of the two mobile devices and ground fans in training has developed agility and motor compatibility and some basic skills of basketball, that the use of devices have a definite effect in the development of variables for the sample of the research, and through the findings of the research recommends that the use of suggested devices Modern in the development of fitness and compatibility and some of the offensive skills basketball, as well as the use of other devices to develop other skills and skills, and the use of the player to the advanced devices during training, especially in the games to improve performance and add fun to train and stay away from boredom and Traditional exercises, experiments and studies on different age groups.
Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Not required

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Implementation of Speech Therapy and Social Stories Increasing Social Interaction in Children with Autism

Retno Twistiandayani¹, Khoiroh Umah¹, Dede Nasrullah²
¹Lecturer in Bachelor Degree of Gresik University, Indonesia; ²Lecture Faculty Health of Science University Muhammadiyah of Surabaya, Indonesia

ABSTRACT

Autism is defined as developmental disorders with the main characteristics i.e. social interaction disorders, communication disorder and restricted imagination interest and ability whose symptoms begin to appear before a three-year-old child (Amanda, 2017). Social Skill Training, one of them is social stories therapy become important to be owned by children with ASD (Autism Spectrum Disorder) so that they can behave in accordance to the social rule. The study aimed to analyze the differences between the influence of speech therapy and social stories in increasing social interaction on children with autism. The research method was a pre-experimental study with a pre and post-test with control group design. This study was divided into two groups and observed in two stages. After the data was fulfilled then an analytical test was used paired t-test and independent t-test. The results found that the influence of speech therapy in increasing social interaction \( p=0.004, \rho<\alpha=0.005 \). It was obtained the influence of social stories therapy as well in increasing social interaction \( p=0.004, \rho<\alpha=0.005 \). There was a significant difference between obtaining speech therapy and social stories in increasing social interaction on children with autism. The speech therapy and social stories were necessary to improve their social interaction that it could increase children’s with autism ability to interact with their surrounding social environment.

Keywords: Speech Therapy, Social Stories Therapy, Social Interaction, Children with Autism

Introduction

According to Baron S and Cohen (2009), autism is a state of person since he/she had been born or toddler made him/her could not form social relation or normal communication, in addition, he/she overcomes trouble to understand anything from other people’s point of view ¹. As a result, they are isolated from others and go into repetitive world, activity, and obsessive desire as well as difficult to develop their ability to create interaction and relation ². There are some therapy methods used to overcome social interaction disorder on children with autism either by medical or non-medical therapy ³. One of medical therapy often used in resource center is speech therapy to improve their social interaction. The speech therapy is applied to train the speaking ability of children’s with autism ⁴.

Gresham and Kern (2004) in Raymond (2008) stated that in order to create effective social skills training, students who observe must be able to pay attention to whom as models of behavior, able to remember what they had been observed, be able to imitate what they have seen, and have the motivation to engage in new behavior ⁵. Based on the latest theory, social skills training has become one of the most efficient therapies for autistic healing, especially in the treatment of social stories focusing on methods of giving examples of social life through a story, so that it indirectly stimulates children to follow the main character’s behavior ⁶. Social therapy stories are a new therapeutic technique for autistic children, where therapists provide an overview of stories about people’s culture that aim to help students who experience impaired social interaction of which aims at understanding social rules of the culture ⁷.

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In some developing countries like Indonesia, children with autism can reach 66,000,805 people. According to data from the East Java Education Office in 2011 there were 388 SLBs of 13,159 students. In addition, there are 93 inclusive schools with students with special needs 1,476 children and 15% (221) of them are autistic children. Based on preliminary data from researchers at the Gresik District Resource Center in October 2016, there were 48 autistic children and 45% experiencing impaired social interaction. Based on the research results of Achmad C (2009) in the “Kasih Mama” therapy center, it was found that play and storytelling therapy could improve the abilities and social skills of children with autistic disorders.

From the 50 children with autism who experienced social interactions disorder, 35 children had mild social interactions (70%). Social interaction on children with autism who were left on an ongoing basis could have a negative impact on their life such as being isolated from the environment because they were happy with their own world but ignoring others around him.

Methodology

This research method was a pre-experimental study by designing pre- and post-test with the control group design. The sample was taken by purposive sampling technique that matches it according to specified inclusion criteria. The independent variable was speech therapy and social stories, while the dependent variable was the social interaction of children with autism. This study was divided into two groups and observed in two glasses. After the data was fulfilled, then the analytical test was carried out using the paired t-test and independent t-test.

Research Result

Effect of Speech Therapy in Improving Social Interaction on Children with Autism

Table 1: Effect of Speech Therapy in Improving Social Interaction on Children with Autism in May-October 2017 at Resource Center

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>Min-Max</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Interaction</td>
<td>Before and After Treatment</td>
<td>7,000</td>
<td>1,82574</td>
<td>5,0-9,0</td>
<td>-7,905</td>
<td>0,004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13,750</td>
<td>1,25831</td>
<td>12,0-15,0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results showed that the average score of social interaction in the experimental group carried out speech therapy before nurse competency test was 7.00 and after the test given was 13.750 so that its points increased 6.75. The Result of the statistic was $p$-value = 0.004 and $\alpha = 0.05$ which showed $p$ value $< \alpha$ or $p$ value $< 0.05$, it meant that Ho was rejected so that the speech therapy affected to Improvisation social interaction on children with autism.

Effect of Social Story Therapy in Improving Social Interaction on Children with Autism

Table 2: Effect of Social Story Therapy in Improving Social Interaction on Children with Autism From May-October 2017 at Resource Center

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>Min-Max</th>
<th>T</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Interaction</td>
<td>Control Before After</td>
<td>7,000</td>
<td>2,16025</td>
<td>4,0-9,0</td>
<td>-3,6</td>
<td>0,035</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10,250</td>
<td>1,89297</td>
<td>9,0-130</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results showed that the average score of social interaction in the control group treated with social stories before nurse competency test was 7.00 and after doing the test was 10.250 so it increased 3.25 points. The statistic test result was $p$-value = 0.035 and $\alpha = 0.05$ that showed $p$ value $< \alpha$ or $p$ value $< 0.05$, it meant that Ho was rejected so that the social story therapy affected to improve social interaction on children with autism.
The Different Between Implementation of Speech and Social Stories Therapy in Improving Social Interaction on Children with Autism

**Tabel 3: The Different Between Implementation of Speech and Social Stories Therapy in Improving Social Interaction on Children with Autism From May-October 2017 at Resource Center**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>T</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Interaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech Group</td>
<td>4</td>
<td>13.75</td>
<td>1.258</td>
<td>3.080</td>
<td>0.022</td>
</tr>
<tr>
<td>Social Story Group</td>
<td>4</td>
<td>10.25</td>
<td>1.893</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The statistic result showed that independent test of p-value = 0.022 dan α = 0.005 depicted that p value < α or p value < 0.05 which meant Ho was rejected so that there was a significant difference in social interaction between experimental and control groups. The result of social Interaction on the experimental group after and before carrying out speech therapy treatment showed higher than social stories group.*

**Discussion**

**Effect of Speech Therapy in Improving Social Interaction on Children with Autism:** The statistical test resulted in the effect of speech therapy in increasing social interaction on children with autism. The results of the analysis obtained the minimum-maximum value in the experimental group experienced an increase in social interaction after speech therapy. There were several therapeutic methods that could be used in dealing with social interaction disorder on children with autism both through medical therapy and non-medical therapy. One of non-medical therapy commonly used in resource centers was speech therapy to increase social interaction on children with autism. Speech therapy aimed to train the speaking ability of children with autism. Social interaction was influenced by several factors, i.e. motivation, gender, environment, value, background, and age.

Before speech therapy, the level of social interaction ability of children with autism reached a minimum of 5 and a maximum of 9, because the characteristics of respondents were 5-12 years old. The phase of school children aged 5-12 years experienced various patterns of development such as intellectual, language, emotional, social, moral, motoric, and religious appreciation. At point no. 2 (to care if friends fall), 4 (to be able to greet others), 6 (to want to budge), 9 (to want cooperating and not challenging), 13 (be able to share), 15 (be sensitive to the feelings of others) and 18 (gestures directed/focused), all respondents did not have those abilities. After carrying out speech therapy, it increased their social interaction of children with autism that was a minimum score of 12 and a maximum of 15. This state could be seen from their achievement of social interaction values in points 4, 8 and 20, which were most children with autism could afford to greet others, to show good care and to provide care when parents left. The provision of speech therapy was carried out in 8x meetings using teaching aids so that it could stimulate the children to show and to tell things related to the picture in question. This speech therapy would train children with autism to communicate and speak. Moreover, their parents must be patient and should not give up in training them as it is not like training normal children.

**Effect of Social Stories Therapy In Improving Social Interaction On Children with Autism:** The results of statistical tests showed that social stories therapy increased social interaction on children with autism. The results of the analysis obtained the minimum-maximum value in the control group got an increase in social interaction after the therapy, yet it was not too significant. The social therapy stories are a new therapeutic technique for children with autism done by therapists who provides a description of stories about community culture that aims to help students who experience social interaction disorder. It aimed to understand the social rules of the culture of society. And it could be given once a week.

Before implementing social stories therapy, the level of social interaction ability of children with autism reached a minimum score of 4 and a maximum score of 9. At point no. 2 (to care if friends fall), 4 (to be able to greet others), 6 (to want to budge), 9 (to want cooperating and not challenging), 13 (be able to share), 15 (be sensitive to the feelings of others) and 18 (gestures directed/focused), all respondents did not have the ability in that matter. After therapy social stories experienced improvement, the social interaction of children with autism reached a
minimum of 9 and a maximum of 14. It could be seen in the achievement of social interaction scores in point no. 4, 6, 9, 13 and 18, most of them were able to greet others, want to give in, work same and not challenging could share and gesture directed/focused.

Social therapy stories aim to increase social interaction on children with autism so that those who initially don’t budge refuse to work together and challenge them eventually to budge and cooperate with friends13.

Different Between Implementation of Speech Therapy and Social Stories in Improving Social Interaction on Children with Autism: The results of the statistical analysis showed that there were significant differences in social interactions between experimental and control groups. The social interaction in the experimental group after speech therapy was higher than the control group.

Social interaction was a dynamic relationship, involving relationships between individuals, between groups and between individuals and groups. Two conditions for the occurrence of social interaction according to Gillin (2010) were the existence of social contact (social context) and social communication 14. In the experimental group after speech therapy, most of the respondents were already at the stage of social communication which item no.5 indicated that all respondents had contact with other people and most children who experienced autism worked together and were not challenging. According to Pamoedji G (2007) The level of success in handling autism in children was not only dependent on the therapy process, but there were factors that could influence it, including role and involvement of parents in the treatment of children with autism, Teaching and education processes on them, their health conditions, their level of intelligence, their level of abnormalities (mild, moderate, severe) and their ages when first handled 15 16.

Conclusion

The results showed that speech therapy had an effect on increasing the social interaction of children with autism as well as social stories therapy and there were differences in speech therapy and social stories on social interactions in children with autism. The speech therapy and social stories were one alternative therapy that has many known benefits in the field of health. However, responding to speech had more influence in increasing the social interaction of children with autism. For this reason, therapists at the Gresik Resource Center were advised to more optimally apply speech therapy in their implementation, especially on children with autism who experience social interaction disorder.

Acknowledgment

We gratefully acknowledge the support of the Ministry of Research, Technology and Higher Education of the Republic of Indonesia.

Conflict of Interest: The authors confirms that this article contains no conflict of interest.

Ethical Clearance: This study was approved by the Health Research Ethics Committee (KEPK) University Airlangga of Surabaya and the Regional Departement of Health (Gresik, Indonesia). All participants were providede with a participant information sheet written in Bahasa Indonesia, and they signed the consent from prior to participating in the study.

Source of Funding: This study has research ministry grant the Ministry of Research, Technology and Higher Education of the Republic of Indonesia.

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Determination of Safe Sulfur Dioxide (SO₂) Concentration among Street Vendors of Ampera Bus Station, Palembang, Indonesia

Rizqy Kartika Sari¹, Abdul Rohim Tualeka¹, Pudji Rahmawati², Syamsiar S Russeng¹, Atjo Wahyu³
¹Department of Occupational Health and Safety, Faculty of Public Health, Universitas Airlangga, 60115 Surabaya, East Java, Indonesia; ²Department of Development of Islamic Society, State Islamic University Sunan Ampel, Surabaya, Indonesia; ³Department of Occupational Health and Safety, Faculty of Public Health, Hassamuddin University, Makassar, Indonesia

ABSTRACT

Sulfur dioxide is a corrosive substance harmful to humans. In the form of gas this substance has a pale color, nearly invisible and has a strong odor. Transportation activities in the bus station produces SO₂ exhaust gas which is dangerous for street vendors. The purpose of this study was to determine the safe concentration of sulfur dioxide at street vendors at Palembang’s Ampera Terminal, Indonesia. This is an observational, cross sectional and descriptive study. The study population was street vendors at Ampera Terminal Palembang, Indonesia. The sampling technique used a total population of 84. Data analysis was conducted manually quantitative to determine the safe concentration (C safe) of sulfur dioxide for workers obtained from the data of experimental white mice (W animals) weight, body surface area of white mice (BSA animals), workers’ body weight (W), workers’ height (h), workers’ body surface area (BSA), workers’ respiratory rate (BR), working time (t), concentration of sulfur dioxide (C), animal km, human km, NOAEL and reference of concentration (RfC).

From data processing, the concentration of sulfur dioxide in Ampera bus station, Palembang was 0.2298 mg/m³ (0.08771 ppm). This value is under (SNI) 19-0232-2005 of 5.2 mg/m³ (1.98 ppm). Based on the manual calculation, the safe limit of sulfur dioxide concentration in Ampera bus station, Palembang is 0.395 ppm. This value exceeds the value set by Permenaker No. 5 of 2018 of 0.25 mg/m³ (0.09542 ppm). From these findings, control from the adverse effects of sulfur dioxide on workers’ health is needed. Control recommendations include routine inspection of vehicle exhaust emissions and improvement efforts to reduce SO₂ emission levels to reduce health risks. In addition, health consultation facilities need to be provided for street vendor workers in Ampera Palembang.

Keywords: sulfur dioxide, bus station, safe concentration, street vendor

Introduction

SO₂ is the most common toxic substance in large cities and is a very strong pollutant in relation to respiratory diseases (Farisi, 2018)¹. Effects of exposure to sulfur dioxide in adults include problems in breathing, changes in breathing ability, as well as burning sensation in the nose and throat (ATSDR, 2010)².

One of the vehicle exhaust gases produced from activities is SO₂ gas. Emission of vehicles in the bus station when engine is running but the vehicle stops (idling) is twice higher than that of the emissions of exhaust gases when the vehicle is running normally (EPA, 2011)³. Transportation in large coal-fueled cities contributes 32.5% SO₂ in national pollutants (Rao V et al, 2013)⁴.

According to (SNI) 19-0232-2005 the permissible TLV of sulfur dioxide is 5.2 mg/m³ (1.98 ppm)⁵.
According to Permenaker No. 5 of 2018 Threshold Limit Value (TLV) of sulfur dioxide is 0.25 mg/m³ (0.09542 ppm). ACGIH in 2005 set a threshold limit value (TLV) of sulfur dioxide of 2 ppm.

The safe concentration of sulfur dioxide is not a reference in determining the threshold value of sulfur dioxide that it often has an effect on workers even though the concentration is below the threshold. A study found that lung cancer incidence was 1.3% higher in areas of high concentration of sulfur dioxide (≥0.008 ppm) than in areas with low concentration of sulfur dioxide (<0.005 ppm) (ATSDR, 2010). Changes in lung function were found in workers exposed to 0.4-3.0 ppm sulfur dioxide in 20 years or more. Sensitive breathing such as asthma can result from exposure to low concentrations (0.25 ppm) of sulfur dioxide (ATSDR, 2010). Based on the results of the research, the concentration of sulfur dioxide below the specified TLV (ATSDR, 2010 of 3 ppm) has had a health effect on workers. Thus TLV needs to be improved based on the results of research on the safe limits of sulfur dioxide concentrations in the work environment. The average weight, height, temperature and air pressure conditions in a place are the reasons for safe concentration and TLV of a different chemical. Based on calculations, the concentration is safely influenced by body weight, respiratory rate, and length of work time.

The research was carried out by determining the safe limits of sulfur dioxide concentration in the work environment based on workers’ body weight, respiration rate and duration of daily work. Respiration rate is influenced by workers’ body weight.

This research aims to determine the safe concentration of sulfur dioxide at street vendors in Palembang’s Ampera bus station, Indonesia. This study began with the determination of NOAEL in white rats and RfC. The benefit of the research is as a reference in determining sulfur dioxide TLV in the work environment in Indonesia, i.e the Ampera Palembang bus station as an improvement from the existing TLV.

**Material and Method**

This study was an observational, cross sectional and descriptive study. The population of this study is street vendors around the Ampera Terminal Palembang.

The sampling technique was a total population of 84 people. The study began with the collection of primary data including concentrations of sulfur dioxide in the air, length of work, and workers’ body weight. Primary data of experimental animals is the weight of white mice. Data on the concentration of sulfur dioxide in the air obtained by direct measurement at the Ampera bus station in Palembang, Indonesia refers to SNI 19-7119.2-2005. Measurements were made using the midget impinger and Griess Saltzman method and spectrophotometer analysis technique.

The research variables include the concentration of sulfur dioxide in the workplace, workers’ weight, height, respiration rate, length of work daily, body surface area, weight of white rats, body surface of white rats, highest dose of toxin without effect on experimental animals (NOAEL), Km factor in animals (Animal Km), Km factor in workers (Human Km), safe limit of toxin dose for workers (RfC), and benzene concentration safe for workers (C safe).

NOAEL of sulfur dioxide from μg/m³ to mg/kg, where 1 mg/kg equivalent to 1 ppm obtained from calculations using the following formula:

\[
\text{NOAEL} = \frac{n \times \text{BeratMoleckul}}{24,45} \times 1000
\]

Determination of safe dosage of toxin for workers (RfC) is calculated using the following formula (Shaw et al, 2017 in Tualeka, 2013):

\[
\text{RfC} = \frac{\text{Animal Km}}{\text{Human Km}} \times \text{NOAEL}
\]

Where:

RfC : References of concentration (mg/kg)

Animal Km : Km factor on animal

Human Km : Km factor on human

Determination of safe concentration using the following formula (William et al, 1985 in Tualeka, 2013):

\[
\text{C safe} = \frac{(RfC)(Wb)}{\delta(BR)(t)} \text{mg/m}^3
\]

Conversion of units of mg/m³ to ppm was performed by using the following formula (Tualeka, 2013) (9):
C safe (ppm) = \( \frac{mg}{m^3} \) (MV) 24,5

Where :

C safe : concentration of toxin in the air safe for workers (mg/m³)

RfC : Inhalation Reference Concentration (mg/kg)

W : Weight (kg)

\( \delta \) : % substances absorbed by the lungs

BR : Human respiratory rate (m³/hour)

t : Working duration (hours/day)

MW : Molecular Weight

Data analysis was performed by using quantitative data analysis manually to determine safe sulfur dioxide concentrations for street vendors at Ampera bus station, Palembang, Indonesia.

Findings

A. Characteristics and the Surface Area of Try Animals (White Mice):

Human response to toxicity is generally similar to animal responses qualitatively, thus, test on animal becomes the basis for extrapolating animal to human data (Tualeka et al, 2019). Toxicity test is carried out by using white rats.

Table 1: Distribution of Experimental Animal (White Mice) Characteristic

<table>
<thead>
<tr>
<th>ANIMAL KM</th>
<th>Research Object (White Rats)</th>
<th>W (Kg)</th>
<th>BSA (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.141</td>
<td>0.024223</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.141</td>
<td>0.024223</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.02405</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.02428</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0.844</td>
<td>0.145105</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>0.140667</td>
<td>0.024184</td>
<td></td>
</tr>
</tbody>
</table>

Based on white rat body weight data, the body surface area (BSA) was calculated using the following formula:

Animal \( BSA = 0,09 W^{0,67} \)

where:

BSA : Body Surface Area (m²)

W : Weight (kg)

B. Workers’ Characteristics, Body Surface Area and Breathing Rate:

The characteristics of the workers in this study include weight and duration of work from 84 street vendors at Palenbang’s Ampera bus station, Indonesia. Based on Table 2, the highest body weight was 100 Kg, the lowest weight was 37 Kg, and the average body weight was 65.57 Kg. The average working duration in a day is 8 hours, the shortest duration of work in a day was 5 hours/day and the longest duration of working in a day was 12 hours/day. The height used in the research was the average value of Indonesian adult height of 159 cm.

Based on data on body weight and height of workers, body surface area and worker respiratory rate were calculated using the following formula:

1. Workers’ Body Surface Area

\[ BSA = \sqrt{W.h/3600} \]

\[ = \sqrt{65,57 \times 159/3600} \]

\[ = 1,448 \text{ m}^2 \]

where:

BSA : Body Surface Area (m²)

W : Weight (kg)

h : Height (cm)

2. Workers’ Breathing Rate

\[ BR = 5,3 \ln W - 6,9/24 \]

\[ = 5,3 \ln 65,57 - 6,9/24 \]

\[ = 0,63627 \text{ m}^3/\text{hour} \]

where:

BR : Breathing Rate (m³/hour)

W : Weight (kg)

Table 2: Average Distribution of Workers, Breathing Rate and Working Duration of Street Vendors of Ampera Bus Station, Palembang, Indonesia

<table>
<thead>
<tr>
<th>Number of workers</th>
<th>Wb (kg)</th>
<th>h (cm)</th>
<th>BSA (m²)</th>
<th>t (hour/day)</th>
<th>BR (m³/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>84</td>
<td>65,57</td>
<td>159</td>
<td>1,448</td>
<td>8</td>
<td>0,63627</td>
</tr>
</tbody>
</table>
The results of the calculation of body surface area and worker respiratory rate were 1,448 m² and 0.63627 m³/hour, respectively.

**C. Sulfur Dioxide (SO₂):** Measurement of the concentration of Sulfur Dioxide was obtained through measurements at 4 predetermined points (Arista et al, 2015). The average value of SO₂ concentration in Ampera Terminal Palembang was 229.8μg/Nm³ or equivalent to 0.2298 mg/m³ (0.08771 ppm). The concentration of sulfur dioxide is under (SNI) 19-0232-2005 of 5.2 mg/m³ (1.98 ppm). The concentration of sulfur dioxide is below the threshold (TLV) value of sulfur dioxide according to ACGIH in 2005 of 2 ppm. However, the average concentration of sulfur dioxide is very close to the highest level allowed by Permenaker No. 5 of 2018 of 0.25 mg/m³ (0.09542 ppm).

**D. Animal Km and Human Km**

1. **Animal Km**

   \[ \text{Animal Km} = \frac{W \text{ animal}}{\text{BSA animal}} \]

   where:
   - Animal Km : Km factor on animal
   - W : Weight (white rats)
   - BSA : Body Surface Area (white rats)

   Table 3 shows the calculation result of Animal Km in white rats of 5.81.

<table>
<thead>
<tr>
<th>Research Object (White Rats)</th>
<th>W (Kg)</th>
<th>BSA (m²)</th>
<th>Animal Km = W/BSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.02416</td>
<td>5.81421</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.02416</td>
<td>5.81421</td>
</tr>
<tr>
<td>3</td>
<td>0.141</td>
<td>0.02422</td>
<td>5.82102</td>
</tr>
<tr>
<td>4</td>
<td>0.141</td>
<td>0.02422</td>
<td>5.82102</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.02405</td>
<td>5.80052</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.02428</td>
<td>5.82783</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>0.844</td>
<td>0.14510</td>
<td>34.8988</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>0.14066</td>
<td>0.02418</td>
<td>5.81647</td>
</tr>
</tbody>
</table>

2. **Human Km**

   \[ \text{Human Km} = \frac{W \text{ human}}{\text{BSA human}} \]

   where:
   - Human Km : Km factor on human
   - W : Weight (Kg)
   - BSA : Body Surface Area (m²)

   The average Human Km of street vendors in Palembang’s Ampera terminal is shown in the table of 45,283.

**Table 4: Workers’ Average Human Km Calculation**

<table>
<thead>
<tr>
<th>Number of workers</th>
<th>Wb avg (Kg)</th>
<th>BSA avg (m²)</th>
<th>Human Km avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>84</td>
<td>65,57</td>
<td>1,448</td>
<td>45,283</td>
</tr>
</tbody>
</table>

**E. No Observed Adverse Effect Level (NOAEL):**

Toxicity test is used to evaluate the safety of a substance. The safe limit of the concentration of a chemical can be determined by the toxicity test for determining the highest dose without causing effects on experimental animals or No Observed Adverse Effect Level (NOAEL). NOAEL of sulfur dioxide was 660 μg/m³ (OEHHA, 2016) or equal to 0.25 mg/kg (0.25 ppm) obtained from the following calculation:

\[ \text{NOAEL} = \frac{n \times \text{Berat Molekul}}{24,45} \times 1000 \]

\[ 660 \mu g/m^3 = \frac{n \times 64,06}{24,45} \times 1000 \]

\[ n = 0,25 \text{ mg/kg} \]

**F. Reference of Concentration (RfC):** Calculation of Inhalation Reference Concentration for street vendors in Ampera Palembang, Indonesia based on NOAEL values, on average Animal Km, the average Human Km is as follows.

\[ \text{RfC} = \frac{\text{NOAEL} \times \text{Animal Km}}{\text{Human Km}} \]

\[ = 0,25 \times \frac{5,81}{45,283} \]

\[ = 0,032 \text{ mg/kg} \]

Where:

- RfC : References of concentration or Inhalation Reference Concentration (mg/kg)
- Animal Km : Km factor on animal
- Human Km : Km factor on human
From the calculation of the formula, the RfC calculation result is 0.032 mg/kg.

G. Safe Concentration of Sulfur Dioxide (C safe):

The results of the calculation of safe concentration of sulfur dioxide in street vendors of Ampera Palembang bus station based on RfC values, average workers’ weight, percentage of substance absorption, average workers’ breathing rate and average duration of work are as follows:

\[
C_{safe} = \frac{RfC(Wb)}{(\delta)(BR)(t)}
\]

\[
= \frac{(0,032)(65,57)}{(40\%)(0,63)(8)}
\]

\[
= 1,034134 \text{mg/m}^3
\]

\[
C_{safe} \text{ (ppm)} = \frac{mg/m^3}{(MV)}^{24,5}
\]

\[
= \frac{1,034mg/m^3}{(64,06)}^{24,5}
\]

\[
= 0,395 \text{ ppm}
\]

Where:

- C safe: Toxin concentration in the air safe for worker (mg/m³)
- RfC: Inhalation Reference Concentration (mg/kg)
- W: Weight (kg)
- \(\delta\): % substances absorbed by the lungs
- BR: Human Breathing Rate (m³/hour)
- t: Working duration (hour/day)
- MW: Molecular Weight

The result of the calculation of the reference dose (RfC) exposure to sulfur dioxide was 0.032 mg/kg. RfC in the present study is smaller than the RfC determination at studies of human exposure controls in a population of 0.067 mg/kg. At this rate, human health including populations that have sensitive breathing such as asthmatics still protected. Thus, the RfC of the present study is safe for humans.

Based on the results of this study, the safe concentration of sulfur dioxide in the street vendors of Ampera bus station, Palembang was 0.395 ppm. This value is lower than sulfur dioxide threshold value according to (SNI) 19-0232-2005 of 5.2 mg/m³ (1.98 ppm) and ACGIH in 2005 of 2 ppm. Thus, the value of the result of this study can be used as a reference in determining the threshold value of Sulfur Dioxide in the Ampera bus station, Palembang and is safe for those who were exposed to it.

Conclusion

The measurement result of the average concentration of sulfur dioxide in street vendors around the Ampera bus station in Palembang, Indonesia was 0.2298 mg/m³ (0.08771 ppm), which means below the threshold according to the Indonesian National Standard (SNI) 19-0232-2005 about the Threshold Limit Value (TLV) in the workplace air of 5.2 mg/m³ (1.98 ppm). However, the average concentration approached the highest level permitted according to Permenaker No. 5 of 2018 of 0.25 mg/m³ (0.09542 ppm). In contrast to the predetermined threshold value of 0.095 ppm, the concentration of sulfur dioxide in the present study was 0.395 ppm. This value is lower than that of specified in the 2005 ACGIH Threshold Value of 2 ppm. Therefore, control efforts are needed that the communities are protected from the adverse effects of sulfur dioxide on health.

Control recommendations include routine inspection of vehicle exhaust emissions and improvement efforts to reduce \(SO_2\) emission levels so as to reduce health risks. In addition, health consultation facilities need to be provided for street vendors in Ampera bus station, Palembang.

Conflict of Interest: All authors have no conflicts of interest to declare.

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Vendors of Ampera Bus Station, Palembang, Indonesia” of Occupational Health and Safety Department that was supported by Faculty of Public Health, Universitas Airlangga.

**Ethical Clearance:** The study was approved by the institutional Ethical Board of the Public Health, Universitas Airlangga.

**REFERENCE**


7. ACGIH. 2005 TLVs and BEIs. TLVs and BEIs. 2005.


The Influence of Training Handover based SBAR Communication for Improving Patients Safety

Roymond H. Simamora¹, Achmad Fathi¹

¹Faculty of Nurses Universitas Sumatera Utara., Jl. Prof. T Ma’as No.3 Medan. Sumatera Utara Indonesia

ABSTRACT

Background: Nurses in patient safety have promoted the use of standard communication at the time of handoff as a means to reduce margins for errors during the transfer of important information. One way to standardization is to use the effectiveness of SBAR communication. The purpose of this study was to determine the effect of training on the implementation of nursing handover based on SBAR communication.

Method: used quasi-experimental, with intervention and control groups. The Statistical test used Wilcoxon and Mann Whitney test. Result: z value is -2.093 and p> 0.05. This shows that there is an effect of training on the leadership of the standard implementation of the head of the room on the commitment of nurses in implementing SBAR Communication Based Handover nursing.

Discussion: there is a difference in the level of commitment of nurses in implementing nursing handover based on SBAR communication in the control group. intervention group in terms of implementing SBAR communication-based Nursing Hand Over.

Recomendation: This study shows the value of utilizing educational programs for nursing in handoff communication settings. Such standard training programs must be considered to train nurses to communicate effectively at handoff.

Keywords: Nurses Commitment, Nursing Hand Over, Patient Safety, SBAR Communication

Introduction

Ineffective handoffs can contribute to gaps in patient care and violations of patient safety including medication errors, and patient death(1). In his seminary report, Crossing the Quality Chas(2) revealed that inadequate reports were among the main causes for errors in patient safety. This is a Joint Commission joint-to-joint analysis of more than 3,000 events that resulted in death or serious injury. Communication failure was cited as the root cause of 65% of these events with at least half of the failures that occurred during the handoff (3).

The health system of more than one person with various levels of education and maintenance of continuity between turns is very important for safety. Researchers from this industry have studied errors in long communication handoffs before patient safety culture becomes clear in today’s health systems (4). In particular, the literature that examines strategies to improve the security of the handoff report process is a means of combating barriers to effective communication (6). The results of the study by (5) describe a marked decrease in adverse events in patients after applying the standard communication process during handoff, which was found to assist in the arrangement and standardization of communication between caregivers. communication SBAR, This technique was originally developed by the military and is associated with inaccurate and incomplete information transmission (7).

SBAR is a standard oral communication method, but it has been used as a template to guide the development of written forms and checklists that accompany patients during handoff times. This framework assists nurses in presenting their patient’s thoughts and data; situation, background,
and judgment, in a logical order that encourages critical thinking; recommendations about what needs to happen next in a patient care situation. The authors conducted an evidence-based literature review on the effectiveness of repair interventions in clinical handoffs. Their evaluation is related that although they often mention the role of education and training literature in handoffs, detailed studies of their structure, implementation or evaluation are still limited. Traditionally, communicating handoff reports from nurses to nurses on shift changes has been stated in the literature by (8).

According to Wolf (8), nurses are critical of the ability of new graduates to collect data, provide sufficient information, and articulate diagnoses, treatments and treatment plans. Wolf (8) observed in his study that the performance of novice nurses during the shift report serves as evidence of their competence. According to nurses graduates are “ashamed when their reports are long and there is confusion about important facts for the well-being of their patients”. The author also makes it difficult for nursing students to understand and promote confusion between them. Therefore, nursing instructors and primary care nurses often spend extra time interpreting shift reports to students. The authors expressed concern that nurses were not routinely exposed to standard communication techniques such as those currently applied in important team communication such as the shift hand-offs (10). The authors have limited opportunities for evidence-based communication skills during their educational experience. Because the health care system continues to be documented (2) in their executive summary, the American Association of Colleges of Nursing Specifically addresses the need to teach communication practices that enable the delivery of high-quality and safe patient care (11). Institute of Medicine Reports for Nursing Education, argue that the IOM report must be at the core of all nursing development programs (12).

The Quality and Safety Development Project for Nurses consists of nursing faculty members who have adopted an approach to integrating quality and safety content into a continuing nursing education curriculum (13). In terms of teamwork and collaboration, the project recommends that nurses learn skills that will enable them to follow communication practices that minimize the risks associated with handoffs between providers and all transitions in care (14). Beginner nurses and expert nurses feel the situation from different sets that can change how the situation is communicated (15). Standardization of communication during handoffs between nurses has the potential to equalize the differences between beginner nurses and experts when trying to communicate the clinical situation. In conclusion, literature scanning reveals the relationship between the quality of information shared during handoff and adverse patient outcome problems. Teaching nurses how to conduct a quality handoff report using a standardized communication technique such as SBAR has the potential to empower and enable them to communicate handoff report in a manner that enhances patient safety immediately upon entering into practice. Suggested components of a quality handoff using SBAR in a published handoff form that can be used between nurses at shift change (5). Introduction of standardized communication for handoff at the academic level will help to address identified evidence gaps in education and training in clinical handoff. This research aims to address the quality of novice nurses handoff reports and its’ significance to a culture of patient safety. The purpose of this study was to determine the effect of an SBAR developed education program on the quality and organization of nurses handoff reports.

**Method**

This research design is quasi-experimental. 2 groups namely intervention and control groups, The sample is 94 nurses from 6 rooms, 47 people as the control group and 47 intervention groups. The instrument uses Self Reports Instrument analyzed by non-parametric statistical tests because the results of normality test and homogeneity test data are not normal to the test used Wilcoxon and Mann Whitney test.

**Result and Discussion**

The results of the research are shown in the table:

**Table 1: Test Results of Different Characteristics of Respondents in Intervention Groups and Control Groups**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Groups</th>
<th>X²</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td>Gender:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>35 (74,5)</td>
<td>2 (4,3)</td>
<td>1,23</td>
</tr>
<tr>
<td>Male</td>
<td>12 (25,5)</td>
<td>45 (95,7)</td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Normality Test Results of Nurses’ Commitment in Implementing Hand Over Nursing Based on SBAR Communication Before and After Training in Control and Intervention Groups

<table>
<thead>
<tr>
<th>Measurement Scale</th>
<th>Time</th>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Commitment of Nurses in Implementing SBAR Communication Based Nursing Hand Over</td>
<td>Before</td>
<td>Control</td>
<td>60,15</td>
<td>3,978</td>
<td>0,002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention</td>
<td>61,00</td>
<td>3,407</td>
<td>0,052</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>Control</td>
<td>61,36</td>
<td>4,406</td>
<td>0,428</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention</td>
<td>62,60</td>
<td>2,684</td>
<td>0,001</td>
</tr>
</tbody>
</table>

Table 2 shows the results of the normality test using the Shapiro-Wilk statistical test, can be concluded that the data is not normally distributed, so the right statistical test to do is to use non-parametric statistics namely Wilcoxon.

Table 3: Average Differences in Level of Commitment of Nurses in Implementing Hand Over Nursing Based on SBAR Communication Before and After Training in Control Groups

<table>
<thead>
<tr>
<th>Measurement Scale</th>
<th>Groups</th>
<th>Mean</th>
<th>z</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Commitment of Nurses in Implementing SBAR Communication Based Nursing Hand Over</td>
<td>Before</td>
<td>60,15</td>
<td>-1,634</td>
<td>0,102</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>61,36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In table 3, it is obtained p value > 0.05. These results can mean that the average data on the level of commitment of nurses in implementing Hand Over Nursing Based on SBAR Communication before and after training in the control group is no significant difference.

Table 4: Average Differences in Level of Commitment of Nurses in Implementing Nursing Hand Over Based on SBAR Communication Before and After Training in Intervention Groups

<table>
<thead>
<tr>
<th>Measurement Scale</th>
<th>Time</th>
<th>Mean</th>
<th>z</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Commitment of Nurses in Implementing SBAR Communication Based Nursing Hand Over</td>
<td>Before</td>
<td>61,00</td>
<td>-4,095</td>
<td>0,001</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>62,60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Follow Table 4, These results mean that the mean data on the level of commitment of nurses in implementing Nursing Hand Over Based on SBAR Communication before and after training in the intervention group has significant differences.
Table 5: Average Differences in Level of Commitment of Nurses in Implementing Nursing Hand Over Based on SBAR Communication Before and After Training in Intervention Groups

<table>
<thead>
<tr>
<th>Measurement Scale</th>
<th>Groups</th>
<th>Mean</th>
<th>z</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>60.15</td>
<td>-1.401</td>
<td>1.161</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>61.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Follow table 5, These results can be interpreted that the mean level of the level of commitment of nurses in implementing Hand Over Nursing before intervention in the control group and intervention group had no significant difference.

Table 6: Average Difference Level of Commitment of Nurses in Implementing Hand Over Nursing Based on SBAR Communication After Training in Control Groups and Intervention Groups

<table>
<thead>
<tr>
<th>Measurement Scale</th>
<th>Groups</th>
<th>Mean</th>
<th>Z</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>61.21</td>
<td>-2.093</td>
<td>0.036</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>62.64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Shown in table 6. The z value was obtained -2.093 and p>0.05. Thus the average level of commitment of nurses in implementing nursing hand over after training in the control group and intervention group was significant.

Discussion

In table 6. shows the average level of commitment of nurses in implementing weighing (Nursing Handover) after training in the control group and intervention groups there are significant differences. with z value is -2.093 and p>0.05. This shows that there is an effect of training on the leadership of the standard implementation of the head of the room on the commitment of nurses in implementing weighing in Medan city hospitals. The relationship between SBAR communication and patient safety and handoff is well reported throughout the literature. Lack or ineffective verbal communication when handoffs have emerged as a common theme around side effects and the situation almost fails in nursing. With this attitude the nurse will work professionally in providing appropriate nursing care standards and in an effort to improve the quality of nursing services, so as to provide satisfaction to patients and nurses themselves, where employees who have a high commitment will show an attentive and responsible work attitude answer to his duties and show loyalty to his organization (16).

Subjects from both groups communicated “tests/treatments” under the recommendation domain. However, “goals” compared to the control group. Subjects in the control group were negligent in handling the “falling protocol” compared with 2 subjects in the intervention group who discussed it in the recorded audio handoff. The similarity between cohorts is closed every day for 2 hours “part of the recommendation component in the handoff report. This may be due to the nursing system to address skin damage problems. With the exception of one subject from the intervention group, subjects from both groups were ignored to mention the need before removing pneumococcal vaccine Combined Commission includes screening for these vaccines in the Indonesian National Patient Safety Goals, and they consider them to be an important component in the recommendations section of the SBAR handoff, the opportunity to practice SBAR techniques in simulation, clinical awareness and quality improvement reports and improve positive outcomes for patients.

The commitment attitude with high motivation is needed by a nurse in providing health services to patients. With this attitude the nurse will work professionally in providing appropriate nursing care standards and as an effort to improve the quality of nursing services, so as to provide satisfaction to patients and nurses themselves, where employees who have a high commitment will show an attentive work attitude and is responsible for his duties and shows loyalty to his organization.

Because the commitment contained belief, binding, which will generate energy to do the best. Significantly the commitment has an impact on the work performance of human resources which ultimately affects the
performance of a company in realizing the company’s vision and mission goals. With the training approach we take into account based on SBAR communication, the weighing of the thank you in the treatment room will be good so as to enable professional nurses to arrange the provision of nursing care and to regulate the environment to support the implementation of patient safety. The implementation of weighing in a good patient safety effort is influenced by various factors.

The factors that influence success include support from the hospital leadership and the head of the room, knowledge and commitment of all nurses and other staff, as well as collaboration between nurses, with doctors, or another health team. Commitment from all hospital components to carry out patient safety is the basic capital of achieving quality service delivery. Implementation of weighing and implementation of patient safety in hospitals is a commitment of hospital management to be able to provide professional health services.

**Conclusion**

The main conclusion that was realized was that the training provided nurses in the intervention group with a framework, structure and guidelines that allowed them to include more important data points about patients than nurses from the control group. After receiving training presentations and case study examples of SBAR principles, nurses in the intervention group showed evidence of being able to differentiate prominent patient data. The training program provided to nurses assisted them in carrying out handoff reports. This study provides insight and guidance efforts that can help overcome the problem of side effects associated with ineffective handoffs.

**Recommendation**

For Managerial nurses must consider embracing the SBAR patient safety initiative to teach handoffs. Important to educate nurses in the most effective way to do handoffs. Overcoming barriers to effective nurse-to-nurse communication by standardizing and supervising and selecting appropriate handoff methods can be one way to reduce errors. Supporting the practice with SBAR in simulation laboratories to allow nurses to feel confident about transferring these skills to the clinical arena. By introducing SBAR to nurses, this will prepare them for the type of ongoing involvement in quality improvement and error reduction.

**Conflict of Interest:** the authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article

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**Ethical Clearance:** the study was approved by the central ethics commitee of Fakultas keperawatan USU. Persmission was also obtained from the head Nurse in Hospital Medan. Informed consent was taken from the Nurses individually after explaining the objectives and purpose of the study.

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Effects of *Nigella Sativa* Oil on Biochemical Parameters of White Male Rats Exposed to Diazinon

Rusul M. Alhilo¹, Hussain J. Kadhim¹, Mohammed T. Abbas²

¹Collage of Veterinary Medicine, University of Kerbala, Iraq; ²College of Pharmacy, University of Kerbala, Iraq

**ABSTRACT**

Many research showed the negative effects of diazinon (DZN) by inducing hepatorenal dysfunction. Therefore, this study was aimed to investigate the prophylactic and protective effects of *Nigella sativa* oil (NSO) against diazinon induced physiological and biochemical alterations in white male rats by biochemical tests (aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), total bilirubin (TOT.BIL), and total protein). 45 white male albino rats weighing (220–240 g) were used, rats were arbitrarily divided into five groups, (9 rats for every group). Group 1 rats fed on traditional diet without treated as a control (CON). Rats in group 2 were treated with DZN via gavage in a dose of (10 mg/kg/daily) received was started at 15 days to the stop relating to the experiment. Rats in groups 3 were treated with NSO via gavage in a dose of (2 mg/kg/daily) received was started at 15 days to the stop relating to the experiment. Rats in group 4 were treated with DZN plus NSO via gavage and received was started at 15 days to the stop relating to the experiment. Rats in group 5 (prophylactic group) were treated with 2 ml/kg/every other day via gavage NSO in start from the first day for 14 days of the experiment and then DZN received at the above mentioned dose at 15 days to the end of the experiment. The consequences revealed to that a significant increased (P≤0.05) in AST, ALT, ALP, TOT.BIL activity of male rats treated with DZN compared with other groups and such an increase refers to hepatic dysfunction. And a significant increased (P≤0.05) in TP of CON group, (NSO)-treated group, (DZN+NSO)-treated group, and (NSO+DZN)-treated group, compared with (DZN)-treated group. Also, there were a significant increased (P≤0.05) in creatinine and urea in(DZN)-treated group compared with the other groups, which refers to kidney injury. Our Study concluded that *N. sativa* oil pretreatment significantly reduced the diazinon induced hepatotoxicity, and nephrotoxicity.

**Keywords:** *Nigella sativa* oil, diazinon, biochemical, histopathological, rats.

**Introduction**

Therapeutic plants have been utilized for treating diseases for several centuries in dissimilar domestic systems of medicine as like well as popular medicines. Between a variety of therapeutic flora, *Nigella sativa* (*N.sativa*) (Family: Ranunculaceae) is rising as like a marvel herb with a fashionable historic and religious backdrop, several research seeing that exposed its extensive range regarding medicine possible⁴. *Nigella sativa* has been appreciably studied because of its biological actions and medicine potent and shown to possess widish range of actions viz. as diuretic, anti-hypertensive, anti-diabetic, anti-cancer and immunomodulatory activity, painkiller, anti-microbial, anthelmintics, analgesics and anti-inflammatory, spasmolytic, bronchodilator, gastroprotective, hepato protective, renal protective and anti-oxidant characteristics. The seeds regarding *N. sativa* are broadly utilized in therapy of numerous illnesses such as bronchitis, asthma, diarrhea, rheumatism and skin disorder. It is furthermore utilized as liver stimulant, digestive, antidiarrheal, appetite tonic, emmenagogue, to raise milk product in nursing mothers to resist parasitic contagions, and to backing immune system⁵. Diazinon (diethoxy [ (2 – isopropyl – 6 – methyl – 4 – pyrimidinyl) oxy ] - thioxophosphorane) is an artificial alchemical material with wide-ranging insecticide action⁶. It has been broadly utilized throughout the world with enforcements in cultivation and horticulture.
for controlling insect in crop. Several reports have been published with respect to DZN and its effects on biochemical parameters of rats, rabbits, and mice.

This study was aimed to show the efficacy of *Nigella sativa* oil in alleviating the deleterious of diazinon in liver and kidney of rats with respect to biochemical parameters.

**Materials and Method**

**Animals and Management:** Forty-five male albino rats weighted (220-240 g) were utilized in this research. The animals were reserved beneath good ventilation system and received a neutral pattern of eating and water during the experimental time. The experimental was carried out at University of Kerbala-Colleage of Pharmacy: animal were reared in plastic cages under suitable environment conditions at temperature 23 ± 2 °C for two weeks from 2/1/2017 to 12/2/2017, they kept before experimental beginning for acclimation.

**Experimental Design:** The animals were randomly divided into five groups. Each group consisted of nine animals. The first group included CON group: they were fed with only standard rat diet and tap water. The second group included DZN group: in this group rats were gavaged with (10 mg/kg/daily) of DZN as orally and received was started at 15 day to the end of the experiment. The third group included NSO group: rats were treated with (2 ml/kg) every other day dose NSO via gavage, and received was started at 15 day to the end of the experiment. The forth group included DZN + NSO: rats were treated with DZN plus NSO 2 ml/kg every other day via gavage and received was started at 15 days to the end of the experiment. The five group included NSO + DZN group: rats were treated with 2 ml/kg/every other day via gavage start from the first day for 14 days of the experiment and then diazinon received at the above mentioned dose at 15 days to the end of the experiment.

**Data Collection and Biochemical Parameters:** At the end of the experiment, rats were anesthetized with ethanol and sacrificed 24h after the last DZN and NSO. About 5ml of blood was drawn in a disposable syringe by cardiac puncture. Blood samples were gathered in centrifuge tubes. Serum was separated from coagulant blood by centrifugation at 860Xg for 20 min, and then serum was quickly frozen at-20°C for one day for serum biochemical analysis (AST, ALT, ALP, total bilirubin, total protein, urea, creatinine).

**Statistical Analyses:** The data was analyzed using the Statistical Package for Social Science program (SPSS 12). For comparison between dissimilar experimental rat groups, one-way analysis of variance (ANOVA) was utilize pursued by Tukey's test. The results were expressed as means ± SD and (P<0.05) was considered to be statistically significant.

**Results and Discussion**

There are asignificant increased (P ≤ 0.05) in AST, ALT, ALP, TOT.BIL activity of male rats treated with DZN while therewere nosignificant variation among other groups in table (1).

Also theresults ofthis table showed a significant increased (P≤0.05) in TP of CON group, (NSO)-treatedgroup, (DZN+NSO)-treatedgroup, and (NSO+DZN)-treatedgroup, compared with (DZN)-treatedgroup.

Table (1) also shows that therewere asignificant increased (P ≤ 0.05) in creatinine and urea in(DZN)-treatedgroup comparedwith theother groups. (Mean ± SD).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>CON Group</th>
<th>(DZN)-treated group</th>
<th>(NSO)-treated group</th>
<th>(DZN+NSO)-treated group</th>
<th>(NSO+DZN)-treated group</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST(U/L)</td>
<td>106.5 ± 17.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>377 ± 27.82&lt;sup&gt;a&lt;/sup&gt;</td>
<td>102.33 ± 8.59&lt;sup&gt;b&lt;/sup&gt;</td>
<td>110.16 ± 9.41&lt;sup&gt;b&lt;/sup&gt;</td>
<td>109.83 ± 6.99&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>ALT(U/L)</td>
<td>82 ± 8.22&lt;sup&gt;b&lt;/sup&gt;</td>
<td>240.3 ± 44.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>79 ± 5.89&lt;sup&gt;b&lt;/sup&gt;</td>
<td>84.16 ± 7.70&lt;sup&gt;b&lt;/sup&gt;</td>
<td>85 ± 9.18&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>ALP(U/L)</td>
<td>75 ± 17.09&lt;sup&gt;b&lt;/sup&gt;</td>
<td>184.5 ± 14.62&lt;sup&gt;a&lt;/sup&gt;</td>
<td>70.33 ± 15.70&lt;sup&gt;b&lt;/sup&gt;</td>
<td>77.66 ± 12.42&lt;sup&gt;b&lt;/sup&gt;</td>
<td>79.66 ± 10.74&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>TOT.BIL(mg/l)</td>
<td>2.38 ± 0.45&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7.2 ± 2.15&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.35 ± 0.81&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.46 ± 0.89&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.58 ± 0.33&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>TP(g/dl)</td>
<td>55.33 ± 13.82&lt;sup&gt;a&lt;/sup&gt;</td>
<td>40.33 ± 5.92&lt;sup&gt;b&lt;/sup&gt;</td>
<td>57.5 ± 8.43&lt;sup&gt;a&lt;/sup&gt;</td>
<td>53.16 ± 5.52&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>58.83 ± 8.30&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Creatinine(mg/dl)</td>
<td>39.66 ± 7.60&lt;sup&gt;b&lt;/sup&gt;</td>
<td>83.83 ± 18.56&lt;sup&gt;a&lt;/sup&gt;</td>
<td>36.16 ± 5.52&lt;sup&gt;b&lt;/sup&gt;</td>
<td>43.66 ± 5.08&lt;sup&gt;b&lt;/sup&gt;</td>
<td>41.33 ± 5.16&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Urea(mg/dl)</td>
<td>4.01 ± 0.70&lt;sup&gt;b&lt;/sup&gt;</td>
<td>14.83 ± 2.31&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.86 ± 0.81&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.61 ± 1.04&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.46 ± 0.91&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Different letters in the same raw represent a significant difference at (P≤0.05).
Data are represented as mean ± SD, N = 9, DZN= diazinon, NSO= Nigella sativa Oil. AST= aspartate aminotransferase, ALT= alanine aminotransferase, ALP= alkaline phosphatase, TOT.BIL= total bilirubin, TP= total protein.

According to our study concluded that DZN was managed at a dosage of10 mg/kg/daily which resulted in a significant increased (P ≤0.05) in serum levels of liver function markers consisting of AST, ALT, ALP, TOT.BIL activity of male rats while there were no significant differences between other groups in table (1), that evidence of hepatic dysfunction. These dysfunction is also thanks to the manufacturing of free radicals and participation of oxidative stress to internal organ toxicity prompted through DZN treatment. Transaminases (AST and ALT) were considered to be a more sensitive measure in evaluating liver function and damage. Aspartate transaminase (AST) and alanine transaminase (ALT) are the enzymes which is involved in the transformation of amino acids to keto acids. They are pathophysiological marker enzymes utilize to measure tissue harm. Increases in AST and ALT serum levels have been attributed to damage to the structural integrity of the liver. This height could potentially be referring to the discharge of these enzymes from the cytoplasm into the blood circulation following split of the plasma membrane and cellular damage. Serum AST, ALT and ALP are biomarkers in the diagnosis of hepatic damage for the reason that they are freed into the circulation following cellular harm. The raised levels of the ALT and AST enzymes in the serum indicated cellular leakage and loss of functional integrity of the liver cell membrane. In addition, elevated contents of ALP may reflect impaired biliary tract function. The level of serum ALP might be raised due to the presence of increased biliary pressure and cholestasis. The liver is the main location of xenobiotic metabolism and initial pass metabolism for most drugs and chemicals, therefore, hepatotoxicity would be central to any poison chiefly as soon as eaten into the body. The hepatic function check is important in any toxicity diagnosis. The actions of ALT, AST and ALP enzymes are often considered sentient biomarkers which may straight demonstrate the range to which hepatic damage may have take place and or scale of it toxicity. The preceding studies hold talked about comparable conclusion where they observed raised hepatic function with tremendous discharge of these hepatic function enzymes into circulation. According to levels of serum ALT, AST, ALP, and total bilirubin were significantly higher in DZN treated rats, since necrosis or membrane injure discharge these enzymes into circulation, which have the same opinion with the earlier reported consequence. In the other hand, we found there were no significant differentiation among other groups in table (1). CON rats, rats treated with NSO at dose of 2 mg/kg/day, rats treated with (DZN+NSO), and rats treated with (NSO+DZN). The reason is due to a bigger amount of these flora have shown advantageous curative effects, including anti-oxidant, anti-inflammatory, anti-cancer, anti-microbial, and immune modulatory effects. The hepato protective effects of nigella sativa oil in this research can be stand appreciably ascribed in accordance with thymoquinone ingredient. The anti-inflammatory, anti-viral and anti-neoplastic actions of N. sativa have been earlier documented in different in vitro and in vivo study researches. The anti-oxidant effects of N. sativa have been earlier elaborated in animal models of liver ischemia, in which it improved the anti oxidant amplitude and decreased oxidative stress. Our findings in table (1) showed that a significant raise in serum levels of TP, in control rats, rats treated with NSO at dose of 2 mg/kg/day, rats treated with (DZN+NSO), and rats treated with (NSO+DZN) compared with (DZN)-treated group, where there were a significant decreased (P≤0.05), investigated the elevated concentration of total protein and their crumbs may be accredited to raise action of hepatic functions when N. sativa seeds were nourished according to. While we showed that a significant decrease in serum levels of TP in rats treated with diazinon, in agreement with who found that total protein level was significantly decreased after exposure to DZN for three weeks and indicated that the contact to DZN reasoned a harsh disorder of carbohydrates, lipids and proteins metabolism. Our study coincided with many earlier researches recorded significant height in serum urea and creatinine concentration in pesticide uncovered workers and such rising was indicate to renal injure and disorder of kidney action. Serum levels of urea and creatinine were shown to be of clinical assessment that indicate renal injury in pesticide exposed farmers. Creatinine is an off all product that is usually filtered from the blood and secreted with urine. Raise in creatinine level in response to pesticide contact indication renal disorder and maybe a result of damage glomerular role. In the same context, numerous authors referred the altitude of urea and creatinine in pesticide uncovered persons on the base of tubular renal failure,
damage glomerular filtration, urinary tract impediment and kidney injury. Urea is created by deamination of amino acids in the liver, and then it is imparted by blood to the kidneys wherever its release with urine. Height of serum urea observed in the present research in reaction to pesticides exposition may be explained by: 1) failure in its composition as a result of decline hepatic function, 2) disorder in protein metabolism as in the present results and 3) reduction in the filtering rate of the kidney. In this context, undue exposition to pesticides reasoned cytotoxic alteration in the hepatic and renal biochemical markings.

**Conclusion**

Through our serum liver enzymes biochemical tests studies we concluded that (N.sativa oil 2mg/kg) be able to Improvement of liver and kidney status through reduction of diazinon toxicity in male white rats.

**Conflict of Interest:** This research is a personal non-profit work and there is no conflict of interest.

**Source of Funding:** None.

**Ethical Clearance:** Ethical clearance was obtained from the Faculty Scientific Committee (Collage of Veterinary Medicine, University of Kerbala, Iraq) to study the effects of nigella sativa oil on biochemical parameters of white male rats exposed to diazinon.

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Role of Serum Activin A and Granulocyte Macrophage-Colony Stimulating Factor in the Prediction of Pregnancy Outcome in PCOS and Non-PCOS Women Following ICSI

Saad S. Al-Dujaily¹, Nagham T. Shukry²

¹Biotechnology Research Center; ²High Institute of Infertility Diagnosis and ART, Al-Nahrain University, Baghdad, Iraq

ABSTRACT

Granulocyte macrophage-colony stimulating factor (GM-CSF) are a groups of glycoprotein growth factors, which are involved in the embryonic development and implantation process.

This study aimed to found out the role of serum activin A and G-CSF on the positive implantation leading to pregnancy outcome, in the PCOS and non-PCOS women following intra-cytoplasmic sperm injection.

In this study, eighty-eight women were enrolled and divided according to the cause of infertility, into 50 PCOS women, and 38 women diagnosed as non-PCOS, the selected women were undergoing ICSI. The activin A was measured in serum at the day of oocyte retrieval, and the GM-CSF was measured in the serum at the day of embryo transfer. All women participating in this study had the β-HCG test, 12-14 days after embryo transfer.

This study concluded that, serum activin A and GM-CSF levels are valuable in predicting pregnancy outcome in infertile PCOS women than non-PCOS women.

Keywords: Serum activin A, Granulocyte macrophage, Colony stimulating factor, Prediction of pregnancy outcome, PCOS, non-PCOS women, ICSI.

Introduction

Studies on the female reproductive tract show that the complicated physiological processes, like the menstrual cycle, ovulation, parturition, and implantation, are the hallmark of inflammation(1). The reproductive events lead to the up-regulation of the mediators (inflammatory), which includes the cytokines, growth factors, and lipid mediators inside the host. They act through direct effects on oocyte, embryo, and immune cells in the ovarian and uterine tissues, or an indirect effect through the immunological environment of oocytes production, implantation and embryo development(2). Activins have a wide range of action, which includes: Embryogenesis and its regulation, reproductive system development, healing of the wound, differentiation of the stem cell with the regulation of immune response(3). The activins directly stimulate follicular development in two manners: 1-Extra-ovarian effects, by FSH synthesis at the hypothesis. 2-Intra-ovarian autocrine signals by granulosa cells self-enhancing proliferation, with the up-regulation of aromatase enzyme and FSH receptors expressions in the cells within the dominant follicle(4,5). Activin A are playing a role in endometrial decidualization and in the priming of the endometrium, to prepare for implantation and enhance endometrial repair after menstruation(6).

Granulocyte macrophage-colony stimulating factor production and its receptors were confirmed in the reproductive tract of the females (7), and it has been studied frequently at the feto-maternal interface(8). GM-CSF is involved in the embryonic developmental process, by enhancing the growth and viability, through exerting positive effects on the various genetic paths, for example, cell proliferation, development to blastocyst, hatching of zona pellucida and embryonic implantation.

On the other hand, polycystic ovarian syndrome (PCOS), is one of the common causes of subfertility(9). It was first discovered by Stein and Leventhal in 1935(10). The main cause of PCOS remains unclear(11,12) and the prevalence of PCOS can be assessed, based on the
criteria used and population analysis between 6% and 25%(13,14). PCOS causes start with chronic inflammation of the ovary, which leads to changes in the endocrine and metabolism(15). The current study is designed to found out the role of serum activin A hormone and GM-CSF that correlate with successful embryonic implantation and pregnancy in PCOS women following ICSI outcome.

**Patients, Materials and Method**

The present study was performed on the randomized eighty-eight infertile women, who attended the High Institute of Infertility Diagnosis and Assisted Reproductive Technologies, Al-Nahrain University in Baghdad-Iraq through the period from November 2016 till April 2018. The women age that included in the study was ranged between (20-40) years old who complaining from primary and secondary subfertility for a period (1-17) years. Exclusion criteria were included: Endocrine abnormalities, congenital malformation, women with high FSH levels more than 12mIU/ml. The tubal blockage was excluded by hysterosalpingography (HSG). In addition to the examination of all women by pelvic ultrasound. Male partner was evaluated by the specialist in urology.

The 88 women were divided, according to the cause of infertility, into non-PCOS group, which included 38 normal women, and the cause of their subfertility is due to male factors. Second group was included 50 women with PCOS and their diagnosis depends on the at least two of three Rotterdam criteria (Rotterdam ESHRE/ASRMS sponsored PCOS consensus workshop group) (9). The ICSI procedure was done by the clinical embryologist as described by Neri, et al(16).

Embryo transfer usually was done by flexible catheter (Cook-Ireland Ltd) with the guide of abdominal ultrasound. The luteal phase was supported by using progesterone in the form of Actavis (Cyclogest, Barnstable, UK)* 200- 400 mg twice/day, which was given to all women from the day of ova pick up till β-HCG test (performed 12- 14 days post embryo transfer). Serum activin A was measured in both groups at the day of ova pick up and serum GM-CSF was measured at the day of embryo transfer. The obtained serum used to measure the levels of activin A and GM-CSF, by using Enzyme-Linked Immunosorbent Assay (ELISA) technique (Biotek, USA), by using diagnostic kit (Kono Biotech), which provides a quantitative determination of the human activin A and GM-CSF concentration in the serum.

**Statistical Analysis:** The statistical analysis system-IBM-SPSS version 24. The numeric variables expressed as the mean ± standard error (SE), and the nominal variables expressed as numbers and percentages. Comparison between variables was done by using the unpaired t-test and Fisher exact test. The differences between values were considered statistically significant at the level of (P<0.05), and a highly significant at the level of (P<0.001)(17).

**Results**

In the PCOS women the mean age was (31.58 ± 0.65) years old, their age were between 20 and 40 years, while for the non-PCOS group the mean age was (33.23 ± 0.91) years old, ranging between 21 and 40 years. The statistical analysis showed that there was no significant (P=0.134) difference in the mean age between PCOS group and non-PCOS group, as shown in table (1). Women were divided into those having primary infertility and secondary infertility. It was found that the number and percentage of women with primary infertility in the control group was 23 (61%) i.e. more than those of secondary 15(39%). On the other hand, the number and percentage in the PCOS women with primary infertility was 38 (76 %), i.e. more than the number and percentage of PCOS patients with secondary infertility 12(24 %). Thus, there was no significant (P=0.162) difference in the type of infertility between two groups. According to duration of infertility in this study the mean duration of infertility in PCOS group (6.97 ± 0.57) years, and the mean duration of infertility in non-PCOS group (6.23 ± 0.74)years. There was a no significant (P=0.428) difference between the two women groups

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Women fertility status</th>
<th>*P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean ± SE)</td>
<td>Non-PCOS (N= 38)</td>
<td>PCOS (N= 50)</td>
</tr>
<tr>
<td>Range</td>
<td>33.23 ± 0.91</td>
<td>31.58 ± 0.65</td>
</tr>
<tr>
<td>Type of infertility %</td>
<td>Primary</td>
<td>23 (61%)</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>15(39%)</td>
</tr>
<tr>
<td>Duration of infertility (Mean ± SE)</td>
<td>6.23 ± 0.74</td>
<td>6.97 ± 0.57</td>
</tr>
</tbody>
</table>

PCOS: Polycystic ovary syndrome; E2: estradiol; FSH: Follicular stimulating hormone, LH: Luteinizing hormone, *: Unpaired t-test
No significant (P=0.846) difference was encountered between non-PCOS and PCOS groups regarding the total mean of basal E2 for control (44.92 ± 2.08 pg/mL), and for PCOS group (44.34 ± 2.06 pg/mL). Furthermore, the total mean of basal FSH for non-PCOS group (6.41 ± 0.45 mIU/L), and (6.28 ± 0.30 mIU/L) for PCOS group, was shown no significant (P=0.807) difference between the two groups. There was a highly significant (P<0.001) differences in the level of basal LH and in the LH/FSH ratio, between the two groups, (Table 2).

In figure (1), the mean of the estradiol level on the day of hCG injection of non-PCOS group (1381.89 ± 106.26 pg/mL) was significantly (P=0.009) lower than that of E2 level in the PCOS group (1827.79 ± 121.87 pg/mL).

Table 2: Comparison of the basal level of hormones E2, FSH, LH, and LH/FSH ratio between control and PCOS groups

<table>
<thead>
<tr>
<th>Hormones</th>
<th>Study groups</th>
<th>*P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-PCOS Mean ± SE</td>
<td>PCOS Mean ± SE</td>
</tr>
<tr>
<td>Basal E2 pg/mL</td>
<td>44.92 ± 2.08</td>
<td>44.34 ± 2.06</td>
</tr>
<tr>
<td>Basal FSH (mIU/L)</td>
<td>6.41 ± 0.45</td>
<td>6.28 ± 0.30</td>
</tr>
<tr>
<td>Basal LH (mIU/L)</td>
<td>4.86 ± 0.35</td>
<td>7.20 ± 0.34</td>
</tr>
<tr>
<td>LH/FSH ratio</td>
<td>0.81 ± 0.06</td>
<td>1.24 ± 0.07</td>
</tr>
</tbody>
</table>

PCOS: Polycystic ovary syndrome; E2: estradiol; FSH: Follicular stimulating hormone, LH: Luteinizing hormone, *: Unpaired t-test

Figure 1: Comparison of the level of estradiol on the day of hCG injection between non-PCOS and PCOS women

In the current study, the level of activin A in the serum on the day of oocyte retrieval of non-PCOS group (271.42 ± 9.66 pg/ml) was shown no significant (P=0.122) differences compared to PCOS group (292.26 ± 9.27 pg/ml), as illustrated in table (3).

Table 3: Comparison of serum activin A between non-PCOS and PCOS groups

<table>
<thead>
<tr>
<th>Study group</th>
<th>Activin A (serum) pg/mL Mean ± SE</th>
<th>*P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-PCOS</td>
<td>271.42 ± 9.66</td>
<td>0.122</td>
</tr>
<tr>
<td>PCOS</td>
<td>292.62 ± 9.27</td>
<td></td>
</tr>
</tbody>
</table>

PCOS: polycystic ovary syndrome, SE: standard Error, *: Unpaired t-test

The level of serum GM-CSF in non-PCOS group was (2.35 ± 0.12 ng/mL), and (2.48 ± 0.08 ng/mL) for PCOS women. The statistical analysis shown no significant (P=0.365) increase between the PCOS and non-PCOS women groups.

Table 4: Comparison serum GM-CSF between non-PCOS and PCOS women

<table>
<thead>
<tr>
<th>Study group</th>
<th>GM-CSF (Serum) ng/mL Mean ± SE</th>
<th>*P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-PCOS</td>
<td>2.35 ± 0.12</td>
<td>0.365</td>
</tr>
<tr>
<td>PCOS</td>
<td>2.48 ± 0.08</td>
<td></td>
</tr>
</tbody>
</table>

PCOS: polycystic ovary syndrome, GM-CSF: Granulocyte macrophage colony stimulating factor, *: Unpaired t-test
The biochemical pregnancy was positive in 27 (31%) out of 88 women participating in the present study. The number of pregnancy and the percentage was higher in PCOS than that of non-PCOS groups, 17 (34%) versus 10 (26%). However, there was no statistically significant (P=0.439) difference between the two groups as shown in figure (2).

Figure 2: Distribution of non-PCOS and PCOS women into pregnant and non-pregnant

Table (5), illustrates that the level of basal E2 and FSH was non-significantly (P>0.05) higher in pregnant women of the non-PCOS group compared to PCOS pregnant women. On the other hand, there was higher basal LH level and LH/FSH ratio in PCOS pregnant women, than pregnant women from non-PCOS group, and there was a significant (P<0.05) difference between two groups. The statistical analysis show no significant (P>0.05) differences between the level of serum activin A and GM-CSF in PCOS pregnant women compared to non-PCOS pregnant women.

Table 5: Hormone levels according to biochemical pregnancy outcome in non -PCOS and PCOS group

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Non-PCOS group (Pregnant)</th>
<th>PCOS group (Pregnant)</th>
<th>*P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 10</td>
<td>n = 17</td>
<td></td>
</tr>
<tr>
<td>Basal E2 (pg/mL)</td>
<td>46.35 ± 5.37</td>
<td>42.12 ± 3.28</td>
<td>0.482</td>
</tr>
<tr>
<td>Basal FSH (mIU/mL)</td>
<td>6.29 ± 1.12</td>
<td>6.06 ± 0.56</td>
<td>0.840</td>
</tr>
<tr>
<td>Basal LH (mIU/mL)</td>
<td>4.87 ± 0.69</td>
<td>6.90 ± 0.62</td>
<td>0.045</td>
</tr>
<tr>
<td>LH/FSH ratio</td>
<td>0.83 ± 0.12</td>
<td>1.27 ± 0.14</td>
<td>0.042</td>
</tr>
<tr>
<td>E2 on day of HCG (pg/mL)</td>
<td>1666.32 ± 192.19</td>
<td>1695.22 ± 169.37</td>
<td>0.914</td>
</tr>
<tr>
<td>Activin A (Serum) (pg/mL)</td>
<td>286.10 ± 20.74</td>
<td>299.59 ± 14.22</td>
<td>0.585</td>
</tr>
<tr>
<td>GM-CSF (Serum) (ng/mL)</td>
<td>2.31 ± 0.14</td>
<td>2.54 ± 0.12</td>
<td>0.207</td>
</tr>
</tbody>
</table>

SE: Standard Error; E2: Estradiol; FF: Follicular fluid; GM-CSF: Granulocyte macrophage colony stimulating factor, *: Unpaired t-test

Discussion

In the current study, the mean age of the whole females participating in the present study was (32.29 ± 0.55) years, and the mean age of the non-PCOS and PCOS women tends to be comparable to other studies which were done earlier (18,19). This may have resulted from the early marriage in Iraq (5). The result of present work noticed that the rate of primary infertility was more than the rate of secondary infertility in the females with or without PCOS. This finding may comparable to other studies which was dealing with the prevalence of the primary and the secondary infertility (12). The explanation is that the couples with the secondary subfertility have lower tendency toward having another child, probably because they have satisfied and economically stable, so the women with secondary subfertility, asking for the ART’s, will be much lesser than those women with primary subfertility fertility (17).
The current study revealed that the E2 level in the serum, at the day of hCG injection was more in the women with PCOS than in the non-PCOS women. Because in the PCOS females, there was a high degree of ovarian vascularization through the ovarian stimulation associated with vascular endothelial growth factor (VEGF) levels in the serum and in the FF. Moreover, the VEGF, causes enhancement of the proliferation and the function of granulosa cells. The granulosa cells of the women with PCOS were active functionally, with exaggeration of the estrogen hormone responses, to the stimulation by the FSH, when compared to the normal women, and it may be responsible for the increased risk of ovarian hyperstimulation syndrome in the PCOS women, stimulated by gonadotropin. The concentration of the estradiol was a good indicator of the follicular maturation.

The studies show conflicting results, in some of them consistent with the finding of this study, in that the serum E2 is significantly higher in the women with PCOS than in the control females. On the contrary to the results of the present study, several researches were demonstrating lower serum estradiol significantly in the PCOS females when compared to control females. Furthermore, other authors stated that there was no significant difference in mean serum estradiol E2 level between women with PCOS, and control women.

Regarding basal LH level and LH/FSH ratio, the present study shows that the women with PCOS have higher levels than that of non-PCOS, with a highly significant difference between them. In fact, in the PCOS women, there was a consistent elevation in the GnRH pulse frequency which causes an elevation in the LH pulse frequency and amplitude associated with normal or low secretion of the FSH which leads to an elevation in LH/FSH ratio. These results agreed with results obtained by Yins et al., who found that women with PCOS had significantly elevated LH, estradiol, and LH/FSH ratio compared with that in the control group.

Interestingly, some studies they found that the LH/FSH ratio did not significantly different between women with PCOS and normal women, thus they concluded that the LH/FSH ratio was a valuable test but not for PCOS diagnosis.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Not required

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**REFERENCES**


Influence of Perception about their Partners and Marital Status on Prevention of HIV AIDS Transmission among Papuan Women in Sorong City

Sariana Pangaribuan1, Chatarina Umbul Wahyuni2, Hari Basuki2, Ari Probandari3

1Student of Doctoral Program, 2Lecturer of Doctoral Program, Faculty of Public Health Universitas Airlangga, Surabaya, Indonesia; 3Lecturer of Doctoral Program, Faculty of Medicine Universitas Sebelas Maret, Surakarta, Indonesia

ABSTRACT

Introduction: HIV AIDS transmission among women continues to increase. Women’s vulnerability could be driven by gender inequality that leads to women are not able to control sex behavior of their partner and ensure that the practices are safe from HIV transmission. It aimed to analyze influence of marital status, perception about their partner and partner status on prevention of HIV AIDS transmission among Papuan women in Sorong city.

Method: It was analytical observational study with cross-sectional study design. Study population included Papuan women which had spouse, 350 women were involved as samples. Data were collected using questionnaire, analyzed with regression analysis and Chi-Square test.

Results: Majority (50.3%) of respondents lived with their spouse, 14.9% of respondents whose partner had other partner. Most of perceptions about partner were found at moderate levels (70.9%, respectively). Majority (67.4%) of respondents did not use any prevention of HIV AIDS transmission. Marital status ($p$ value = 0.001), partner status ($p$ value = 0.019), Perception about partner ($p$ value = 0.000).

Conclusions: Perception about partner, marital status and partner status had influence on prevention of HIV AIDS transmission among Papuan Women in Sorong city.

Keywords: Marital status, Perception, HIV and AIDS prevention

Introduction

HIV and AIDS transmission among women continues to increase from year to year. According to data from the World Health Organization (WHO), in 2015, 47.5% of people living with HIV and AIDS (PLWHA) were female.1 In addition, data from Ministry of the Health Republic of Indonesia has shown that in 2016, occupation, as a housewife ranked first in people with HIV and AIDS.2 Prevalence of HIV and AIDS in Papua based on behavior survey results in 2013, was 2.3% of general population.3 Besides, according to data from Sorong City Health Office in 2015, 40% of PLWA in Sorong city were housewife.4

Women’s vulnerability to HIV is mainly driven by gender inequality that leads to the inability of women to control the sexual behavior of their partner.5 Condom use as prevention of HIV transmission in Papua is low as only 26%.6 In sexual relation with their partner, women have lower bargaining power to negotiate safe sex practices, even though their partner is at very high risk of HIV transmission.7 The objective of this study was to analyze the influence of marital status, perception about partner and partner status on prevention of HIV and AIDS transmission among Papuan women in Sorong city.

Corresponding Author:
Sariana Pangaribuan
Doctoral Student of Public Health,
Faculty of Public Health, Airlangga University
Mulyorejo, Surabaya, Indonesia
Email: sarianapangaribuan@yahoo.co.id
Material and Method

This was an analytical observational study with a cross-sectional study design. The study population included Papuan women which had the spouse, with a total of 350 women were involved as samples. Multistage random sampling was used as a sampling technique, with inclusion criteria included woman aged 20-40 years and willing to study subject. Data were collected from January to April 2018 and analyzed using regression analysis and Chi-Square test.

Findings

Table 1 shows that majority (50.3%) of respondents lived together without any institutional bond by custom, religion, or civil. In addition, a majority (85.1%) of respondents had no other partner (single partner), but there were remaining 14.9% of respondents whose partner had another partner (multiple partners). Most of the perceptions about partner were found at moderate levels (70.9%, respectively). The majority (67.4%) of respondents did not use any prevention of HIV and AIDS transmission.

Bivariate analysis was used to analyze the correlation between marital status, partner status, perception about partner and prevention of HIV and AIDS transmission as presented in Table 2. Marital status, partner status, and perception about partner had a significant influence on the prevention of HIV and AIDS transmission. Preventive measure against HIV and AIDS transmission was done among 62.3% of cohabiting respondents. Over 78.9% of them had no other partner (single partner), and perception about partner were found at moderate levels (62.3%, respectively).

Table 2: Correlation between marital status, partner status and perception about partner on preventive measure against HIV and AIDS transmission

<table>
<thead>
<tr>
<th>Variable</th>
<th>Preventive Measure</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Marital Status</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Married</td>
<td>133(56.4)</td>
<td>43(37.7)</td>
</tr>
<tr>
<td>Cohabitation</td>
<td>103(43.6)</td>
<td>71(62.3)</td>
</tr>
<tr>
<td>Partner Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having multiple partners</td>
<td>28(11.9)</td>
<td>24(21.1)</td>
</tr>
<tr>
<td>Having single partner</td>
<td>208(88.1)</td>
<td>90(78.9)</td>
</tr>
<tr>
<td>Perception about partner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>31(13.1)</td>
<td>23(20.2)</td>
</tr>
<tr>
<td>Moderate</td>
<td>177(75.0)</td>
<td>71(62.3)</td>
</tr>
<tr>
<td>Good</td>
<td>28(11.9)</td>
<td>20(17.5)</td>
</tr>
</tbody>
</table>

Discussion

In this present study, the majority of respondents did not do any preventive measure against HIV and AIDS transmission even though they were in cohabitation without any institutional bond, and thus there was still a chance of their partner easily leaving them and looking for another partner. It may be caused by lack of knowledge and awareness of the risk of contracting HIV and AIDS from their partner. Marital status significantly influenced preventive measure against HIV and AIDS transmission. Marital status plays a crucial role in the prevention of HIV and AIDS transmission, for without marriage bond between man and woman the household will be more fragile and vulnerable to separation.

Partner status significantly influenced preventive measure against HIV and AIDS transmission. Respondents whose partner had multiple partners were likely to do preventive measure against HIV and AIDS transmission compared to those with a single partner.

The women who are in relation with their partner will generate perceptions about their partner. These
perceptions are a complex process result from the relation with the partner. Perception about the partner is fundamental in building the relationship. Care and the trust-based relationship will shape a good perception. If a man recommends condom use in sexual relation with his partner, possibly he is unfaithful or he has been feeling suspicious of his partner being unfaithful. Condom use as prevention of HIV and AIDS transmission on women was found inconsistent, and women who use a condom were those who have thought that their partner was untrustworthy. Condom use of couple with a single sexual partner was found inconsistent because the perception that their sexual partner was at low risk of contracting HIV. Perceptions have the influence on preventive measures by using the condom and performing HIV/AIDS Voluntary Counselling and Testing (VCT).

Conclusion

Marital status had an influence on the prevention of HIV and AIDS transmission among Papuan women. Partner status had an influence on the prevention of HIV and AIDS transmission. Perception about partner had an influence on the prevention of HIV and AIDS transmission.

Conflict of Interest: The author have declared that there is no conflict interest

Source of Funding: Kemenristek DIKTI

Ethical Clearance: Ethical was approved by the Faculty of Public Health in Airlangga University, Surabaya, Indonesia.

REFERENCES


Using Random Amplified Polymorphic DNA (RAPD) Fingerprinting Technique to Analyze Genetic Variation in Staphylococcus Aureus Isolated from Different Sources in Babylon Province Hospitals

Shaima R. Banoon¹, Zahraa Kamil Kadhim², Zahid S. Aziz¹, Zahraa Isam Jameel¹, Ruqaya M.J. EWadh⁴

¹Biology Department, College of Science, University of Misan, Maysan, Iraq; ²Biology Department, College of Science, University of Kufa, Najaf, Iraq; ³The Islamic University, Babylon, Iraq; ⁴College of Pharmacy, University of Babylon, Babylon, Iraq

ABSTRACT

Genetic fingerprinting of 19 different isolates of Staphylococcus aureus from wounds, skin, nails and urinary tract infection taken from patients who admitted at AL-Hilla General Teaching Hospital and Babylon Hospital for Maternity and Pediatric, using random amplified polymorphic DNA (RAPD) was carried out. Two (OPY-07 and OPX-20) primers showed polymorphism among the isolates tested generating 12 bands, 8 of which were polymorphic with sizes ranging between 250 and 1 kb. All the isolates were classified completely into one major group with nineteen different subgroups. The nineteen different subgroups suggest adaptation of S. aureus in the different host cells. This indicates possible relationship between host origin and genetic variation among S. aureus isolates. The DNA fingerprint defined for each strain of S. aureus could be useful in epidemiological studies, medical diagnosis and the identification of new strains and their origins.

Keywords: Staphylococcus aureus, RAPD, PCR, Fingerprinting Technique, OPY-07 and OPX-20

Introduction

The major sources of S. aureus in hospitals are septic lesions and carriage sites of patients and personnel. Carriage often precedes infection. The principal mode of transmission is via transiently contaminated hands of hospital personnel. Airborne transmission seems important in the acquisition of nasal carriage [1]. S. aureus are Gram positive cocci in clusters belonging to Micrococaceae family. Staphylococcus aureus is an important agent of healthcare-associated and community-acquired infections; they cause a variety of superficial and deep infections [7]. They are frequently found as contaminants in clinical specimens taken from the body surfaces, for example, swab from skin, nose, throat, wounds, burns and bed-sores. Sometimes, acts as opportunistic pathogens and cause infections. The pathogenicity of S. aureus include, abscesses, boils, conjunctivitis especially in newborn, cross-infections in hospitals septicemia and food poisoning [2 & 17].

Staphylococcus pathogenic versatility is compounded by its ability to develop resistance to new antibiotics almost as fast as they are introduced and this consider a serious setback in many hospitals causing various hospital outbreaks has been reported in many studies[3]. However, nosocomial infections caused by S. aureus are clinically serious and control of such infections requires strain typing to identify degree of virulence, the source of contamination, and resistance to commonly used antibiotics. It is important in epidemiology and ecology to be able to identify bacterial species and strains accurately[18].

Rapid identification and classification of bacteria is normally carried out by morphology, nutritional requirements, antibiotic resistance, isoenzyme comparisons, phage sensitivity[19] and more recently by
DNA based methods, particularly rRNA sequences or rDNA \textsuperscript{[20]}, strain-specific fluorescent oligonucleotides \textsuperscript{[16]} and the polymerase chain reaction (PCR)\textsuperscript{[15]}. Each of these methods has specific applications and advantages. However, closely related isolates are difficult to identify and differentiate using the biochemical methods. For effective chemotherapeutic treatments of infections or disease caused by this organism, the degree of virulence of different strains needed to be determined\textsuperscript{[2]}.

The aim of this study is to carry out a genetic characterization of different isolates of \textit{S. aureus} from different sources in Babylon Province hospitals using random amplified polymorphic DNA polymerase chain reaction (RAPD-PCR). This RAPD procedure works with anonymous genomic markers requires only small amounts of DNA and when compared with the biochemical methods, are simpler, very sensitive, cheaper, faster and less labour intensive than other DNA maker methodologies.

Material and Method

Specimen Collection and the Identification of \textit{S. aureus}: Forty clinical samples were collected from wounds, skin, nails and urinary tract infection taken from patients who admitted to AL-Hilla General Teaching Hospital and Babylon Hospital for Maternity and Pediatric, during the period from October 2017 to the May 2018. Collected samples were serially diluted and spread on sterile Mannitol Salt Agar medium and incubated at 37\textdegree C for 24 hrs. Yellow color colonies obtained were screened for the conformation of \textit{S. aureus} by Gram staining, and biochemical (Mannitol fermentation and catalase) tests\textsuperscript{[14]}.

Isolates Propagation: About 200 µl \textit{S. aureus} isolate was transferred into 75 ml of nutrient broth (pH 7.5) in a 250 ml conical flask and kept under constant shaking at 37\textdegree C for 24 h. The bacterial cell was removed by centrifugation, washed with 0.1 mM Tris-EDTA and kept at -20\textdegree C for DNA extraction\textsuperscript{[13]}.

Genomic DNA Extraction: DNA of \textit{staphylococcus aureus} isolates was extracted and purified according to Geneaid protocol of presto™ Mini gDNA Bacteria Kit, Taiwan. Concentration of DNA was determined spectrophotometrically (NanoDrop) by measuring its optical density at 260 nm the purity of DNA solution is indicated by ratio of OD260/OD280 which is in the range of 1.8 ± 0.2 for pure DNA\textsuperscript{[11]}. Gel electrophoresis was used for detection of DNA by UV transilluminator (Cleaver, UK)\textsuperscript{[9]}.

RAPD-PCR amplification: RAPD analysis was according \textsuperscript{[9]}, each isolate was tested with Two arbitrary or random primers as described in [Table -1]\textsuperscript{[18]} were primers synthesized by BioNEER, Korea. The DNA amplification reaction was carried out in a 25\textmu l volume containing 5\textmu l DNA, 12.5\textmu l GoTaq® Green Master Mix (Promega), 2.5\textmu l of primer (10 pMol), and 10\textmu l of nuclease free water; A single primer was used in each reaction. Amplification was carried out in thermal cycler (Eppendorf) which was conducted as in [Table-2]\textsuperscript{[18]} with a little modification.

Table 1: Oligonucleotide primers that showed genetic discrimination among the \textit{S. aureus} isolates using RAPD-PCR analysis

<table>
<thead>
<tr>
<th>Primer</th>
<th>Nucleotide sequence</th>
<th>No of fragments amplified</th>
<th>No of polymorphic bands</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPY-07</td>
<td>5-CTGGACGTCA-3</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>3OPX-20</td>
<td>5-CCCAGCTAGA-3</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>12</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 2: PCR program that apply in the thermocycler \textsuperscript{[18]}

<table>
<thead>
<tr>
<th>Temperature °C/time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial denaturation</td>
</tr>
<tr>
<td>94°C/3minutes</td>
</tr>
<tr>
<td>Cycles number 45</td>
</tr>
</tbody>
</table>

The amplification products were resolved by electrophoresis in a 1.2% agarose gel using TBE buffer 1X (at 70 V for 2 h.) A 1 kb ladder (Promega, USA) was included as molecular size marker. Gels were visualized by staining...
with ethidium bromide solution (0.5 µg/ml) and banding patterns were photographed over UV light using Gel documentation [9].

**Phylogenetic Analysis:** Positions of unequivocally scorable RAPD bands were transformed into a binary character matrix (“1” for the presence and “0” for the absence of a band at a particular position). Phylogenetic tree was created by the unweighted pair-group method arithmetic (UPGMA) average cluster analysis [6].

---

**Results and Discussion**

**Identification of S. aureus:** A total 40 clinical samples were collected from patients who admitted at AL-Hilla General Teaching and Babylon Hospital for Maternity and Pediatric hospitals. The result has been show 19 isolates as *S. aureus*.

**RAPD analysis of staphylococcus aureus:** Polymorphism assay for *Staphylococcus aureus* isolates was carried out using two primers (OPY-07 and OPX-20); as shown in (figure 1 and 2) respectively.

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**Figure 1:** RAPD-PCR using the primer OPY-07. [M Line (Marker), (1-19) the isolates numbered]

**Figure 2:** RAPD-PCR using the primer OPX-20[M Line (Marker), the (1-19) isolates numbered]

---

**Genetic characterization of S. aureus isolates by RAPD analysis:** Two primers (OPY-07, OPX-20) showed polymorphisms among individuals; The amplification reactions with the 2 primers generated 12 bands, 8 of them being polymorphic (Table 1) with ranging between 250bp and 1 Kb detected among the 19 *S. aureus* isolates and each of primer give different genetic profiles (figure 1 and 2).

Using 8 RAPD markers to construct phylogenetic relationship among 19 *S. aureus* isolates with OPY-07 led to classification into one major group while thirteen different subgroups were obtained at 100% similarity coefficient; in these subgroups strain with closed related and divergence as shown (Figure 3).
Figure 3: Dendogram analysis showing phylogenetic diversity of 19 Staphylococcus isolates identified by RAPD markers

As with OPX-20 led to classification into one major group while ten different subgroups were obtained at 100% similarity coefficient; in these subgroups strain with closed related and divergence as shown (Figure 4).

Figure 4: Dendogram analysis showing phylogenetic diversity of 19 Staphylococcus isolates identified by RAPD markers

While phylogenetic relationship among 19 S. aureus isolates with (OPY-07, OPX-20) led to classification into one major group while nineteen different subgroups were obtained at 100% similarity coefficient (Figure 5). This level of clustering was based on the origin of S. aureus strains.

Figure 5: Dendogram analysis showing phylogenetic diversity of 19 Staphylococcus isolates identified by RAPD markers using OPX-20, OPY-07.
Genetic fingerprinting and phylogenetic diversity between different S. aureus isolates were determined by converting RAPD data into a Jaccard similarity matrix and analyzed by UPGMA to produce a phylogenetic tree. The DNA band pattern obtained is similar to a bar code, allowing the identification of each individual. For instance, isolate Staph14 and Staph15 presents unique bands when its DNA amplified with OPX-20 primer tested (Figure 2). In the same way isolate Staph1 and 9 with OPY-07 primer (Figure. 1). These bands could be used to characterize and identify it. All the isolates were classified completely into one major group with nineteen subgroups. However, the nineteen different subgroups obtained in this study suggests possible and frequent occurrence of mutants in S. aureus in different host cells. Previously, S. aureus has been described as a variable bacterium with many pathogenic and antibiotic resistance variants [17]. The restricted number of cultural and morphological characters of S. aureus, and the lack of standardization of cultural conditions and virulence tests among different investigator have led to confusion in the characterization of this pathogen, special phenotypes usually consist of isolates that are genetically less related and such identification of isolates using biochemical, cultural and morphological techniques often lack consistency and accuracy [5]. In the current study, we have found that identification of genetic diversity in S. aureus depends on sources of isolates, different host cells and occurrence of mutants and that agree other studies [10].

Beside, the possible and frequent occurrence of mutants in S. aureus constitutes the broad genetic variation that exists within Staph1 to Staph19 genotypes (figure 5). RAPD markers exposed possible relationship between host origin, mutation and genetic variation among S. aureus isolates, and this proved its fingerprinting and diagnostic potential. Obviously, for these DNA bands patterns to have a practical meaning in the areas of medicine, population biology and epidemiology, specific DNA bands must be related to host origins, mutation and virulence genes [4].

This could be by a systematic comparison of DNA band patterns among bacteria comparing for the different host origins, mutation and virulence genes present. The DNA fingerprint defined for each strain of S. aureus should be useful for epidemiological surveys, medical diagnoses, and in the identification of new virulent strains and their origin. Furthermore, RAPD-PCR could be used to track the paths of transmission, which could be used in controlling the spread of strains within hospital, and between the hospitals, and especially preventing the nosocomial infections caused by the multi-drug resistant MRSA [12].

**Conclusion**

Random amplification of the DNA of S. aureus isolates reveals the efficacy of these selected nucleotides sequences in determination the similarity or variations among all isolates.

**Acknowledgment**

we would like to thank to AL-Hilla General Teaching Hospital and Babylon Hospital for Maternity and Pediatric for helping us collection of specimens.

**Source of Funding:** Nil.

**Conflict of Interest:** There are no conflicts of interest

**Ethical Clearance:** Permission to conduct this study was issued by the Health institutional; AL-Hilla General Teaching Hospital and Babylon Hospital for Maternity and Pediatric, and the Swabbing from patients was carried out by a public health technician.

**REFERENCES**


Effect of Using Distal Extension Bar on the Posterior Ridge Area in Implant Supported Mandibular Overdentures

Sherif M. Abdel Hamid, Ahmed G. Hamzawi, Emad M. Agamy, Gehan F. Mohamed

1Lecturer, Prosthodontics, Faculty of Dentistry, Pharos University, Alex, Egypt; 2Associate Professor, Prosthodontics, Faculty of Dentistry, Minia University, Minia, Egypt

ABSTRACT

Bone resorption of the posterior ridge area considered as a major problem due to overdenture rotation during function.

The aim of this study was to compare the effect of using a distal extension bar in two implant supported mandibular overdentures on the posterior ridge area in two groups of completely edentulous patients receiving two implants in the mandibular canine region.

Twelve completely edentulous patients were assigned randomly into two equal groups, group I patients received an implant supported overdenture with metallic bar attachment with bilateral posterior extension, in group II patients received an implant supported overdenture with metallic bar attachment with no posterior extension. Posterior ridge resorption was measured radiographically.

Results showed non-significant decrease in the posterior ridge resorption between the two groups.

Conclusion bars with distal extensions showed non-significant decrease in the posterior ridge resorption than bars with no distal extension.

Keywords: implant overdenture, distal extension bar, overdenture rotation.

Introduction

Today, restoring the edentulous patient with an overdenture on 2 splinted or un-splinted implants may be considered the state of the art (1,2)

Overtures considered as an ideal treatment option for edentulous patients as they are simple, cost effective, viable, and less invasive, however, controversies toward the design of attachment systems exist (3-5).

The design of attachments used with implant supported overdentures should provide equal implant-tissue support and optimum distribution of the forces around the implants to allow loading within physiologic levels of the bone (6, 7).

Corresponding Author:
Sherif Abdelhamid
Lecturer of Prosthodontics, Pharos University, Canal El Mahmoudia st, Beside Green Plaza Complex, Alex Governorate
Phone: +20 01006557773
Email: Sherif.abdelhamid@pua.edu.eg

Bar retained implant overdentures exhibit high survival rates and low incidence of technical complication for both implant and prosthesis, so they are considered as an adequate treatment option for edentulism (6).

Splinting of implants together was an ideal option to reduce the risk of overload to implant supported overdentures due to obtaining a greater surface area and sharing the load between them (9, 10). However the overdenture rotation during function leads to bone resorption in the posterior ridge areas (11-14).

The use of long-bar overdentures supported by interforaminal implants have been suggested to provide effective support for implant overdentures and minimize their rotation during function (15).

Connecting implants with distal extension bar may decrease the overdenture rotation during function, enhance the denture support, improve chewing, and reduce loading of denture-bearing areas (16-18). Distal extension design increase prosthesis rigidity, retention, improves denture stability, and affords a more conservative surgical and economic treatment. Moreover,
the supporting area of bars with distal extension was found to be larger than those without distal extensions (6).

**Aim of the Study:** The aim of this study was to compare the effect of using a distal extension bar in two implant supported mandibular overdentures on the posterior ridge area in two groups of completely edentulous patients receiving two implants in the mandibular canine region.

In the first group patients received an implant supported and retained overdenture with metallic bar attachment with bilateral posterior extension, in the second group patients received an implant supported and retained overdenture with metallic bar attachment with no posterior extension.

**Materials and Method**

**Patient Selection:** For the present study twelve healthy completely edentulous patients were selected from the outpatient clinic of the prosthodontics department, Faculty of Dentistry, Minia University, with their ages ranged from 50-70 years.

Patients were included in this study provided that they had the subsequent inclusion criteria: Adequate residual alveolar bone quantity and quality anterior to the mental foramen, U-shaped lower ridge to evade the lingual placement of the bar that arises with v-shaped ridges, appropriate Interarch distance to receive overdentures and attachments, Angle’s class I maxilla-mandibular relationship.

Patients were omitted if they had one of the following TMJ or neuromuscular complaints, Abnormal habits, (e.g. bruxism, clenching, smoking and alcoholism). Bone metabolic disorders (e.g. Diabetes), Past radiation therapy in the head and neck region

**Surgical and prosthetic procedure:** A new set of upper and lower complete dentures had been constructed for each patient using the conventional methods.

The denture of each patient was marked by guttapurcha then scanned by the CBCT machine.

Patients were scanned by the CBCT machine (SOREDEX 3DX, Nahkelantie 160, Tuusula. P.O. Box 148, FI-04301 Tuusula. Finland) while they wearing their dentures.

A customized surgical guide was fabricated for each patient, via CAD/CAM technology through the data attained from the cone-beam CT (CBCT).

Taken images by CBCT were introduced into a viewing software then sent for fabrication of the guide as follows

The patients’ scans were opened in blue sky bio software. Blue Sky Bio opens DICOM data directly from the CBCT machine, The Denture scan and patient’s CBCT were superimposed over each other by placing exact dots on the gutta percha markers, to ensure that both scans are accurately superimposed over each other.
lateral cylinders were obtained in each guide to allow the placement of anchor pins for guide fixation.

![Fig. 4: fabricated surgical guide](image)

Two root-form endosseous implants were placed at the canine areas in the mandibular of each patient as follows

Three holes were prepared in the mandible, through the available lateral cylinders of the guides to receive anchor pins for guide fixation.

Osteotomy preparations were prepared at the planned implants sites bilaterally using serial drills to the appropriate depth of the drills. Drills were operated via specific removable sleeves designed to match the drills sizes (OXY implant. Via Nazionale Nord, 21A, 23823 Colico LC, Italy).

After completing the osteotomy preparations and removal of the guide, implants were placed as decided. All implants were of the same length (13 mm) and the same diameter (3.5 mm). (Oxy implant. Via Nazionale Nord, 21A, 23823 Colico LC, Italy)

The fitting surface of the denture was adjusted opposite to the implant positions to accommodate the implant heads, a tissue conditioning material (Alpha dental products Co., subsidiary of Wallace A. Erickson&Co. 1920N. Clybourn Ave., Chicago, IL 60614, USA) was used to reline the denture fitting surface to avoid tissue irritation or implant overloading.

Patients were assigned randomly into two groups: 

**group 1** received Co-Cr metallic bar joint with bilateral distal extensions 7mm **group 2** received Co-Cr metallic bar joint with no distal extensions

After 3 months of implant placement, healing abutments were positioned for two weeks, then two plastic bar abutments were attached to the implant heads with fixation screws, A plastic bar (bar joint design) was positioned between the two copings and its required length was adjusted, leaving 2-mm clearance space beneath the bar for oral hygiene measures.

A prefabricated plastic pattern of the bar was lute to the plastic extensions of the bar abutments using a self-cured acrylic resin (Duralay, Reliance Dental Manufacturing Co., Chicago, USA.). For **group 1**, two plastic distal extensions (7 mm in length) were luted to the plastic bar abutments and oriented along the crest of the ridge. In **group 2**, no distal extensions were used.

![Fig. 5: bar with distal extension](image)

![Fig. 6: bar with no distal extension](image)

Both plastic patterns were cast as one piece into cobalt chromium alloy (Niadure, DFS Diamon, Germany) according to the commonly used casting technique. The bar was then finished, tried in the patient mouth and then polished

The bar copings complex over the implants was checked for passive fitness by the tactile sense when tightening the screws in place without any resistance.

The clinical pick-up procedure was done in the same manner for both groups, nylon clip was secured in place on top of the bar, no clips were placed over the cantilever, The undercuts beneath the bar and copings was blocked out using smooth casting wax (Glattes Gusswaches, Smooth casting wax 0.3mm.,Ref. no.40092,BEGO,Germany).
The fitting surface of the denture's opposing to the bar was modified to allow complete seating without interference. By creating a small window at the lingual flange opposite to the bar and sleeve attachment to escape the excess pick-up material.

The denture placed in the patient mouth and the patient was asked to close in centric relation and maintain maximum biting for the period of setting of the rebase material (Tokuyama Rebase II fast, Tokuyama Dental Corporation, Japan).

**Assessment of Posterior Ridge Area:** The assessment was based on the panoramic radiographs that are routinely taken at intervals during treatment. Radiographs used in this study were those taken shortly after 6 months and the most 12 months. This method is similar to that used by Wright et al. 2002\(^{(19)}\) using proportions that minimize errors related to magnification and distortion.

The anatomical landmarks: M (lower border of mental foramen), S (sigmoid notch), and G (gonion). These 3 landmarks were used to construct the triangles on the right side (M-S-G) and left side (M”-S”-G”) of the mandible. Point (N) is the center of the triangle if line was drawn from each corner (or vertex) of a triangle to the midpoint of the opposite sides, then those 3 lines meet at a center of the triangle.

Boundaries were constructed by the following lines: The boundary line M-G, the boundary line A-L: A line from the crest of residual ridge (point A) to the lower border of the mandible (point L) through M perpendicular on M-G, the boundary line M-N, and the boundary line G-P: the line G-N extended to the crest of the residual ridge through point P. The experimental bone area was eventually outlined by the area PAMG and the reference area by the triangle MGN (Fig 5).

![Fig. 7: assessment of posterior ridge resorption on panoramic radiograph](image)

The posterior ridge ratio was calculated by dividing the bone area over the reference area. Moreover, the ratios for the right and left part in each patient were averaged to get the mean. The change in posterior mandibular ridge ratio was calculated in the 1st interval by subtracting (the ridge ratio at 6 months - the ratio at the loading time) and the 2nd interval by subtracting (the ridge ratio at 12 months - the ratio at the loading time).

### Results

For both groups, the posterior alveolar ridge resorption was recorded at the right and left sides of each patient radiographically using panoramic X-ray, at different follow-up intervals, the first interval from implant insertion-implant loading, the second interval from implant insertion-6 months, the last interval from implant insertion-12 months.

<table>
<thead>
<tr>
<th>Bone loss in the posterior Ridge area 6 months 12 months</th>
<th>Group i</th>
<th>Group ii</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>0.29-0.39</td>
<td>0.31-0.60</td>
</tr>
<tr>
<td>Mean</td>
<td>0.338</td>
<td>0.401</td>
</tr>
<tr>
<td>S.D.</td>
<td>0.039</td>
<td>0.031</td>
</tr>
<tr>
<td>12 months</td>
<td>0.21-0.41</td>
<td>0.30-0.49</td>
</tr>
<tr>
<td>Mean</td>
<td>0.310</td>
<td>0.381</td>
</tr>
<tr>
<td>S.D.</td>
<td>0.046</td>
<td>0.050</td>
</tr>
<tr>
<td><strong>P comparison between group I and II at the same time</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paired t-test showed no statistical significant difference between the two groups at all-time intervals with (p&lt;0.05).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Discussion

Results of posterior ridge areas showed posterior mandibular bone resorption in both groups, this may be due to the built-in possibility of rotation of two-implant-retained overdentures which cause unfavorable distribution of occlusal load to the posterior mandibular ridge\(^{(13)}\).
When the mucosa beneath the denture base is compacted, the blood flow that delivers nutrients and removes metabolites from the bone can be affected, potentially leading to resorption \(^{20}\).

Statistical analysis showed non-significant decrease in posterior mandibular bone resorption between group I (Bar with no distal extension) and group II (Bar with no distal extension). This was in agreement with the results of several studies \(^{14,21,22}\).

The reduced resorption rates in group I (Bar with distal extension) could be due to the direct denture base acrylic contact with the healing abutments, which provides effective support and prevents denture base rotation. The posterior ridge may be protected from excessive loading, with most of the load being transmitted vertically to the implants \(^{23}\).

The reduced posterior ridge resorption when age increases is in agreement with the results of other studies \(^{11,21}\) and may be attributed to the fact that, by increase of age, the quantity of the alveolar bone decreases due to continuous resorption and most of the remaining bone is compact and resistant to resorption. Each 1 mm increase in the initial height of the mandible caused a 1.1% increase in posterior ridge resorption. This may be due to the presence of alveolar bone, which is more liable to resorption \(^{14}\).

**Conclusion**

Within the limitation of this study, it could be concluded that in two implant support mandibular overdentures bars with distal extensions showed non-significant decrease in the posterior ridge resorption than bars with no distal extension.

**Conflict of Interest:** There is no conflict of interest

**Source of Funding:** Self-funding

**Ethical Clearance:** Every patient in this study had given their informed consent for inclusion before their participation. Which is conducted in accordance with the declaration of Helsinki, it was approved by the Ethics Committee of Minia university number (133).

**REFERENCES**


Salivary and Seral Sex Hormones in Relation with Periodontal Problems

Sulafa Khair Al-Deen Banoosh¹

¹B.D.S. M.S.c Lecturer, Department of Basic Sciences, College of Dentistry, University of Tirit, Iraq

ABSTRAcT

The aim of this study to find any differences in the level of sex hormones in saliva and serum and any relations of these hormones with the periodontal tissues status.

Material and Method: This study consist of (40 female and 40 males), blood and salivary samples were taken from young healthy students, their ages(18-24) years. The salivary samples collected according to special constructions, the blood and salivary samples were collected at the same time from the same subjects in the morning at 8:00-10:00AM. The samples were dated and freeze until the time of analysis, the samples were collected from all females during the follicular phase of the menstrual cycles. Oral examinations done by using plane dental mirror and explorer. Any signs and symptoms for gingivitis or periodontitis recorded as study cases.

Results: The results of this study shown that there were appositive correlation between the serum and salivary sex hormones levels. Also there was a significant differences in the levels of the testosterone hormones for female in study group (periodontal problems) when compared with control group.

Conclusion: Periodontal problems could be caused by many factors some are locally others are systemically or could be genetic, in this study no hormonal effects noted and any increased could be due to the treated effects of the hormone for treat the inflammatory conditions. These facts need more researches to be improved.

Keywords: sex hormones, periodontal problems, gingivitis, periodontitis, saliva

Introduction

Hormones are definite as regulatory molecules that adjust reproduction, growth and development, continuance of the inner environment, in addition to energy production, operation, and storage[1], the hormonal effects be a sign of physiological/pathological changes just about every types of tissues in the body. Targets for many hormones like androgens, estrogen, and progesterone have also been found in periodontal [2], as a result, systemic endocrines imbalances might had a significant impact in periodontal pathogenesis.

Periodontal diseases (gingivitis and periodontitis), are two most important types of inflammatory disease attack the periodontium [3]. Gingivitis can be defined as an inflammation of gingival tissues that not caused clinical attachment loss [4]. The homeostasis of the periodontium include compound factors interaction, in which the endocrine system acting significant function [5]. Researchers have shown that any changes in the periodontal situation may be related to variations in the levels of sex hormones. This relations is clear in the recent periodontal diseases categories [6], which includes the follow hormone -related diseases categories: puberty- linked gingivitis, menstrual cycle-related gingivitis and pregnancy – related gingivitis [7]. Estrogen and progesterone are responsible for physiological changes in ladies at particular periods of their life. The two hormones have important natural activities that can influence many organs systems as well as the oral cavity. Estrogen receptors find in osteoblast-
like cells give a mechanism for the activity on bone, these receptors were additionally situated in periosteal fibroblasts, scattered fibroblasts of the lamina propria and periodontal ligament fibroblasts, demonstrating the activity of sex hormones on various periodontal tissues. Progesterone epidemiologic, experimentally, and clinically information have established that its activity in the bone metabolism and can be important in the role of combination of the bone resorption and bone formation \(^8\). Androgens hormones are responsible for normal spermatogenesis and are concerned for the improvement the secondary sexual characters in male puberty, testosterone receptors are find in the periodontal tissues and the count of these receptors on the fibroblasts tends to increase the inflammation or overgrowth of the gingival, the testosterone have an effect on periodontal tissues by increase the matrix synthesis \(^9\). The aim of this study to find any differences in the level of sex hormones in saliva and serum and any relations of these hormones with the periodontal tissue’s status.

Materials and Method

This study started from December 2017-february 2018 which consist of (40 female and 40 males), their ages (18-24) years. Blood and salivary samples were taken from young healthy students who normally looked with no personal or family history for any diseases. Oral examinations done by using plane dental mirror and explorer. Any signs and symptoms for gingivitis or periodontitis recorded as study cases. The salivary samples collected by asking the subjects to spit the saliva in the graduated tube according to the construction of Tenvuo and Lagerlof\(^9\), the blood and salivary samples were collected at the same time from the same subjects in the morning at 8:00-10:00AM and dated, freeze until the time of analysis, the samples were collected from all females during the follicular phase of the menstrual cycles. Serum and salivary sex hormones (testosterone, progesterone, and estrogen) were determined by using AccuBind ELISA Microwells (competitive enzyme immunoassay kit) (Monobind Inc., USA). The statistical tests that were used in this study was paired t-test for comparison, the level of significance was accepted at P< 0.05, and highly significance when P< 0.001.

Results

Table (1) Shows the means and standard deviation of the sex hormones (testosterone, estrogen, and progesterone) in serum for control and study groups and the (t) test and p-value between them. statistically no significant differences between them.

Table 1: The means and standard deviation of the sex hormones in serum in both groups

<table>
<thead>
<tr>
<th>Serum hormones</th>
<th>control G. (n = 40) Mean ± SD</th>
<th>Study G. (n = 40) Mean ± SD</th>
<th>t-test p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testo.</td>
<td>3.6945 ± 3.22568</td>
<td>3.8220 ± 3.32097</td>
<td>-0.174 0.862</td>
</tr>
<tr>
<td>Estro.</td>
<td>61.4518 ± 27.78563</td>
<td>60.5557 ± 28.39462</td>
<td>0.143 0.887</td>
</tr>
<tr>
<td>Progestr.</td>
<td>0.7420 ± 0.20282</td>
<td>0.7585 ± 0.20422</td>
<td>-0.363 0.718</td>
</tr>
</tbody>
</table>

Table (2) Shows the means and standard deviation of the sex hormones (testosterone, estrogen, and progesterone) in saliva for con trol and study groups and the (t) test and p-value between them. statistically no significant differences between them.

Table 2: The means and standard deviation of the sex hormones in saliva in both groups

<table>
<thead>
<tr>
<th>Salivary hormones</th>
<th>control G. Mean ± SD</th>
<th>Study G. Mean ± SD</th>
<th>t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testo.</td>
<td>0.7818 ± 0.11266</td>
<td>0.7818 ± 0.11211</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Estro.</td>
<td>0.7405 ± 0.26003</td>
<td>0.6862 ± 0.20691</td>
<td>1.032</td>
<td>0.305</td>
</tr>
<tr>
<td>Progestr.</td>
<td>0.1825 ± 0.04354</td>
<td>0.1848 ± 0.04624</td>
<td>-0.224</td>
<td>0.823</td>
</tr>
</tbody>
</table>

Table (3) Illustrates the correlation coefficient of serum sex hormones in relation to salivary sex hormones concentration for both groups the study and control, which were all positively highly significant the p- values < 0.001.
Table 3: The correlation coefficient of serum and salivary sex hormones in both groups

<table>
<thead>
<tr>
<th>Serum</th>
<th>Control g saliva</th>
<th>Study g saliva</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>p r</td>
<td>p r</td>
</tr>
<tr>
<td>Testosterone</td>
<td>&lt;0.001 0.568</td>
<td>0.001 0.500</td>
</tr>
<tr>
<td>Estrogen</td>
<td>&lt;0.001 0.698</td>
<td>&lt;0.001 0.770</td>
</tr>
<tr>
<td>Progesterone</td>
<td>&lt;0.001 0.646</td>
<td>&lt;0.001 0.761</td>
</tr>
</tbody>
</table>

P-values < 0.001

Table (4) shows the means and standard deviations of the sex hormones in saliva and serum for both study and control groups and the t test, p-values between them for female only, the statistical analysis show that there is a significant differences in serum testosterone hormones that is more in study group than in control group.

Table 4: The means and standard deviation of the salivary and serum sex hormones in both groups for female

<table>
<thead>
<tr>
<th>Hormones (female)</th>
<th>control G. n = 20 Mean ± SD</th>
<th>Study G. n = 20 Mean ± SD</th>
<th>t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saliva</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testo.</td>
<td>0.7175 ± 0.07398</td>
<td>0.7200 ± 0.08651</td>
<td>-0.098</td>
<td>0.922</td>
</tr>
<tr>
<td>Estro.</td>
<td>0.9505 ± 0.20067</td>
<td>0.8675 ± 0.12217</td>
<td>1.580</td>
<td>0.122</td>
</tr>
<tr>
<td>Progestr</td>
<td>0.2205 ± 0.01905</td>
<td>0.2245 ± 0.02438</td>
<td>-0.578</td>
<td>0.567</td>
</tr>
<tr>
<td>Serum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testo.</td>
<td>0.5480 ± 0.09197</td>
<td>0.6085 ± 0.08412</td>
<td>-2.171</td>
<td><strong>0.036</strong></td>
</tr>
<tr>
<td>Estro.</td>
<td>86.9690 ± 13.6298</td>
<td>85.6235 ± 17.19545</td>
<td>0.274</td>
<td>0.785</td>
</tr>
<tr>
<td>Progestr</td>
<td>0.8925 ± 0.07152</td>
<td>0.9135 ± 0.03897</td>
<td>-1.153</td>
<td>0.256</td>
</tr>
</tbody>
</table>

P<0.05

Table (5) Shows the means and standard deviations of the salivary and serum sex hormones for both study and control groups and the t test, p-values between them for male only, the statistical analysis show that there is no significant differences between them.

Table 5: The means and standard deviation of the salivary and serum sex hormones in both groups for male

<table>
<thead>
<tr>
<th>Hormones (male)</th>
<th>control G. n = 20 Mean ± SD</th>
<th>Study G. n = 20 Mean ± SD</th>
<th>t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saliva</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testo.</td>
<td>0.8460 ± 0.10903</td>
<td>0.8435 ± 0.10143</td>
<td>0.075</td>
<td>0.941</td>
</tr>
<tr>
<td>Estro.</td>
<td>0.5305 ± 0.07536</td>
<td>0.5050 ± 0.06160</td>
<td>1.172</td>
<td>0.249</td>
</tr>
<tr>
<td>Progestr</td>
<td>0.1445 ± 0.02212</td>
<td>0.1450 ± 0.02164</td>
<td>-0.072</td>
<td>0.943</td>
</tr>
<tr>
<td>Serum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testo.</td>
<td>6.8410 ± 0.71140</td>
<td>7.0355 ± 0.94384</td>
<td>-0.736</td>
<td>0.466</td>
</tr>
<tr>
<td>Estro.</td>
<td>35.9345 ± 5.30499</td>
<td>35.4880 ± 6.02736</td>
<td>0.249</td>
<td>0.805</td>
</tr>
<tr>
<td>Progestr</td>
<td>0.5915 ± 0.17786</td>
<td>0.6035 ± 0.18305</td>
<td>-0.210</td>
<td>0.835</td>
</tr>
</tbody>
</table>

**Discussion**

In this study there were appositive correlation between the concentration of sex hormones in saliva and serum for both groups (control and study) these results make saliva more acceptable for monitor the biomarkers than that done by other biological fluids like serum or urine because the sample of saliva is non-invasive, and can collected from special peoples (infants, children) and many other conditions in which the blood or the urine samples is not viable [10]. this results similar to the results found by (Zahim, jameel 2014) [11]. Also in this study there were no clear results about the concentration
of the sex hormones in the study group when compared with control group only a significant differences in the concentration of the testosterone hormone in the female in study group this could be due to the effect of testosterone in periodontal tissues which are:

1. Inhibit prostaglandin secretion[11]
2. Enhance osteoblast proliferation and differentiation[12]
3. Reduce IL-6 production during inflammation[13]
4. Enhance matrix synthesis by periodontal ligament fibroblasts and osteoblasts [3].

That could make the concentration of the hormone increase to overcome the inflammation in these tissues. This results similar to the result by (Eleni, et al) [14] who conclude that the androgen hormone may alter periodontal tissues responses to microbial plaque and thus indirectly contribute to periodontal disease, and (Elizabeth, et al.) [2] who found that testosterone hormone act as immunosuppressor that decrease the immunity therefore male more expected to infection than female. It’s important to understand that female have periodontal problems due to the fluctuations of sex hormones in various decades of life. One must remember the differences in the outcome among studies could be attributed to contrasts in symptomatic criteria used, size of the samples, contrasts in biochemical systems procedures, even differences in statistical methods and difference in the method for salivation collections (stimulated or un stimulated), in additions to contrasts in inclusion criteria used for choice of ladies.

Conclusion

Sex hormones consider a serious part in influencing periodontal problems development. These properties are varied depending upon the gender and in addition the life time periods. It is additionally that not all patients and their periodontal tissues react similarly to similar amounts of sexual hormones. also, the sex hormones can be limited its effect by plaque control and maintains good oral hygiene.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Tikrit university committe

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10. ElAttar TM, Lin HS, Tira DE. Testosterone inhibits prostaglandin formation by human gingival


Effectiveness of Soursop Leaf Extracts on Decreasing Blood Sugar for Type-2 Diabetes Mellitus Patients

Ta’adi¹, Mardi Hartono¹, Sunarto¹, Choiroel Anwar²

¹Lecturer of Nursing Study Program, Ministry of Health Polytechnic Semarang, Indonesia; ²Lecturer of Ministry of Health Polytechnic Semarang, Indonesia

ABSTRACT

Background: Lately, the treatment of diabetes mellitus, which is often carried out by the community is eating herbal plants, one of which is soursop leaves, which are believed to be able to reduce blood sugar levels. The objective of this research is to determine the effectiveness of soursop leaf extract in reducing blood sugar levels in type-2 diabetes mellitus patients.

Method: This study is quasi-experiment randomized with pre-test - post-test control group design in 32 types two patients treated in Pekalongan city health center area. The blood sugar level of the treatment group was measured after administration of 500 mg soursop leaf extract, three times a day within one week (65 mg extract of soursop leaves in 500 mg).

Results: There was an effect of soursop leaf extract on blood sugar although not statistically significant (p = 0.957). Also there was the effect of soursop leaf extract on fasting blood sugar, although it was not statistically significant (p = 0.770) and there was an effect of soursop leaf extract on postprandial blood sugar although it was not statistically significant (p = 952).

Conclusion: There was the effect of soursop leaf extract on reducing blood sugar levels (fasting and postprandial) even though it was not statistically significant.

Keywords: Soursop leaf extract, Blood sugar, Type-2 diabetes mellitus

Introduction

The increasing number of patients with diabetes mellitus (DM) mostly types two diabetes mellitus with several risk factors, including risk factors that cannot be changed and risk factors that can be changed. Unchangeable risk factors include a family history of diabetes mellitus: over 45 years of age, ethnicity, childbirth with birth weight above 4 kg and less than 2.5 kg. The risk factors that can be changed include obesity, physical activity, hypertension, dyslipidemia, and unhealthy (1).

Management with insulin (especially injection) is still quite expensive and with some side effects of oral hypoglycemic drugs. This experience makes the control of diabetes Mellitus switch to herbal treatments, namely soursop leaves (Annona muricata). This relates to the ease of these materials to find as well as the secondary metabolic content of soursop leaves which is useful in decreasing blood sugar levels, such as flavonoids and tannins. Compounds flavonoids and tannin have hypoglycemic effects by several mechanisms, namely by inhibiting glucose absorption, stimulating insulin release, increasing glucose uptake by peripheral tissues, and regulating enzymes that play a role in carbohydrate metabolism.

All parts of the soursop tree can be used as traditional medicines against various human diseases. The fruit can be used as a natural remedy for rheumatic pain, neuralgia, arthritis, diarrhea, dysentery, fever, malaria, parasites, rheumatism, and rushing skin as well as to increase the production of breast milk after childbirth. The leaves are used to treat cystitis, diabetes, headaches,
and insomnia. Also, soursop leaf extract (Annona muricata) has the potential as an agent for the treatment of hyperglycemia.

The leaf decoction is believed to show anti-rheumatic and neuralgic effects, while topically cooked leaves are used to treat abscesses and rheumatism. In a previous study, soursop leaves with a given dose of hypoglycemic impact were thought to be caused by flavonoids, which stimulated insulin secretion, increased repair or proliferation of β-cells and increased effects of insulin.

**Method**

This study used a quasi-experimental design randomized with pre and post-test control group design. Several samples fulfilling the requirements were randomly allocated with the proportion half of the samples was treatment group and another half as control group.

Descriptive data analysis was indicated by the mean or proportion and standard deviation of blood sugar levels, occupation, gender, age, genetic history. To prove the effect of soursop leaf extract on blood sugar levels in patients with type 2 diabetes mellitus, repeated measure of ANOVA at α = 0.05 was applied.

**Results**

This study was conducted in 4 (four) medical center areas in Pekalongan city. As stated in the following table - each medical center area was taken 4 samples into treatments and 4 samples as controls. Respondent characters describe on the table below.

<table>
<thead>
<tr>
<th>Table 1: Sample Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Characteristics of</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Health Center:</strong></td>
</tr>
<tr>
<td>West Pekalongan</td>
</tr>
<tr>
<td>South Pekalongan</td>
</tr>
<tr>
<td>East Pekalongan</td>
</tr>
<tr>
<td>North Pekalongan</td>
</tr>
<tr>
<td><strong>Gender:</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
</tbody>
</table>

**Marital Status:**

|  |  |  |
| **Married** | 14 (87.5%) | 13 (81.3%) |
| **Not Married** | 1 (6.3%) | 0 (0%) |
| **Divorced** | 1 (6.3%) | 0 (0%) |
| **Widowed** | 0 (0%) | 3 (18.8%) |

**Working Status:**

|  |  |  |
| **Not Work** | 8 (50%) | 8 (50%) |
| **Work** | 8 (50%) | 8 (50%) |

**History of Diabetes Mellitus:**

|  |  |  |
| **Having A History Of Diabetes Mellitus** | 5 (31.3%) | 6 (37.5%) |
| **Doesn’t Have A History Of Diabetes Mellitus** | 11 (68.8%) | 10 (62.5%) |

**Pregnancy Status:**

|  |  |  |
| **Not pregnant** | 16 (100%) | 16 (100%) |
| **Pregnant** | 0 (0%) | 0 (0%) |

|  |  |  |
| **Weight** | 56.5 ± 8.48 | 58.9 ± 7.98 |
| **Height** | 157.7 ± 4.85 | 156.1 ± 6.52 |
| **Systole** | 130.0 ± 16.33 | 135.0 ± 22.51 |
| **Diastole** | 81.9 ± 5.44 | 83.8 ± 6.19 |

|  |  |  |
| **Sugar Levels During (Pre)** | 253.3 ± 121.94 | 255.3 ± 96.03 |
|  | ± 108.79 | 239.2 ± 96.47 |
| **Levels Of Fasting Sugar (Pre)** | 179.2 ± 78.89 | 145.5 ± 51.82 |
| **Levels Of Fasting Sugar (Post)** | 165.6 ± 76.93 | 145.5 ± 51.82 |
| **The Level Of Sugar 2 Hours Post Meal (Pre)** | 265.2 ± 115.19 | 251.7 ± 95.22 |
| **Sugar Content 2 Hours Post Meal (Post)** | ± 114.18 | 251.7 ± 95.22 |
| **Age** | 54.7 ± 6.58 | 54.4 ± 7.27 |

**Discussion**

The effect of soursop leaf extract on blood sugar when, after being controlled by sex, age, genetic history of diabetes mellitus, and work status, shows that in the treatment group initially had an average blood sugar at 254.6 which was slightly higher than in the control group i.e. 253.97 after being given soursop leaf extract with a
dose of 3 x 500 mg/day for 6 days, in the treatment group experienced a decrease in sugar blood when lowered to 234.99 compared to the control group only dropped to 239.51. A reduction in blood sugar when lower in the treatment group showed that soursop leaf extract drinks affected lowering blood sugar while even though it was not statistically significant (p = 0.957). The small influence is influenced by various factors, including those related to the type of food (carbohydrate intake) of the respondents who in this study were not rigidly regulated; time of taking blood samples with the distance between meals, and activities of respondents after eating.

The effect of soursop leaves on fasting blood sugar, after being controlled by sex, age, genetic history of diabetes mellitus, and work status; shows that in the treatment group initially had an average fasting blood sugar 179.48 which was slightly higher than in the control group ie 175.52, after being given soursop leaf extract with a dose of 3 x 500 mg/day for 6 days, the treatment group decreased fasting blood sugar becomes 155.95, while in the control group it drops to 145.11. The decrease in fasting blood sugar in the treatment group showed that soursop leaf extract affected reducing fasting blood sugar even though it was not statistically significant (p = 0.770). The small influence is influenced by various factors, including the type of food intake consumed at dawn and the activities of spatial respondents.

The effect of soursop leaf extract on blood sugar 2 hours after meals, after being controlled by gender, age, genetic history of diabetes mellitus, and work status; shows that in the treatment group that initially had an average fasting blood sugar 251.11. The lowering of blood sugar when more economical in the treatment group showed that soursop leaf extract affected reducing blood sugar while even though it was not statistically significant (p = 0.0001). The small influence is influenced by various factors, one of which is the primary type of carbohydrate intake consumed.

The content of lactose additives 25% affects blood sugar levels, although this lactose additive cannot be avoided because it is an absolute requirement to make extracts in capsule form with a function to minimize unpleasant odors and prevent the solids from becoming sticky. Even in establishing several other extracts, the levels of lactose can reach 65%, meaning that the lactose additives in the soursop leaf extract are the minimum limits (3).

The results of the previous study showed that high glucose levels in diabetes mellitus triggered oxidative stress characterized by an imbalance between the amount of free radicals and antioxidants. Previous research on effective soursop and moringa extract in its single form were able to reduce blood sugar levels accompanied by the ability to reduce the impact of oxidative stress. 36 animals were divided into 6 groups: normal group (aquades), negative control (cmc na 0.5%), positive control (glibenclamide dose 1.26 mg/kg bw), soursop extract 100 mg/kg bw, moringa extract dose 200 mg/kg bb and combination i (75:25), ii (50:50) and iii (25:75) in percent. All groups of test animals, except the normal group, were induced by alloxan at a dose of 160mg/kgbb on day 0, followed by treatment of test animals from day 1 to day 14. On the last day, the test animals were sacrificed to take the liver organs and measured oxidative stress levels, including lipid peroxidase and glutathione. The use of single and combination moringa and soursop leaf extracts was able to reduce oxidative stress, which was marked by the decrease in LPO levels and significantly increased gsh levels. (p<0.05). Optimal activity on 50:50 moringa soursop combination. This combination gives better results than the single form (4).

Based on the results of the study with the theme of blood glucose levels before and after administration of extract of starfruit leaves and soursop leaves in patients with diabetes mellitus, obtained and analyzed by paired t-test with confidence interval of the difference 95%obtained a significant value = 0.000 means p <0.05, then h1 was accepted which showed a significant difference between blood glucose levels in patients with diabetes mellitus before and after administration of soursop leaf extract (5).

In a study entitled the effect of soursop leaf extract (Annona muricata), On decreasing blood glucose levels, it was explained that flavonoid is having a hypoglycemic impact with several mechanisms namely by inhibiting glucose absorption, increasing glucose tolerance, stimulates insulin release or acts like insulin, increases glucose uptake by peripheral tissue and regulates
enzymes that play a role in carbohydrate metabolism\(^{(4)}\). Other studies more specifically mention that quercetin compounds, one type of flavonoid from subclass flavonol, have the potential as a hypoglycemic agent through a mechanism inhibition of the alpha-amylase enzyme that plays a role in the breakdown of carbohydrates. In vitro research also shows that quercetin has the potential as an inhibitor of glucose transport by intestinal glut2 and glut5, which is responsible for glucose absorption in the small intestine. This is what causes quercetin to reduce glucose levels in the blood\(^{(6)}\). Tanin can lower blood glucose levels by increasing glucose uptake through activation of MAPK (Mitogen-Activated Protein Kinase) and PI3K (phosphoinositide 3-kinase). The hydrolyzed tannin is divided into gallotannic and ellagitannin. Gallatin can increase glucose uptake while inhibiting adipogenesis. Ellagitannin derivatives, on the other hand, namely lagerstroemin, flosin b, and reginin have properties similar to the hormone insulin (insulin-like compound). These three compounds can increase glucose transport activity in adipose cells in vitro\(^{(7)}\).

On blood sugar levels of alloxan-induced Wistar (Rattus norvegicus) rats, it was concluded that soursop leaf extract at a dose of 5000 mg/kg bb rats had the effect of lowering blood sugar levels in wistar rats higher than soursop leaf extract dose of 1000 mg/kg bb rats and 2000 mg/kg bb rats measured at 30, 60, 90 and 120 minute minutes. Further research with variations in dosage and determination of the active ingredients contained in soursop leaves need to be done\(^{(8)}\).

As with the study of the effect of ethanol extract of soursop leaves (Annona muricata) On blood glucose levels and liver histology in alloxan-induced diabetic mice (Mus musculus) Using a completely randomized design with five treatments and five replications. The treatment consisted of negative controls (without treatment), positive controls (injected with alloxan as much as 100 mg/kg bw), and treatment of soursop leaf extract with a multilevel dose of 50 mg/kg, 100 mg/kg bw, 150 mg/kg every day for 21 days. The results showed that administration of soursop leaf ethanol extract was able to increase the body weight of mice (p <0.05) at a dose of 50 mg/kg bw per day. Ethanol extract of soursop leaves caused a decrease in blood sugar levels (p <0.05) and improvement in liver histology\(^{(9)}\).

Experiments in the study treated the concentrated extract of soursop leaves for two weeks in hyperglycemic Wistar rats, decreased glucose levels, 8-ohdg levels, and ages levels. 2. The lowest levels of glucose, 8-ohdg and ages occurred in treatment p3 (dose of 150 mg/bb/day) with levels of 137 mg/dl, 1.664ng/l and 0.033 mol/dl respectively. The finding is another alternative of treatment besides natural treatment like walking\(^{(10)}\).

**Conclusion**

There is an influence of the administration of soursop leaf extract on decreasing blood sugar levels, fasting blood sugar, postprandial blood sugar, which is controlled by gender, age, occupation, and genetic history even though it is not statistically significant.

**Ethical Clearance:** Ethical clearance was obtained from the Semarang Ministry of Health Polytechnic. We also wish to thank all the participants who contributed to this study.

**Conflict of Interest:** Nil.

**Source of Funding:** Nil.

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Effectiveness of Mini Long Protocol in Patients with Previous IVF Failure Due to Poor Response

Thuraya Hussamuldeen Abdull1, Sumaya Taher Sayhood2, Alaa Mohammad AlKhawaz3
1Consultant Obstetrics & Gynecology, Fellowship of Infertility & Reproductive Medicine; 2Proff. In Obstetrics & Gynecology, Tikrit Medical College, University of Tikrit, Tikrit city, Iraq; 3Consultant Uro-surgery, Director of High Institute for Infertility Diagnosis and ART

ABSTRACT

Background: If pregnancy is not achieved after several cycles of in vitro fertilization, it is important to know the causes of implantation failure to design the appropriate strategy to increase the chances of pregnancy.

Objective: To evaluate the effectiveness of mini long protocol in patients with previous IVF failure due to poor response in group of Iraqi patients.

Patients and Method: A clinical trial study was carried out during the period from the first of October 2018 to the end of May 2019. The data was conducted in High institute of Infertility diagnosis and assisted reproductive technologies/Al-Nahrain University- Baghdad center for infertility and In-Vitro fertilization, when the convenient samples were taken. 30 convenient samples of infertile women suitable for ICSI within the ages between 27-43 years with previous IVF failure were included.

Results: Positive PT were found in 18/30(60%) of the infertile women after the IVF and stimulation procedures, Significant associations were found between all variables in the table 4 with the PT success (when there is highly significant association were found between AMH, E2 at pick up, embryo of transfer, Lt ovary, embryo day and number of embryo transfer) with the success pregnancy. While significant association were found between; female age, male age, FSH, AFC, endometrium thickness, dose of stimulation, right ovary, and number of oocyte with success pregnancy.

Conclusion: Mini-long protocol can help to improve the patient experience, egg yields and clinical pregnancy rate.

Keyword: Smooth down regulation, in vitro-fertilization, endometrium thickness, Embryo.

Introduction

Fertility is the capacity to produce offspring and it was defined as: failure to achieve a pregnancy in a 12 month period for patients under 35 years of age and failure to conceive in a 6 month period for the over 35 years. (1)

The Global prevalence of the infertility is expected to be one in seven to one in five (14-20%) couples in their reproductive age. (2) In the High institute of Infertility diagnosis and assisted reproductive technologies/Al-Nahrain University- Baghdad center for infertility and In-Vitro fertilization the infertility rate was (30%). (3)

The causes of infertility can be divided into: male cause, female cause or a combination of both and include ovulatory disorders, tubal disease, endometriosis, chromosomal abnormalities, sperm factors and unexplained infertility. (4) The majority of infertility cases, both male and female factors, are overcome through surgical and medical infertility treatment. Medical treatment options include assisted reproductive techniques (ART) such as in vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI), and intrauterine insemination (IUI). (5)
Recurrent implantation failure: Implantation failure is a term used to describe both patients who have never shown quantifiable signs of implantation such as increased levels of hCG, and those who have increased hCG production without later ultrasound evidence of a gestational sac. (6)

**Objective**

To evaluate the effectiveness of mini long protocol in patients with previous IVF failure due to poor response in group of Iraqi patients.

**Patients and Method**

A clinical trial study was carried out in the period from the first of October 2018 to the end of May 2019. The data was conducted in High institute of Infertility diagnosis and assisted reproductive technologies/Al-Nahrain University- Baghdad center for infertility and In-Vitro fertilization, when the convenient samples were taken.

**Ethical consideration:** The study protocol was approved by the Arabic Board of Medical Health Specialization for Obstetrics and Gynecology in Iraq and the High Institute for Infertility diagnosis and Assistance Reproductive Technologies- Al Najrain University.

**Sample size:** 30 convenient samples of infertile women suitable for ICSI within the ages between 27-43 years with previous IVF failure were included. Women with basal FSH levels under 15 IU/L, TSH, and prolactin (PRL) levels within normal limits (2-29 ng/ml)

**Exclusion Criteria:**

1. Women with history of IVF and become a pregnant (no matter if the abortion or labor were happened)
2. Women with premature ovarian failure.
3. Husband with Azo-spermia cases confirmed by testicular biopsy were excluded

Full history from the patients were taken (women age, Husband age, type &duration of infertility) and BMI were measured.

The end points studied included the number of oocytes recovered, number of mature (MII) oocytes, fertilization, cleavage, morphology based embryo quality, pregnancy rate.

**Method**

On the 2<sup>nd</sup> day of menstruation, venous blood were drop from the patients to measure AMH, estrogen, Progesterone, LH, FSH, TH function, prolactin and thrombophilia screening

On the 5<sup>th</sup> day of menstruation the patients receive oral contraceptive pills for 2 weeks duration (14 days) and on the day 12<sup>th</sup> when patients take pills number 12 the progesterone tab (5 mg) two times daily were giving to the patients for three days duration.

Then patients were assessed and after the day 14<sup>th</sup> of taking the OCP and progesterone the Decapiptyle injection were given to the patients, in which each ampoule contain 0.1 ml of Tripetorelin and daily injection of one unit (0.01) of the Tripetorelin for 6 days. The patients will follow up by vaginal U/S and E2 every 3 days

Then after these six days of Tripetorelin injections the patients came either in the first day of menstrual cycle or without cycle but the endometrium size was (≤3mm) and the follicles were symmetrical in both ovaries and their sizes were (<5 mm), all patients were received androgen gel during the days of decapiptyle injection 0.01 unit vaginally

On the days 7<sup>th</sup> the stimulation protocol were begin which is either by FSH (alone or with LH) with Decapeptyl in a dose of 0.1 IU full dose ampoule (long agonist protocol).

During the stimulation period we follow up of the patients by vaginal U/s and E2 level measurement according to the response of each patients, we can use one ampoule of Decapeptyl, then follow up of the patients until the follicule reach size 17,18,19, and 20 mm.

Pregnyl trigger the detection of serum progesterone were done, then Pregnyl trigger in a dose of 5000 IU or 10000 IU and after 35 hours the ovum were pickup and then return it.

**Results**

A total of 30 women with history of infertility and previous IVF failure were included in this study, the main age group of the patients were in age between 31-40 years in which 19(60.0%) patients in this group, 15 (50.0%) of the male were found in this group. 21(70.0%)
of the patients were with primary infertility and 9(30.0%) is 2ndary. The main cause of the infertility was ovulatory 14(46.7%), then male infertile 11(36.7%) then unexplained 3(10.0%) and 1(3.3%) for each tubal and blocked tube.

As shown in figure 1, the positive PT were found in 18/30(60%) of the infertile women after the IVF and stimulation procedures and 12/30(40%) were not become pregnant after the study procedures.

![Figure 1: Response of pregnancy rate according to the number of patients (n = 30)](image)

Significant association were found between cause of infertility especially ovulatory and male fertility with primary infertility (p=0.03), while no association were found between women age and pregnancy test with the type of infertility (p>0.05) (table 1)

**Table 1: The association between age, cause of infertility and PT with type of infertility**

<table>
<thead>
<tr>
<th></th>
<th>Primary infertility</th>
<th>Secondary infertility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Women age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 30</td>
<td>3</td>
<td>50.0</td>
</tr>
<tr>
<td>31-40</td>
<td>13</td>
<td>72.2</td>
</tr>
<tr>
<td>&gt; 40</td>
<td>2</td>
<td>33.3</td>
</tr>
<tr>
<td>Cause of infertility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male F</td>
<td>8</td>
<td>72.7</td>
</tr>
<tr>
<td>Unexplained</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Ovulatory</td>
<td>13</td>
<td>92.9</td>
</tr>
<tr>
<td>Tubal</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Blocked tube</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>PT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>11</td>
<td>61.1</td>
</tr>
<tr>
<td>Negative</td>
<td>10</td>
<td>83.3</td>
</tr>
</tbody>
</table>

Table 2 revealed that there is highly statistically significant increase of LH in primary infertility in comparison with LH in 2ndary infertility. No association were found for (AMH, E2, FSH, AFC, endometrial thickness, E2 at pick up and dose of stimulation
Table 2: Association between many variables and type of infertility

<table>
<thead>
<tr>
<th></th>
<th>Primary Infertility</th>
<th>Secondary Infertility</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td></td>
</tr>
<tr>
<td>AMH</td>
<td>1.6 ± 1.1</td>
<td>2 ± 1</td>
<td>0.14</td>
</tr>
<tr>
<td>E2</td>
<td>37 ± 11</td>
<td>37 ± 13</td>
<td>-</td>
</tr>
<tr>
<td>FSH</td>
<td>10 ± 3</td>
<td>9 ± 2</td>
<td>0.13</td>
</tr>
<tr>
<td>AFC</td>
<td>10 ± 5</td>
<td>9 ± 4</td>
<td>0.3</td>
</tr>
<tr>
<td>Endo Thickness in (mm)</td>
<td>9 ± 3</td>
<td>10 ± 2</td>
<td>0.1</td>
</tr>
<tr>
<td>E2 at pick up</td>
<td>845 ± 631</td>
<td>1069 ± 562</td>
<td>0.15</td>
</tr>
<tr>
<td>Dose of stimulation</td>
<td>401 ± 79</td>
<td>394 ± 78</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Figure 2 show the distribution of the of embryo transfer according to the grade, when 8 patients with 4 embryo in G1 and 8 patients with 1 embryo in G2, 4 patients in each of 2 embryo in G1 and 2 embryo in G2, 7 patients with 1 embryo G1, 6 patients with 2 embryo Grade 1 and no one in the rest grades.

Figure 2: Quality of embryo and pregnancy rate (n = 30, but 7 of them had 2 grades)

Significant associations were found between all variables in the table 3 with the PT success (when there is highly significant association were found between AMH, E2 at pick up, embryo of transfer, Lt ovary, embryo day and number of embryo transfer) with the success pregnancy. While significant association were found between; female age, male age, FSH, AFC, endometrium thickness, dose of stimulation, right ovary, and number of oocyte with success pregnancy.

Table 3: Association between many variables and PT

<table>
<thead>
<tr>
<th></th>
<th>Positive PT</th>
<th>Negative PT</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td></td>
</tr>
<tr>
<td>Female Age</td>
<td>34 ± 5</td>
<td>37 ± 4</td>
<td>0.01</td>
</tr>
<tr>
<td>Male Age</td>
<td>38 ± 6</td>
<td>42 ± 4</td>
<td>0.003</td>
</tr>
<tr>
<td>AMH</td>
<td>2.1 ± 1.1</td>
<td>1.2 ± 0.8</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Conted…

<table>
<thead>
<tr>
<th></th>
<th>Positive PT</th>
<th>Negative PT</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td></td>
</tr>
<tr>
<td>E2</td>
<td>33 ± 8</td>
<td>42 ± 14</td>
<td>0.003</td>
</tr>
<tr>
<td>FSH</td>
<td>9 ± 3</td>
<td>11 ± 3</td>
<td>0.01</td>
</tr>
<tr>
<td>AFC</td>
<td>11 ± 0.5</td>
<td>9 ± 5</td>
<td>0.03</td>
</tr>
<tr>
<td>Endometrium thickness (mm)</td>
<td>11 ± 3</td>
<td>9 ± 2</td>
<td>0.003</td>
</tr>
<tr>
<td>E2 at pick up</td>
<td>1183 ± 624</td>
<td>516 ± 285</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Dose of stimulation</td>
<td>375 ± 85</td>
<td>435 ± 47</td>
<td>0.001</td>
</tr>
<tr>
<td>RT ovary</td>
<td>7 ± 3</td>
<td>5 ± 3</td>
<td>0.01</td>
</tr>
<tr>
<td>LT ovary</td>
<td>7 ± 3</td>
<td>3 ± 2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No. of oocyte</td>
<td>5 ± 4</td>
<td>3 ± 3</td>
<td>0.03</td>
</tr>
<tr>
<td>Embryo day</td>
<td>3 ± 1</td>
<td>2 ± 1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Number of embryo transfer</td>
<td>3 ± 1</td>
<td>2 ± 0</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Response of pregnancy rate according to the grade and number of embryo, show that increase number of embryo associated with increase the possibility of pregnancy especially in grade 1 (table 4).

**Table 4: Distribution of the pregnancy rate according to grade and number of embryo (n = 37)**

<table>
<thead>
<tr>
<th>No.</th>
<th>+ve PT</th>
<th>-ve PT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>G1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 embryo</td>
<td>3</td>
<td>16.7</td>
</tr>
<tr>
<td>2 embryo</td>
<td>4</td>
<td>22.2</td>
</tr>
<tr>
<td>3 embryo</td>
<td>4</td>
<td>22.2</td>
</tr>
<tr>
<td>4 embryo</td>
<td>7</td>
<td>38.9</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>100.0</td>
</tr>
<tr>
<td>G2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 embryo</td>
<td>2</td>
<td>40.0</td>
</tr>
<tr>
<td>2 embryo</td>
<td>3</td>
<td>60.0</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Discussion**

The current study revealed that there is an important role of the maternal age in the quality of the embryo, Zeyneloglu HB et al, found that when the maternal age increases so the frequency of aneuploidy does. (8)

Pregnancy rates also have been found to be decreased as maternal age increases. (9) Which is same that found in the current study which is found that there is a significant decrease of the mother age <35 years old with increase pregnancy rate.

Endometrium thickness in the current study was significantly increased in positive pregnancy rate than in negative pregnancy rate. Miwa et al. study conducted a trans-vaginal Doppler ultrasonography study that found that uterine radial artery resistance index was significantly higher in patients with thin endometrium < 8 mm than with normal thickness endometrium > 8 mm, the thickness of the endometrium has been determined to have an effect on implantation rates. (10) It was suggested that about 8 mm is the lower limit for which ART can still usually be successful. From a thickness of 9 mm to 16 mm chance of pregnancy increases from 53 to 77% showing that a significant difference does exist in implantation rates. (11)

The principal aim of treatment with in vitro fertilization is to realize a live birth term. On the other hand, as the number of eggs retrieved is considered to be an essential prognostic variable, treatment protocols of the IVF is aim to improve this outcome. The current study revealed that blastocysts in grade one with more embryo were with pregnancy rate more than others. This is in agreement with Sunkara SK et al, study that mentioned there is a strong association between the number of eggs and live birth rate. (12)

**Conclusion**

Mini-long protocol can help to improve the patient experience, egg yields and clinical pregnancy rate.

**Conflict of Interest:** The author declares that there is no conflict of interest.

**Source of Funding:** The Source of funding: self

**Ethical Clearance:** was taken from the Iraqi Ministry of health/scientific committee.

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Determination of Reference of Concentration (RfC) Sulfur Dioxide (SO$_2$) Based on NOAEL SO$_2$ in White Rats and the Body Weight and Height of Indonesian Exposed to SO$_2$

Wanda Widya Wisesa$^1$, Abdul Rohim Tualeka$^1$, Rois Solichin$^2$, Pudji Rahmawati$^3$, Syamsiar S Russeng$^4$, Atjo Wahyu$^4$, Ahsan$^5$

$^1$Department of Occupational Health and Safety, Public Health Faculty, Airlangga University, 60115, Surabaya, East Java, Indonesia; $^2$Medical and Health Science Faculty, State Islamic University Syarif Hidayatullah, Jakarta, Indonesia; $^3$Department of Development of Islamic Society, State Islamic University Sunan Ampel, Surabaya, Indonesia; $^4$Department of Occupational Health and Safety, Faculty of Public Health, Hassamudin University, Makassar, Indonesia; $^5$Faculty of Nurse, University of Brawijaya, Malang, Indonesia

ABSTRACT

Sulfur dioxide (SO$_2$) is a sharp and non-flammable gas from coal combustion activities, fuel oil power plants, copper smelting, and volcanic eruptions. The accumulation of SO$_2$ exposure can detriment to lung function, respiratory tract, irritation, asthma, and even causes death. This study aimed to calculate the value of RfC from SO$_2$ exposure in communities in residential settlements around the area of Palembang’s fertilizer industry, Indonesia by using NOAEL SO$_2$ in white rats and the weight and height of Indonesian exposed to SO$_2$. This was an observational cross-sectional study. To analyze the data, manual quantitative analysis was made. The samples were adults and adolescents, seventeen years old or above, who had settled for more than 2 years. The variable of this research were the concentration of SO$_2$ in the settlements around the fertilizer industry, residents’ body weight, height, respiratory rate, exposure time per day, and body surface area, weight and body surface of white rats, No Observed Adverse Effect Level (NOAEL), Animal Km, Human Km and Reference of Concentration (RfC).

The results showed that the average SO$_2$ concentration was 0.248 mg/m$^3$ (0.0946 ppm). This meant that it is below the threshold limit value according to PP RI No. 41 of 1999 namely 900 µg/Nm$^3$ (0.34 ppm). However, it is approaching the highest limit permitted by Permenaker No. 5 of 2018 which stated the limit to be equal to 0.25 mg/m$^3$ (0.095 ppm). The average SO$_2$ RfC obtained in this study was 0.04 mg/kg. It is less than the one issued by EPA/NAAQS 2010, that is equal to 0.21 mg/kg and it means that the RfC result of this study is safer for humans than of the others. Nevertheless, the presence of SO$_2$ around residential areas, which is almost close to TLV and can increase at any time, can bring a negative effect to public health. Therefore, continuous controlling is highly needed. It includes reducing SO$_2$ concentration, controlling SO$_2$ emissions and evaluating industrial activities periodically in order to maintain air quality and level of exposure so health effects can be well-controlled.

Keywords: Sulfur dioxide, RfC, community, fertilizer industri

Introduction

SO$_2$ is a gas that smells sharply and is non-flammable.$^1$ SO$_2$ in air comes from coal combustion activities, fuel oil power plants, copper smelting, and volcanic eruptions.$^2$ In urban areas, the main source of SO$_2$ in the air are from electricity generation activities, especially those that use coal or diesel oil as fuel, gases discharged from diesel-using vehicles and industries that use coal and crude oil fuels.
During the process of making the urea fertilizer, the fertilizer industry in Palembang disposes waste which contains impurities in the form of gases, a by-product of SO₂ which is produced by boilers and electric power chimneys in the factory areas, which is the biggest contributor of SO₂ emissions in the world.

In his study, Solichin (2016)³ measured that the concentration of SO₂ in residential areas around the Palembang fertilizer industry is 0.248 mg/m³ (0.0946 ppm). His result is below the threshold value limit set by Indonesian government in PP RI No. 41 of 1999 limit to be 900 µg/Nm³.⁴ However, his result is approaching the highest limit permitted by Permenaker No. 5 of 2018, which is equal to 0.25 mg/m³.⁵ Even though it does not cause a carcinogenic effect, it can bring negative impact to public health if the community are continuously exposed to it.

The accumulation of SO₂ exposure can detriment to lung function, respiratory tract, irritation, asthma, bronchitis, emphysema, and even causes death.⁶ Daud and Sedionoto study (2010) showed that residents who lived for a long time with a radius of less than 300 m from the SO₂ industrial area had a risk of decrease of pulmonary capacity by 1.37 times and pulmonary function by 1.62 times.⁷ Moreover, according to Kurniawati and Azizah (2006), there were numbers of people living within 300 metres from the industry who suffer from throat irritation, chronic cough, and eye irritation.⁸

There is still no research that calculates the reference concentration (RfC) for SO₂ in communities in the residential area of the Palembang fertilizer industry using anthropometric data of Indonesian people. RfC for SO₂ recommended for the people of Indonesia still uses references from American and European research, so that it cannot fully be used as a reference in determining risk for Indonesian people for its less accuracy. It is like the study conducted by Ani (2018)⁹ which used the RfC of SO₂ issued by EPA/NAAQS 1990, namely 0.026 mg/kg.

In this study, the calculation of RfC will be derived from experimental doses of NOAEL using the characteristics of the experimental animals of white rats (rattus novergicus) from Indonesia and anthropometric factors from the community in the area settlement of the Palembang fertilizer industry. The values used in this study are NOAEL SO₂ of 0.25 mg/kg, average body weight of 57.65 kg and average height of 159 cm.

Therefore, this article was aimed to determine SO₂ reference of concentration (RfC) in the community around the Palembang fertilizer industry, so that the results can be used as a reference to estimate the safe limit of SO₂ exposure each day for the community without causing harmful effects during their lifetime using the characteristics of Indonesian people.

Material and Method

This study was conducted in the residential settlements in Palembang’s fertilizer industry. This was an observational cross-sectional study. The population in this study was residents living in the area around the fertilizer industry exposed to SO₂, with a sample of adults and adolescents aged 17 years and older who had settled for more than 2 years. Cluster sampling technique was employed, resulting in 297 respondents.

The primary data of this study were SO₂ concentration, breathing rate, duration of exposure, and body weight. The measurements of SO₂ concentration were carried at 10 air sample points in 3 different locations (radius of 800 meters, 1050 meters, and 1300 meters).

The variable of this research were the concentration of SO₂, residents’ body weight, breathing rate, exposure time per day, body surface area, weight and body surface of white rats, NOAEL of SO₂, Animal Km, Human Km and RfC. To analyze the data and determine RfC of SO₂, manual quantitative analysis was made.

Findings

A. Characteristics and Body Surface Area of Experimental Animal: The experimental animals used in this study were white rats (Rattus novergicus). In general, the human response to toxicity is qualitatively similar to the response of these animals, so that the results of this study test can be used as a basis for extrapolation from animal to human data.¹⁰

<table>
<thead>
<tr>
<th>Research Object (White Rats)</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
</tr>
</tbody>
</table>
Using the data of white rats in Table 1, body surface area of white rats can be calculated using the following formula:

\[
\text{BSA} = 0.09 \times W^{0.67}
\]

Annotation:
BSA : Body Surface Area (m²)
W : Weight (kg)

B. Characteristics, Body Surface Area and Respiratory Rate of Residents: The residents’ characteristics in this study included body weight and exposure time. The average body weight was 57.65 kg and the average exposure time was 21 hours. For the height, the average height of Indonesian people, 159 cm, was used. Using this data, body surface area and breathing rate can be calculated using the following formula:

1. Body Surface Area of Residents

\[
\text{BSA} = \sqrt{\frac{W \times h}{3600}}
\]

Annotation:
BSA : Body Surface Area (m²)
W : Weight (kg)
H : Height (cm)

\[
\text{BSA} = \sqrt{\frac{57.65 \times 159}{3600}} = 1.59 \text{ m}^2
\]

2. Breathing Rate

\[
\text{BR} = \frac{53 \ln W}{69} \times \frac{24}{24} = \frac{53 \ln 5765}{69} = 0.6 \text{ m}^3/\text{hour}
\]

The measurement results showed that the average body surface area of residents is 1.59 m² and their breathing rate is 0.6 m³/hour.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Wb (kg)</th>
<th>H (cm)</th>
<th>BSA (m²)</th>
<th>T (hour/day)</th>
<th>BR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>84.8</td>
<td>159</td>
<td>1.94</td>
<td>16</td>
<td>0.69</td>
</tr>
<tr>
<td>2</td>
<td>57.5</td>
<td>159</td>
<td>1.59</td>
<td>24</td>
<td>0.60</td>
</tr>
<tr>
<td>3</td>
<td>72.6</td>
<td>159</td>
<td>1.79</td>
<td>24</td>
<td>0.65</td>
</tr>
<tr>
<td>Dst</td>
<td>297</td>
<td>44.5</td>
<td>1.4</td>
<td>24</td>
<td>0.55</td>
</tr>
<tr>
<td>Average</td>
<td>57.65</td>
<td>159</td>
<td>1.59</td>
<td>21.28</td>
<td>0.6</td>
</tr>
</tbody>
</table>

C. \( \text{SO}_2 \) Concentration: The following is the measurement of the concentration of \( \text{SO}_2 \) in ambient air collected at 10 points of air samples, each of which is carried out three times, in the morning, evening and night.

Table 3: Distribution of Sulfur Dioxide Concentration in the Residential Areas around the Fertilizer Industry

<table>
<thead>
<tr>
<th>Radius</th>
<th>( \text{SO}_2 ) Concentration (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>800 m</td>
<td>0.254</td>
</tr>
<tr>
<td>1,050 m</td>
<td>0.246</td>
</tr>
<tr>
<td>1,300 m</td>
<td>0.244</td>
</tr>
<tr>
<td>Average</td>
<td>0.248</td>
</tr>
</tbody>
</table>

Based on the measurement results, it is known that the average \( \text{SO}_2 \) concentration in the residential areas around the fertilizer industry is 0.248 mg/m³ (0.0946 ppm) with the highest concentration of 0.254 mg/m³ (0.097 ppm) and the lowest concentration is 0.245 mg/m³ (0.0943 ppm).

D. Animal Km and Human Km: To determine the RfC for the community, Animal Km and Human Km need to be carefully calculated.

1. Animal Km

\[
\text{Animal Km} = \frac{W_{\text{animal}}}{\text{BSA}_{\text{animal}}}
\]

Annotation:
Animal Km : Animal Km factor
W : Weight (kg)
BSA : Body Surface Area (m²)
Table 4: Calculation result of Animal Km of White Rats

<table>
<thead>
<tr>
<th>Research Object (White Rats)</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
<th>Animal km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.8141941</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.024165</td>
<td>5.8141941</td>
</tr>
<tr>
<td>3</td>
<td>0.141</td>
<td>0.024223</td>
<td>5.820914</td>
</tr>
<tr>
<td>4</td>
<td>0.141</td>
<td>0.024223</td>
<td>5.820914</td>
</tr>
<tr>
<td>5</td>
<td>0.1395</td>
<td>0.02405</td>
<td>5.8004158</td>
</tr>
<tr>
<td>6</td>
<td>0.1415</td>
<td>0.024165</td>
<td>5.8555762</td>
</tr>
<tr>
<td>Average</td>
<td>0.1406</td>
<td>0.024165</td>
<td>5.81</td>
</tr>
</tbody>
</table>

Table 4 shows that the average animal Km of white rats is 5.81.

2. Human Km

Human Km = \( \frac{W}{BSA} \)

Annotation:
- Human Km : Human Km factor
- W : Weight (kg)
- BSA : Body Surface Area (m²)

Table 5: Calculation Results of Human Km for Residents around the Fertilizer Industry

<table>
<thead>
<tr>
<th>Residents</th>
<th>W (kg)</th>
<th>BSA (m²)</th>
<th>Human Km (W/BSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>84.8</td>
<td>1.93</td>
<td>43.8178</td>
</tr>
<tr>
<td>2</td>
<td>57.5</td>
<td>1.59</td>
<td>36.0817</td>
</tr>
<tr>
<td>3</td>
<td>72.6</td>
<td>1.79</td>
<td>40.5435</td>
</tr>
<tr>
<td>Dst</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>297</td>
<td>44.5</td>
<td>1.40</td>
<td>31.7419</td>
</tr>
<tr>
<td>Average</td>
<td>57.65</td>
<td>1.59</td>
<td>35.9685</td>
</tr>
</tbody>
</table>

Table 5 shows that the average of Human Km is 35.96.

E. No Observed Adverse Effect Level (NOAEL):

NOAEL can determine doses experimentally where there is no statistically significant indication of toxic effects or biological problems. The Office of Environmental Health Hazard Assessment in 2016 stated that NOAEL sulfur dioxide is 660 µg/m³ or equal to 0.25 mg/kg. It was obtained from the calculation using the following formula:\(^{11}\)

\[
\text{NOAEL SO}_2 = \frac{n \times \text{molecul weight}}{24,45,1000}
\]

\[
n = 0.25 \text{ mg/kg}
\]

F. Reference of Concentration (RfC): Saridewi dan Tualeka (2019) stated that the calculation of RfC used the formula from Shaw et a. (2007).\(^{12}\)

\[
\text{RfC} = \frac{\text{NOAEL \ Animal Km}}{\text{Human Km}}
\]

Annotation:
- RfC : Reference of concentration (mg/kg)
- Animal Km : animal km factor
- Human Km : human Km factor

The result of RfC calculations obtained from NOAEL, the average of animal Km, and the average of human Km are shown below.

\[
\text{RfC} = \frac{\text{NOAEL \ Animal Km}}{\text{Human Km}} = 0.25 \times \frac{5.81}{35.96} = 0.04 \text{ mg/kg}
\]

The results above shows the RfC for SO₂ in the community living in the vicinity of the Fertilizer Industry, Palembang is 0.04 mg/kg

Discussion

Based on the results of measurements made, the average value of SO₂ concentration in residential areas around the fertilizer industry is 0.248 mg/m³. The value of SO₂ concentration obtained from this study is higher than the results of research conducted by Nukman et al (2005) who studied the SO₂ in 9 major cities and found the average SO₂ value of 0.033 mg/m³.\(^{13}\) A risk assessment has been ldakassar by characterizing risk quotient (RQ) The significant different concentration between this study and other studies is caused by differences in the sources of SO₂ pollution itself. SO₂ source for the study by Nukman et al (2005) was the source line, namely the highway, while SO₂ sources for this study were the power plant chimney and fertilizer industry boiler. Those are among the main sources of sulfur, the activities of industries that use coal and crude oil fuels.

The RfC result showed 0.04 mg/kg. This indicates that the calculation of RfC SO₂ in this study is smaller than
the calculation of SO₂ RfC issued by EPA/NAAQS 2010 in Rahman (2007) which is equal to 0.21 mg/kg. Thus, it can be said that the results of this research are safer for humans. Although it is still relatively safe, exposure to SO₂ continuously could bring a negative impact. Thus, control efforts need to be carried out including overcoming the reduction of SO₂ which can be done through two processes, absorption and electron beam.

Effort in reducing and controlling SO₂ emissions can be carried out with several ways, using low sulfur fuel, replacing other energy sources for fuel, processing sulfur before combustion, and processing SO₂ from exhaust gases. In addition, it is necessary to evaluate activities in the fertilizer industry by taking samples of SO₂ regularly, preparing health consultations for the community, installing additional air monitoring devices in several locations by waste management institutions, recording all odor complaints by the community, namely nature, location, time, and frequency of complaints, so that health effects can be well-controlled.

**Conclusion**

The average result of SO₂ concentration in residential areas around the fertilizer industry is 0.248 mg/m³, which one of the results of SO₂ measurements in this study passed the quality standard of government regulations (PP RI No.41 of 1999). However, the average SO₂ concentration is very close to the highest level permitted by Permenaker No. 5 of 2018 concerning Occupational Safety and Health of the Work Environment which set the limit to be equal to 0.25 mg/m³ (0.095 ppm).

The RfC for SO₂ result showed 0.04 mg/kg. This indicates that the calculation of RfC for SO₂ in communities in the residential area of the Palembang fertilizer industry is smaller than the calculation of RfC for SO₂ issued by EPA/NAAQS 2010 which is equal to 0.21 mg/kg. Thus, it can be concluded that the results of this research are safer for humans. However, the fact that it is very close to TLV and can increase at any time can bring a negative effect to public health. Therefore, serious prevention action is highly needed.

**Conflict of Interest:** All authors have no conflicts of interest to declare.

**Source of Funding:** This is an article “Determination of Reference of Concentration (RfC) Sulfur Dioxide (SO₂) Based on NOAEL SO₂ in White Rats and the Body Weight and Height of Indonesian Exposed to SO₂” of Occupational Health and Safety Department that was supported by Faculty of Public Health, Airlangga University.

**Ethical Clearance:** The study was approved by the institutional Ethical Board of the Public Health, Airlangga University.

**REFERENCES**


Comparative Study for Preemptive Administration of Intravenous Infusion of Nefopam Versus Paracetamol in Providing Postoperative Analgesia for Patients Undergoing Anterior and Posterior Vaginal Wall Repairs Under Spinal Anesthesia

Yasir Fadil Muhammad Ali Alkhazraji1, Sahar Swadi Raheem2, Qatar Al-Nada Adnan Abood3
1M.B.Ch.B, DA, FICMS-A&IC and Pain Management, College of Medicine, Al-Nahrin University; 2Specialist in Gynecology & Obstetrics, College of Medicine, Al Muthanna University; 3D. A&IC. Abugraib General Hospital

ABSTRACT

Background: The aim of the current study was to evaluate and compare the postoperative analgesic effects of preemptive intravenous (IV) paracetamol and nefopam versus and their effect on the total requested dose of tramadol postoperatively.

Materials and Method: 60 adult female patients, aged 20-55 years, ASA physical status I and II were scheduled for anterior and posterior vaginal wall repair (APR) and assigned in a randomized manner into three groups after spinal anesthesia. In control group, 50 ml of normal saline had been infused intravenously over 15 minutes. In group (P), an intravenous infusion of 1 g paracetamol had been given over 15 minutes. In group (N), an intravenous infusion of 20 mg nefopam in 50 ml normal saline had been given over 15 minutes. Visual analogue scale (VAS) were taken at a constant times postoperatively and the total requested postoperative dose of tramadol had been calculated.

Results: Both paracetamol and nefopam groups are associated with a significant longer time to first request of postoperative analgesic treatment (group N > P > C) (P < 0.05) with a significant reduction in the total required postoperative analgesics. VAS revealed a significantly lower score in Group N and P, compared to group C.

Conclusion: Preemptive i.v. paracetamol and nefopam is a good plan to provide an effective postoperative analgesia following spinal anesthesia in patients undergoing vaginal APR.

Keywords: Anterior and posterior vaginal wall repair; Intra venous paracetamol, nefopam, preemptive, tramadol

Introduction

Pelvic organs prolapse is a common gynecological problem and mostly need to be corrected surgically by anterior and posterior vaginal wall repair (APR). Postoperative pain (POP) is a major psychological burden and responsible for the triggering a series of physiological changes that increases the rate of morbidity and mortality. Early and adequate treatment of POP enhances early mobilization and reduces the rate of complications and hence cost of hospitalization. Preemptive analgesia immediately before the surgical procedure is an effective measure in the prevention of POP. Paracetamol is an analgesic agent used for mild to moderate pain. It has minimal side effects and it does not interfere with blood clotting. Intraoperative administration of paracetamol before the end of surgery is an effective measure in the management of POP. Nefopam is a centrally-acting non-opioid analgesic. It

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does not affect COX but it interrupts the reuptake of serotonin, dopamine, and norepinephrine. Plasma peak concentrations are reached after 30 min of continuous intravenous infusion and its effect lasts for 6 hours. The potency of a 15–30 mg dose is equivalent to 50–100 mg of pethidine administration and considered as a safer, well-tolerable agent with fewer side effects. The aim of this study was to evaluate and compare the efficacy and safety of paracetamol and nefopam infusion as a preemptive analgesia and to assess their effects on the total daily requirement of postoperative analgesic drugs.

**Materials and Method**

This study was conducted from 1st of November 2018 to 1st of May 2019 when 60 adult patients, aged 20-55 years, ASA physical status I and II were scheduled for APR and involved in this study.

Exclusion criteria from this study include: Patients with ASA physical status > II, patients receiving analgesics, allergy to local anesthetics, refusal of the patient, Patients who receive enzyme inducers (carbamazepine, phenytoin, barbiturates, rifampicin) or have a history of alcohol abuse, history of liver or renal diseases, history of bleeding tendency, neuropathies, diabetes mellitus, hypertension, pregnant and lactating women, infection at the site of infection and immune compromised patients.

A clear approval was taken from all the patients who were divided randomly into two equal groups. Non-invasive blood pressure, oxygen saturation and lead II electrocardiogram were monitored. After receiving an intravenous infusion of 10 ml/kg normal saline, spinal anesthesia was done using gauge 25 spinal needle at L3-L4 interspace and administration of 2.5 ml bupivacaine 0.5%. Immediately before starting the surgical procedure (APR), patients were divided randomly into three equal groups. In control group (C), 50 ml of normal saline had been infused intravenously over 15 minutes. In group (P), an intravenous infusion of 1 g paracetamol had been given over 15 minutes. In group (N), an intravenous infusion of 20 mg nefopam in 50 ml normal saline had been given over 15 minutes. POP was assessed by using the visual analogue score (VAS) which is measured every 3 hours during the first 24 hours postoperatively. I.V. administration of 50 mg tramadol was given as a rescue analgesic agent. Time of first rescue analgesic and the total analgesic dose/24 hours were recorded.

**Statistical Analysis**

Statistic with the SPSS program, version 24. The qualitative data had been analysed by using of Chi - square. The quantitative data had been analysed by using student’s paired t-test was used. VAS were analysed by the Friedman test.

**Results**

Demographic parameters (age and body weight) showed that there was no obvious significant difference in N and P groups in comparison with control group. Regarding the duration of surgery, there was a significant difference in group C which is clinically of no applicable importance (79.13 ± 20.58 in control group in comparison with 109.13 ± 36.33 in nefopam group and 97.25 ± 30.60 in paracetamol group) (table 1).

**Table 1: Age, body weight and duration of surgery**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group (C)</th>
<th>Group (N)</th>
<th>Group (P)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>36.25 ± 9.80</td>
<td>33.05 ± 11.01</td>
<td>34.90 ± 9.77</td>
<td>0.348</td>
</tr>
<tr>
<td>Body weight</td>
<td>75.52 ± 8.80</td>
<td>72.90 ± 7.72</td>
<td>76.44 ± 6.76</td>
<td>0.411</td>
</tr>
<tr>
<td>Duration of surgery (minutes)</td>
<td>79.13 ± 20.58</td>
<td>109.13 ± 36.33</td>
<td>97.25 ± 30.60</td>
<td>p&lt;0.001</td>
</tr>
</tbody>
</table>

There was no significant difference between all groups regarding the mean changes in heart rate and mean blood pressure during 0,15,30,, 90,120 and 180 minutes following spinal anesthesia (table 2).

**Table 2: Heart rate and mean arterial blood pressure in C, P and N groups during 0, 15, 30, 90, 120 and 180 minutes following spinal anesthesia (C = control group, P = Paracetamol group, N = Nefopam group)**

<table>
<thead>
<tr>
<th>Group</th>
<th>0</th>
<th>15</th>
<th>30</th>
<th>60</th>
<th>90</th>
<th>120</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HR</td>
<td>HR</td>
<td>HR</td>
<td>HR</td>
<td>HR</td>
<td>HR</td>
<td>HR</td>
</tr>
<tr>
<td></td>
<td>MBP</td>
<td>MBP</td>
<td>MBP</td>
<td>MBP</td>
<td>MBP</td>
<td>MBP</td>
<td>MBP</td>
</tr>
<tr>
<td>C</td>
<td>93 ± 12</td>
<td>76 ± 9</td>
<td>87 ± 9</td>
<td>63 ± 11</td>
<td>92 ± 12</td>
<td>71 ± 1</td>
<td>91 ± 12</td>
</tr>
<tr>
<td>N</td>
<td>86 ± 14</td>
<td>72 ± 7</td>
<td>89 ± 11</td>
<td>61 ± 7</td>
<td>87 ± 10</td>
<td>75 ± 5</td>
<td>83 ± 9</td>
</tr>
<tr>
<td>P</td>
<td>88 ± 11</td>
<td>74 ± 5</td>
<td>86 ± 9</td>
<td>65 ± 5</td>
<td>89 ± 6</td>
<td>73 ± 5</td>
<td>88 ± 5</td>
</tr>
<tr>
<td>P. value</td>
<td>0.425</td>
<td>0.44</td>
<td>0.321</td>
<td>0-423</td>
<td>0.40</td>
<td>0.43</td>
<td>0.396</td>
</tr>
</tbody>
</table>
Regarding the onset of pain, was much earlier in Group C. Mean of VAS was higher in group C > P and N groups. VAS revealed a significantly lower score in Group N and P, compared to group C. There was no significant difference between all groups regarding VAS at 3rd postoperative hour. The maximum mean of VAS score occur at 6th postoperative hour in control group, while it occurs at 9th postoperative hour in Paracetamol and at 12th postoperative hour Nefopam group. There was significant difference between the groups regarding VAS at 6th, 9th and 12th postoperative hours while there was no significant difference thereafter. Nefopam group has a lower VAS score than Paracetamol group (which is only significant at 9th postoperative hour) (table 3). Total dose of analgesic (tramadol in mgs in 24 hours) was very significantly lower in groups P and N than group C (N < P < C) (table 4).

Table 3: Comparison of visual analogue score (VAS) between all groups. SD: Standard deviation, Group C (control), Group P (Paracetamol), Group N (Nefopam). +++ p<0.001 -highly significant, ++ p<0.01 -very significant, + p<0.05 (0.02- 0.05)-significant, (NS) p>0.05-not significant

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>Group 3 (mean ± SD)</th>
<th>Group 6</th>
<th>Group 9</th>
<th>Group 12</th>
<th>Group 15</th>
<th>Group 18</th>
<th>Group 21</th>
<th>Group 24</th>
</tr>
</thead>
<tbody>
<tr>
<td>C (control)</td>
<td>1.5 ± 1</td>
<td>4.4 ± 1.3</td>
<td>3.9 ± 1.3</td>
<td>2.8 ± 0.9</td>
<td>2.4 ± 0.6</td>
<td>2.1 ± 0.3</td>
<td>2.3 ± 0.6</td>
<td>1.8 ± 0.8</td>
</tr>
<tr>
<td>P (Paracetamol)</td>
<td>1.3 ± 0.8</td>
<td>2.4 ± 1.1</td>
<td>3 ± 0.9</td>
<td>2.2 ± 0.5</td>
<td>2.1 ± 0.5</td>
<td>1.8 ± 0.5</td>
<td>2.1 ± 0.4</td>
<td>1.7 ± 0.4</td>
</tr>
<tr>
<td>N (Nefopam)</td>
<td>1.2 ± 0.9</td>
<td>2.2 ± 0.9</td>
<td>2.4 ± 0.5</td>
<td>2.9 ± 0.7</td>
<td>2.7 ± 0.6</td>
<td>2.4 ± 0.2</td>
<td>2.0 ± 0.2</td>
<td>1.6 ± 0.3</td>
</tr>
</tbody>
</table>

P value: NS, ++++ p<0.001, ++ p<0.01, + p<0.05, (NS) p>0.05

Table 4: Total dose of analgesic (tramadol) in milligram/24 hours postoperatively in control (group C), Paracetamol (group P) and Nefopam (group N) groups

<table>
<thead>
<tr>
<th>Total dose of analgesic (tramadol) in mgs in 24 hours.</th>
<th>Group C</th>
<th>Group P</th>
<th>Group N</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>88.55 ± 15.25</td>
<td>39.45 ± 12.88</td>
<td>30.22 ± 10.0</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Adequate postoperative analgesia is very important for the accurate care of the patients and considered as an essential human right. This study is focused on the impact of the administration of an intravenous infusion of Paracetamol and Nefopam on the outcome of pain control after APR surgeries. There was significant difference between these groups regarding VAS at 6th, 9th and 12th postoperative hours with prolonged duration of postoperative analgesia and reduced total analgesic dose in Paracetamol and Nefopam groups than control group. Paracetamol is widely used for controlling moderate postoperative pain. It has an anti - prostaglandins (PGs) effect with some cyclooxygenase inhibitory effects. Nefopam produces its analgesic effect through a non-opioid centrally acting mechanism. This study is in agreement with the study of S. Zhang and his colleagues which revealed that Nefopam can provide a safer analgesic effect than tramadol and can reduce the total consuming dose of postoperative tramadol. V. Martinez and his colleagues concluded that nefopam was superior to most analgesics used alone in terms of reducing morphine consumption with patient control analgesia which is run in parallel with the result of the current study. Regarding the effect of preemptive administration of i.v. paracetamol, A. W. H. Barazanchi and his colleagues found that Preoperative use of paracetamol is recommended for providing postoperative analgesia.

Conclusion

Preemptive i.v. paracetamol and nefopam is a good plan to provide an effective postoperative analgesia following spinal anesthesia in patients undergoing vaginal APR.

Conflict of Interest: The author declare that there is no conflicts of interest.

Source of Funding: Self

Ethical Clearance: Taken from the scientific committee of the Iraqi Ministry of health.
REFERENCES


Impact of Thyroid Dysfunction on Control of Diabetes Mellitus

Zahraa Abdulaali Al-Mudhafar¹, Israa Nihad Ahmed², Mohammed Sami Turki², Safaa Ali Khudhair³

¹Department of Physiology, Faculty of Medicine, University of Kufa, Iraq; ²Najaf Health Directorate, Ministry of Health, Iraq; ³Department of Medicine, Faculty of Medicine, University of Kufa, Iraq

ABSTRACT

Background: Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. There are two broad categories of DM, designated type 1 and type 2. Thyroid hormones affect glucose metabolism via several mechanisms. Thyroid disorders and DM are the two most common endocrine diseases reported in clinical practice and each can influence the other. During hyperthyroidism, the half-life of insulin is reduced together with increase hepatic glucose production and increase in glucose gut absorption. In hypothyroidism, reduced glucose absorption from gastrointestinal tract is accompanied by diminished hepatic glucose Production.

Aim of the Study: To assess effect of thyroid dysfunction on control of diabetes mellitus.

Patient and Method: This is a cross sectional study enrolled 60 patients with diabetes mellitus and thyroid disorder; 16 male (26.7%) and 44 female (73.3%) with a mean age of 47.2 ± 13.6. The patients were collected from center of diabetes and endocrine disease in Al-Najaf and Al-Manathera center during the period from April (2018) to December (2018). The effect of thyroid dysfunction on glycemic control has been evaluated using HbA1c as marker of control.

Results: There was a significant relationship between HbA1c and thyroid status in both hyperthyroid and hypothyroid patients. No significant difference was observed in the distribution of thyroid disorder between the two types of DM and among different age groups, but significant difference was reported between female and male diabetic patients.

Conclusion: Thyroid dysfunction in form of hyperthyroidism and hypothyroidism associated with poor glycemic control in diabetic patients.

Keywords: DM – Hypothyroidism – Hyperthyroidism.

Introduction

Diabetes mellitus is a clinical syndrome characterized by hyperglycemia due to absolute or relative insulin deficiency. The chronic hyperglycemia of diabetes is associated with long-term complications of various organs, particularly the eyes, kidneys, nerves, and blood vessels. Several distinct types of DM result from a complex interaction of genetics and environmental factors(1).

Diabetes can be classified into the following general categories(2):

1. Type 1 diabetes (due to absolute insulin deficiency)
2. Type 2 diabetes (due to a progressive β-cell secretory defect on the background of insulin resistance)
3. Gestational diabetes mellitus (GDM)
4. Specific types of diabetes like, such as neonatal diabetes and maturity-onset diabetes of the young (MODY).

The latest estimates show a global prevalence of 382 million people with diabetes in 2013, and expected to rise to 592 million by 2035. Type 2 diabetes accounting for the majority (>85%) of total diabetes prevalence(3).
Hypothyroidism is one of the common endocrine diseases caused by deficiency of thyroid hormone. It usually results from primary thyroid disorder with inadequate thyroid hormone production. Subclinical hypothyroidism occurs in the clinical setting of high serum TSH level and normal serum FT4 concentration. With the exception of iodine deficit areas, Hashimoto’s thyroiditis is the most common cause of hypothyroidism. The prevalence of hypothyroidism in the developed world is about 4-5%. The prevalence of subclinical hypothyroidism in the developed world is about 4-15%. Clinical features of hypothyroidism range from asymptomatic patient to life-threatening condition. The most common symptoms are decrease alertness, fatigue, cold intolerance, obesity, menorrhagia, and hoarseness of voice, but clinical presentation varies with age and sex.

The term thyrotoxicosis and hyperthyroidism are used interchangeably and refer to state of excess thyroid hormone activity. Hyperthyroidism has a prevalence of 1% to 2% in women and 0.1% to 0.2% in men. Graves’ disease is the most common cause of thyrotoxicosis, followed by toxic multinodular goiter (TMNG) and toxic adenoma (TA). Other causes are thyroiditis, and gestational hyperthyroidism. Drug-induced thyrotoxicosis has been associated with amiodarone and iodinated contrast. Graves’ disease is an autoimmune disease characterized by formation of antibodies that stimulate TSH receptors to cause excess secretion of thyroid hormones. This results in hyperplasia of thyroid follicular cells, and goiter. The cause of Graves’ disease is not known, but genetic and environmental factors may play role, such as smoking, stress, and dietary iodine.

The prevalence of thyroid disease in diabetic patients was reported to be 13.4% with higher prevalence (31.4%) in female. Type 2 diabetic patients as compared to (6.9%) in male patients. The prevalence of thyroid disorder in T2DM patients was reported to be 16% in Saudi Arabia. Diabetes mellitus and Thyroid disorders are the two most common endocrine diseases reported in clinical practice. Diabetes and thyroid diseases have been shown to influence each other.

Thyroid stimulating hormone (TSH) level is inversely related to the insulin resistance and function of β cell, this relation can be explained by counter-regulatory effect of thyroid hormones on insulin action. These observations reveal that glucose intolerance is tightly associated with thyroid dysfunction.

This study aims to assess the effects of the thyroid dysfunction on glycemic control in diabetic patients.

**Patients and Method**

This is a cross-sectional study enrolled 60 patients with diabetes mellitus and thyroid disorder; 16 male (26.7%) and 44 female (73.3%) with a mean age of 47.2 ± 13.6.

The patients were collected from the center of diabetes and endocrine disease in Al-Najaf and Al-Manathera center of diabetes during the period from April to December (2018).

**Inclusion Criteria:**

1. T1DM or T2DM
2. Previous or current diagnosis of thyroid disorder

**Exclusion Criteria**

1. History of thyroid surgery
2. Pregnancy.

The patients were exposed to the questionnaire about the onset of diabetes mellitus, duration of the diabetes mellitus, type of treatment, the history of the thyroid disorder and type of treatment. Patients were informed about the study and verbal consent was obtained.

All patients were evaluated for glycemic control by HbA1c and for thyroid status by TSH. Venous blood samples were drawn from all patients enrolled in the study. HbA1c assay, was tested using NycoCard® READER II instruction manual, (NycoCard® HbA1c). The TSH assay, was tested using a mini VIDAS assay, company name is (BIOMETRIEUX).

**Statistical Analysis**

SPSS® Software (version 23.0 for Linux®) was used to perform statistical analysis. Qualitative data are presented as numbers and percentages, while continuous numerical data are presented as mean ± standard deviation. Comparison of study groups was carried out using chi-square test for categorical data, and using Student’s t-test for continuous data. Correlations were assessed using Pearson’s product-moment correlation coefficient. P value of < 0.05 was considered statistically significant.
Results

The demographic data of the study population are illustrated in table 1.

There was no significant difference in the prevalence of thyroid disorder between type 1 and type 2 DM as shown in table 2.

There was significant effect of thyroid dysfunction on glycemic control. Hyperthyroid patients had the worst control among the enrolled patients in this study. Table 3 and figure 1.

Table 1: Demographic data of the study population

<table>
<thead>
<tr>
<th>Parameters</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16</td>
<td>26.7</td>
</tr>
<tr>
<td>Female</td>
<td>44</td>
<td>73.3</td>
</tr>
<tr>
<td>Age</td>
<td>47.2 ± 13.6</td>
<td></td>
</tr>
<tr>
<td>Type of DM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 1</td>
<td>20</td>
<td>33.3</td>
</tr>
<tr>
<td>Type 2</td>
<td>40</td>
<td>66.7</td>
</tr>
<tr>
<td>Initial thyroid Disorder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypothyroid</td>
<td>30</td>
<td>50.0</td>
</tr>
<tr>
<td>Hyperthyroid</td>
<td>30</td>
<td>50.0</td>
</tr>
</tbody>
</table>

Table 2: The relation between types of DM and thyroid dysfunction.

<table>
<thead>
<tr>
<th>Type of DM</th>
<th>Hypothyroid</th>
<th>Hyperthyroid</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>8 (26.7%)</td>
<td>12 (40.0%)</td>
<td>0.273</td>
</tr>
<tr>
<td>Type 2</td>
<td>22 (73.3%)</td>
<td>18 (60.0%)</td>
<td></td>
</tr>
</tbody>
</table>

Chi-square = 1.20, d.f. = 1, P-value = 0.273

Table 3: Thyroid status and glycemic control among diabetic patients

<table>
<thead>
<tr>
<th>Thyroid Status (TSH)</th>
<th>No.</th>
<th>(mean ± SD)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperthyroid (&lt;0.2)</td>
<td>13</td>
<td>10.36 ± 2.28</td>
<td></td>
</tr>
<tr>
<td>Euthyroid (0.2 – 4.5)</td>
<td>31</td>
<td>7.67 ± 1.58</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Hypothyroid (&gt;4.5)</td>
<td>16</td>
<td>9.38 ± 2.16</td>
<td></td>
</tr>
</tbody>
</table>

ANOVA F = 9.76, P-value < 0.001

Figure 1: Scatterplot diagram showing the relationship between thyroid function test and HbA1c.
In this study there was no significant relation between age of diabetic patients and thyroid dysfunction, however significant relation was observed between the gender and thyroid dysfunction. Table 4, 5.

Table 4: Comparison between age of diabetic patients and thyroid disorder

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>Thyroid Disease</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hypothyroid (n = 30)</td>
<td>Hyperthyroid (n = 30)</td>
</tr>
<tr>
<td>20 – 45</td>
<td>12 (40.0%)</td>
<td>13 (43.3%)</td>
</tr>
<tr>
<td>46 – 65</td>
<td>18 (60.0%)</td>
<td>17 (56.7%)</td>
</tr>
</tbody>
</table>

Chi-square = 0.07, d.f. = 1, P-value = 0.800

Table 5: Comparison between gender diabetic patients and thyroid disorder

<table>
<thead>
<tr>
<th>Gender</th>
<th>Thyroid Disorder</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hypothyroid (n = 30)</td>
<td>Hyperthyroid (n = 30)</td>
</tr>
<tr>
<td>Male</td>
<td>12 (40.0%)</td>
<td>4 (13.3%)</td>
</tr>
<tr>
<td>Female</td>
<td>18 (60.0%)</td>
<td>26 (86.7%)</td>
</tr>
<tr>
<td>Total</td>
<td>30 (100%)</td>
<td>30 (100%)</td>
</tr>
</tbody>
</table>

Chi-square = 5.45, d.f. = 1, P-value = 0.020

Discussion

The present study revealed that poor control diabetes mellitus is more common among patients with thyroid dysfunction than in age matched patients with diabetes mellitus and euthyroid. These results highlighted the need for further investigations for thyroid dysfunction among patients with poor diabetic control.

A cross sectional study done by Maxon et al (2011) in the USA revealed increased hyperglycemia in patients with Hyperthyroidism\(^{(15)}\).

Hyperthyroidism has long been associated with hyperglycemia, and different mechanisms are suggested including, reduced half-life of insulin due to increased insulin clearance rate, an enhanced release of biologically inactive insulin precursors, and increase glucose absorption from the gut\(^{(16)}\). Moreover hyperglycemia, in hyperthyroidism, is aggravated by elevated hepatic glucose production and increased glycogenolysis\(^{(17)}\). These effects are responsible for worsening of subclinical DM and exaggeration of hyperglycemia in T2DM\(^{(18)}\).

Evidence supporting glucose impairment in patients with hypothyroidism. Jiang et al. (2011) who studied a total of 1534 Chines adult, and found a higher TSH level in patients with metabolic syndrome compared to those in the non-metabolic syndrome group, and concluded that subclinical hypothyroidism may be a potential risk factor for metabolic syndrome\(^{(19)}\).

Bhattacharjee R et al (2017) in India, found baseline HbA1c levels were significantly higher in hypothyroid patients compared to control individuals despite similar glucose levels\(^{(20)}\).

In hypothyroidism, reduced glucose absorption from gastrointestinal tract accompanied by diminished hepatic glucose production; in addition to reduced renal clearance of insulin, leads to diminished insulin requirements\(^{(21)}\).

Lastly recurrent hypoglycemic episodes are reported in patients with hypothyroidism and T1DM, and replacement with thyroid hormones reduced the fluctuations in blood glucose levels\(^{(22)}\).

Conclusion

Thyroid dysfunction in form of hyperthyroidism and hypothyroidism associated with poor glycemic control in diabetic patients.

Conflicts of Interest: None of the authors have any conflicts of interest relevant to this research subject.

Ethical Clearance: The study was conducted in accordance with ethical principles that have their origin in the Declaration of Helsinki. The study protocol, care of animals and subject information were reviewed and approved by a local Ethics Committee.

Source of Funding: University funding was provided for: data collection, analysis, and interpretation; trial design; patient recruitment. No public funding was received.

REFERENCES


Study the Effect of Cladosporium Spp. on Some Internal Organs of Experimental Animals

Zainab R. Zghair
Zoonosis Unit, College of Veterinary Medicine, University of Baghdad, Baghdad, Iraq

ABSTRACT

This study was designed as Twenty four Balb C mice were used 6 weeks in age and both sexes weight from 25 grams were randomly divided into three groups each one contain 8 animals and suspension (2x10^6) cfu/ intraperitoneal 0.3 cc were obtained first group as F1 group infected with *cladosporium* for two weeks, second group as F2 group infected for three weeks and third group as control group injected with PBS 0.3 cc. Results of liver function were ALT, and Bilirubin F2 group had significantly increase (P<0.01) for tests ALT and bilirubin (83.55 ± 6.49), (5.75 ± 0.59) respectively when compared with control group; while F1 group had non-significantly increase (P<0.01). Histopathological showed lesions in group (F2) more severe than (F1) group specially in liver which appeared necrosis of hepatocytes and karyohexis of nucleus and granulomatous aggregation of inflammatory cells like macrophage and lymphocytes around bile ducts with aggregation of inflammatory cells as clusters between necrotic tissue, kidney revealed degeneration of some epithelial cells of renal tubules, lung showed infiltration of inflammatory cells like macrophage and vacuolation the cytoplasm of alveolar endothelial cells, and showed necrosis and infiltration of inflammatory cells like macrophage in large numbers in spleen.

**Keywords:** *Cladosporium* spp., histopathology, and liver functions.

Introduction

Fungi of the genus *Cladosporium* are common in many areas of the world, they are cosmopolitan organisms. Their spores can be found in air, soil and water. Also, they are commonly isolated from accommodation and public use areas and from food products¹. *Cladosporium* species are ubiquitous, saprobic, dematiaceous fungi, only infrequently associated with human and animal opportunistic infections². Some species are pathogens of various plants, causing economically important plant diseases and others have only endemic importance. Commonly they occuras saprotrophs¹. Allergic reactions in humans can caused by *Cladosporium* spp., that sometimes leads to asthma mainly in people with compromised immune systems such as patients with AIDS or hematological diseases ³.

Materials and Method

**Preparation of cladosporium:** Cladosporium was obtained from Zoonosis Unit/College of Veterinary Medicine/University of Baghdad.

**Experimental Study:** Twenty four Balb C mice were used in this study 6 weeks in age and both sexes weight from 25 grams were randomly divided into three groups each one contain 8 animals and suspension (2x10^6) cfu/ intraperitoneal 0.3 cc was prepared as the method in⁴ as the following:

a. First group as F1 group infected with *cladosporium* for two weeks.

b. Second group as F2 group infected with *cladosporium* for three weeks.

c. Third group as control group injected with PBS 0.3 cc

**Measurement of Liver Function:** After scarified of all groups and obtained blood from animals, serum separation and ALT, Bilirubin were measured.

**Histopathology:** All animals killed after the end of experiment and the internal organs were taken for histopathological examination using 10% formalin as a fixative, and then processed routinely as⁵.
Statistical Analysis: The Statistical Analysis System program was used to detect the effect of difference groups in study parameters. Least Significant Difference-LSD in this study.

Results

1. Measurement of Liver Function: Groups that infected with *Cladosporium* revealed when measured of liver function like ALT, and Bilirubin of F2 group had significantly increase (P<0.01) for tests ALT and bilirubin (83.55 ± 6.49), (5.75 ± 0.59) respectively when compared with control group; while F1 group had non-significantly increase (P>0.01) when compared with control group, just mild increase as in (table 1).

![Fig. 1: Histopathological changes in kidney of infected animal with *cladosporium* for two weeks (F1) shows degeneration of epithelial cells of renal tubules (red raw) (H&E stain, X400)](image)

**Table 1: Shows Compare between difference groups in ALT, and Bilirubin of *Cladosporium* SPP.**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean ± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>G2 (F1): 8 Animal</td>
<td>ALT: 44.98 ± 1.06 b, Bilirubin: 1.757 ± 0.12 b</td>
</tr>
<tr>
<td>G1 (F2): 8 Animal</td>
<td>ALT: 83.55 ± 6.49 a, Bilirubin: 5.75 ± 0.59 a</td>
</tr>
<tr>
<td>G3 (Control): 8 Animal</td>
<td>ALT: 44.42 ± 0.97 b, Bilirubin: 1.108 ± 0.08 b</td>
</tr>
<tr>
<td>LSD value</td>
<td>11.295 **, 1.043 **</td>
</tr>
<tr>
<td>P-value</td>
<td>0.0001, 0.0001</td>
</tr>
</tbody>
</table>

Means having with the different letters in same column differed significantly

2. **Histopathology:** Histopathological lesions of infected animal with *cladosporium* for two weeks (F1) showed degeneration of epithelial cells of renal tubules in kidney(Fig1), Fig:2 showed infiltration of inflammatory cells in liver around and inside the blood vessels with necrosis of hepatocytes, lung in other sections revealed hyperplasia of alveolar septa and infiltration of macrophage; while in spleen showed necrosis and infiltration of some inflammatory cells.

The pathological changes of group (F2) that animals infected with *cladosporium* for three weeks showed more sever lesions specially in liver which appeared in some sections necrosis of hepatocytes and karyohexis of nucleus, and granulomatous aggregation of inflammatory cells like macrophage and lymphocytes around bile ducts(Fig3), while in other sections showed infiltration and aggregation of inflammatory cells as clusters between necrotic tissue, kidney revealed degeneration of some epithelial cells of renal tubules as in(Fig4), lung showed infiltration of inflammatory cells like macrophage and vacuolation the cytoplasm of alveolar endothelial cells (Fig5), and finally spleen showed necrosis and infiltration of inflammatory cells like macrophage in large numbers.

![Fig. 2: Histopathological changes in liver of infected animal with *cladosporium* for two weeks(F1) shows infiltration of inflammatory cells around and inside the blood vessels (red raw) and necrosis of hepatocytes (blue raw) (H&E stain, X400)](image)

![Fig. 3: Histopathological changes in liver of infected animal with *cladosporium* for three weeks (F2) shows granulomatous aggregation of inflammatory cells like macrophage and lymphocytes around bile ducts (blue raw) (H&E stain, X400)](image)
Fig. 4: Histopathological changes in kidney of infected animal with Cladosporium for three weeks (F2) shows degeneration of some epithelial cells of renal tubules (blue raw) (H&E stain, X400)

Fig. 5: Histopathological changes in lung of infected animal with Cladosporium for three weeks (F2) shows infiltration of inflammatory cells like macrophage (red raw) and vaculization the cytoplasm of alveolar endothelial cells (blue raw) (H&E stain, X400)

Discussion

Groups that infected with Cladosporium revealed when measured of liver function like ALT, and Bilirubin F2 group had significantly increase (P<0.01) for tests ALT and bilirubin (83.55 ± 6.49), (5.75 ± 0.59) respectively when compared with control group; while F1 group had non-significantly increase (P<0.01) when compared with control group, just mild increase as in (table 1). Infection with the mold Cladosporium effected on liver function due to duration of infection were increased and the mold need three weeks for growth 7. Molds can easily be cultured and their spores can be obtained very rapidly in high purity. More importantly, mold spores are complex particles composed of numerous proteins4.

Histopathological (F1) group showed degeneration of epithelial cells of renal tubules in kidney, infiltration of inflammatory cells in liver around and inside the blood vessels with necrosis of hepatocytes, lung revealed hyperplasia of alveolar septa and infiltration of macrophage and the spleen showed necrosis and infiltration of some inflammatory cells. The changes were observed in a dog with Cladosporium infection in the kidney, liver, cerebellum, and spleen 8.

The pathological changes of group (F2) revealed more severe lesions specially in liver which appeared necrosis of hepatocytes and karyohexis of nucleus and granulomatous aggregation of inflammatory cells like macrophage and lymphocytes around bile ducts, while infiltration and aggregation of inflammatory cells as clusters between necrotic tissue. The occurrence of granuloma in the chronic infections of bacterial and fungal diseases, and F2 group after three weeks of Cladosporium infection showed that, so the macrophages with the pool of lymphocytes. Degeneration of some epithelial cells of renal tubules as in kidney, lung showed infiltration of inflammatory cells like macrophage and vaculization the cytoplasm of alveolar endothelial cells and showed necrosis and infiltration of inflammatory cells like macrophage in large numbers in spleen. So the pathogenicity of Cladosporium were not involve the liver, but other important organs like lung,kidney and spleen, Exposure of mice intraperitoneal (ip) to Cladosporium spores developed allergic lung inflammation and hyper-reactivity. The hyperreactivity appeared within 3 weeks and continued 9. This mold need to comprehensive study due to the lack of sources about the experimental infections of this fungus.

Conclusion

Study revealed that infection with Cladosporium that the damage of internal organs especially liver increased in three weeks of infection more than two weeks, also F2 group (three weeks infection with Cladosporium) had significantly increase (P<0.01) for tests ALT and bilirubin.

Ethical Clearance: Taken from Zoonosis unit committee

Source of Funding: Self

Conflict of Interest: Nil.
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9. Denis O. van den Brûle S, Heymans J, Havaux X, Rochard C, Huaux F, and Huygen K. Chronic intranasal administration of mould spores or extracts to unsensitized mice leads to lung allergic inflammation, hyper-reactivity and remodelling. Immunology. 2007; 122, 268-278.
The Effect of Addition of White Portland Cement on the Physical Properties of MTA Fillapex

Rehab Ali Farag¹, Maged M. Negm², Magdy M. Ali³, Lamia I. Ahmed⁴
¹Assistant lecturer, Faculty of Oral and Dental Medicine, MUST University; ²Professor of Endodontics, Faculty of Oral and Dental Medicine, Cairo University; ³Professor and head of department of Endodontics, Faculty of Dentistry, Minia University; ⁴Associate professor of Endodontics, Faculty of Dentistry, Fayoum University

ABSTRACT

Aim: To evaluate the effect of adding white Portland cement, in the ratio of 25% by weight, on the physical properties of MTA Fillapex.

Methodology: White Portland cement (WPC) powder was incorporated into the paste of mixed MTA Fillapex in the ratio of 25% by weight. Different properties including powder-paste ratio, strength properties, setting time, film thickness, water solubility, and push out bond strength were studied in comparison to MTA Fillapex.

Results: The experimental material showed higher setting time, higher film thickness, higher solubility, higher diametral tensile strength, and higher compressive strength, though the last one was not statistically significant. On the other hand, the push out bond strength of the experimental material was significantly lower.

Conclusions: Addition of Portland cement to MTA Fillapex increases its setting time, film thickness, solubility, diametral tensile strength and compressive strength. However, its push-out bond strength decreased.

Keywords: MTA Fillapex, Strength properties, Portland cement, Push-out bond strength.

Introduction

An ideal endodontic sealer should flow along the entire canal all surfaces, fill all voids and gaps between the core root filling material and dentin and adhere to both dentin and gutta-percha. Mineral trioxide aggregate (MTA) was introduced by Torabinejad in 1993. MTA is a derivative of Portland cement. It consists of 50-75% by weight calcium oxide and 15-25 silicone oxide. These two components together comprise 70-90% of the cement. When they blended together they produce tricalcium silicate, dicalcium silicate, trialuminate and tetracalcium aluminoferrite.

A new calcium silicate –based sealer (MTA Fillapex) has been recently proposed as an endodontic filling material. The MTA Fillapex is a sealer that is composed of MTA, salicylate resin, natural resin, bismuth oxide and silica. Any trial to interfere with the composition of MTA Fillapex in order to improve some of its properties, if possible, would be a logical step.

Materials and Method

Setting Time Test: The time from the onset of mixing to the sealer setting was taken as the setting time. Five measurements were made for each sealer.

Flow Evaluation: The minimum and maximum diameters of the sealer disc were measured by a digital caliper.

Film Thickness: The thickness of the two glass plates and the sealer was measured with a digital caliper.

The Solubility Test: The percentage of weight loss of each sample was considered the solubility of the sealer.

Compressive Strength: Six specimens were made by split Teflon molds. their dimensions were confirmed using a digital caliper.

Diametral Tensile Strength: Five samples were prepared by the split metallic molds.
**Push Out Test:** Twenty single-rooted human teeth. Each root was horizontally sectioned by using a low-speed saw with a diamond disk under continuous water irrigation. The root filling of each sample was loaded with plunger. Loading was performed on the universal testing machine.

**Discussion**

The endodontic sealer properties include good sealing, visible radiopacity, easy handling, good resistance, dimensional stability, and low solubility (1). MTA has established properties and indications for use in several endodontic procedures (2). In the present study the push-out test method was used to test the dentine bond strengths of the sealers. This method has been shown to be effective (3). Also it allows root canal sealers to be evaluated even when bond strengths are low (4). We have prepared 1-mm-thick sections from each root has been found reliable in push-out bond strength measurements (5). Despite the flow ability shown by MTA Fillapex, this sealer does not seem to display bond strength to root dentin (6). The reason could be the low adhesion capacity of these tag-like structures corroborated by the study made by Sagsen et al (7). However, acceptable push-out bond strength values for MTA Fillapex, similar samples filled with AH Plus sealer (8).

Samples filled with MTA Fillapex and Portland cement showed lower push out strength, these values are related to the degree of residual moisture on dentin surface for both materials (9). The Portland product powder consists of fine hydrophilic particles that set in the presence of water (10), with moisture from the surrounding tissues purportedly assisting the setting reaction (11). The setting process is said to be responsible for the development of material strength (12).

The setting time is the period of time measured between the start of mixing until it is no longer possible to handle the sealer without promoting adverse effects on its properties (13). This time is directly linked with the setting time. Both times are dependent on the constituent components, their particle size, the ambient temperature, and relative humidity (14). The setting reactions are complex, and even though the sealer surface becomes hard, the inner mass may remain soft for an extended period (15). Because of the extended setting time is advantageous to the root canal sealers, different studies showed the possibility to modify the composition of MTA-based materials in order to delay the setting time (16). The initial setting time of MTA Fillapex with Portland cement obtained in this study was in agreement with previous studies (17).

The solubility of a specific material is the loss of mass during a period of immersion in water (18). The solubility testing in the current study was devised according to the methodologies reported previously (19). This methodology is based on the measurement of the mass loss of the specimen before and after immersing the sample in distilled water for 7 days. Which are significant for Portland or MTA Fillapex as these materials have high water uptake ability (20), which can play a significant role in the results (21).

Materials with higher solubility may release irritants and increase the risk of leakage and bacterial colonization (22). These results are in agreement with Borges et al (23), who attributed the high solubility of this experimented material to the complex setting reaction of this material, resulting in a fragile matrix (24). Also, MTA Fillapex has MTA in the composition, which is less soluble than Portland cement (25) and bismuth trioxide that could had exert a negative effect as other studies affirmed that it can lower the molecular stability of MTA-based materials (26). MTA Fillapex should be resistant to solubility and disintegration in an aqueous environment (27). MTA Fillapex was less soluble than the experimental material, which is consistent with previous findings (28). This difference between experimental MTA Fillapex with Portland cement and other cements may be related to its chemical composition, which shows different structures after setting (29).

In the development of Portland-derived cements, it should be considered that the differences in particle uniformity and reduction of gypsum content cause a delayed reduction of cement solubility, and also lengthening of setting and structure weakening (30).

Film thickness and dimensional stability are affected by flow which determines the ability of sealers for filling the irregularities, while the viscosity determines the flow characteristics (31). A root canal sealer should have a flow rate of not less than 20 mm (32). MTA Fillapex had flowability higher than 20 mm and a film thickness
lower than 50 µm. MTA Fillapex was significantly more flowable than MTA Fillapex with Portland cement. Other investigators stated similar flow, film thickness and inferior compressive strength of MTA Fillapex when compared to AH Plus sealers. Flow of MTA Fillapex was higher than MTA Fillapex with Portland cement. Film thickness of MTA Fillapex with Portland cement is higher than MTA Fillapex with significant difference. The flowability test results revealed that the addition of Portland cement provides a reduction in flowability of the MTAF. This can be explained by an increase in the powder/liquid ratio also promoted, in accordance with that observed in a previous study.

Endodontic sealers typically exhibit pseudo-plastic properties. However, Portland cement, and hence MTA Fillapex cement in general, typically exhibit shear thickening behaviour unless substantial admixtures are present. MTA Fillapex cement without such additives will not reliably flow into these limited access areas when increased pressure is applied. So addition of MTA Fillapex to Portland cement will decrease flow rate, and hence so it will increase film thickness.

MTA Fillapex had the lowest mechanical resistance in all periods of analysis and it can be related to the composition of this material which is not only composed of MTA. This may be explained by the lack of hydration of Portland compound in the MTA Fillapex as a resinous vehicle was used to mix this sealer instead of water. There for there was no significant difference between the compressive strength in both sealers MTA Fillapex and MTA Fillapex mixed with Portland cement.

Diametral tensile strength (DTS) is a mechanical property that must be assessed because several cements are extremely friable and have a susceptibility to mechanical failure. This test is widely used due to its relative simplicity and reproducible results. Calcium silicate diminishes the plastic deformation of MTA Fillapex causing an increase in the final resistance since this filler can fill any pores in the matrix. The presence of calcium silicate was also proven interesting because it provides radiopacity without affecting biocompatibility.

In the present study, the MTA-based sealer” MTA Fillapex” had the lowest bond strength to root dentin. Sarkar et al in 2005 suggested that the release of calcium and hydroxyl ions from the set sealer will result in the formation of apatite as the material comes into contact with phosphate-containing fluids. The reason for the low bond strength of MTA Fillapex in the present study could be the low adhesion capacity of these tag-like structures, corroborated by the study made by Sagsen et al. Although previous studies have already shown that MTA Fillapex had weak bond strength with the dentin wall, this fact is not normally expected from MTA alone, but in the presence of the other ingredients this may happen. MTA Fillapex with Portland cement properties showed good adhesion to dentin walls, adequate seal and resistance to dislodgement.

MTA Fillapex with Portland cement showed higher bond strength when compared with MTA Fillapex, in all sections tested. The higher bond strength obtained with the experimental sealer may be explained by its ability to react with exposed amino groups in collagen. These cements had low bond strength to the dentin, which may have been caused by the low tensile cohesive strength.

Conflict of Interest: Nil

Source of Funding: Self funding

Ethical Clearance: Not working on patients

REFERENCES


Effectiveness of Generative Learning Strategy for Those with Cognitive Style (Risk/Caution) in the Cognitive Achievement and Motor Compatibility and Learning the Reception Skill (Pass) of The Student in Volleyball

Hatem Flayyh Hafedh¹, Amer Hussein Ali², Zaman Torki Hashim³

¹The College of Physical Education and Sports Science, University of KUFA, Iraq, Najaf; ²The College of Physical Education and Sports Sciences, University of Kerbala, Iraq, Karbala; ³The College of Education Girls, University of KUFA, Najaf, Iraq

ABSTRACT

Generative learning strategy of those with cognitive risk style vs. caution has contributed to develop the cognitive achievement lesser than the followed strategy.

The generative strategy and the followed one are deemed effective strategies in developing the research variations. Cooperative learning strategy of those with cognitive risk style vs. caution plays more great and effective role than the followed strategy in developing the compatibility and learning the skill of volleyball reception.

People with cognitive risk style who has learned under the generative learning strategy are more capable of learning skills subject to the study than the persons with caution style. There is a convergence of skill performance level between those with cognitive risk style and cognitive caution style that have acquired such skills according to the followed strategy. The best results of research groups were achieved by the experimental group which has adopted the cooperative learning strategy.

Keywords: Generative Learning, Cognition, Motor Compatibility, Healthy Practicing

Introduction

Motor Learning is one of the important sciences and the base on which educational process is based in the field of physical education. The educational unit is the basic rule of the curriculum of physical education. It helps the learner to acquire skills of sports games, develop his/her motor performance and provide him/her with educational experiences to practice various sports activities. Learning is one of the most important processes through which knowledge and information are conveyed to the player, which helps to motivate him/her and increase his/her desire to search for full knowledge. The field of learning has witnessed a great development, especially in terms of creating educational situations in a way that motivates the player’s motivation and reach the goal of the educational process [1].

Problem of the Research: Preparation of educational curriculum using the Generative Learning Strategy in the development of cognitive achievement and cognitive compatibility and Learning the Reception Skill (pass) of the Student in Volleyball. Identification of the impact of the educational curriculum using the Generative Learning Strategy of the cognitive method (risk Vs. caution) in cognitive achievement and motor compatibility and Learning the Reception Skill (pass) of the Student in Volleyball.

Methodology of the Research

The researchers used the experimental approach with a(2×2) factorial design. The field procedures of the research are summarized as follows:
Nomination of Tests: Cognitive Style Measurement (risk vs. caution) \(^2\) - cognitive achievement test

- Compatibility Test: Serving and receiving balls on the wall \(^3\)
- Skill Tests: the reception skill by arms from the bottom from different places \(^4\).
- Exploratory Experiments: The exploratory experiments were carried out for (risk vs. caution measurement - cognitive achievement measurement - skill tests - educational curriculum)

Sample Identification: It is made by (Risk vs. Caution) style

Statistical means: Statistical package for social sciences (spss).

### Results and Discussion

1. Results of comparison between the range tests of the experimental and control groups in the cognitive achievement of volleyball

#### Table 1: Arithmetic Mean and Standard Deviations of the range tests of Cognitive Achievement for those with a with Cognitive Style, risk and caution approach to the control and experimental groups

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Groups</th>
<th>Unit of Measurement</th>
<th>S</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Risker (control)</td>
<td>Degree</td>
<td>10.87</td>
<td>1.29</td>
</tr>
<tr>
<td>2.</td>
<td>Cautioner (control)</td>
<td>Degree</td>
<td>9.83</td>
<td>0.92</td>
</tr>
<tr>
<td>3.</td>
<td>Risker (experimental)</td>
<td>Degree</td>
<td>15.75</td>
<td>2.13</td>
</tr>
<tr>
<td>4.</td>
<td>Cautioner (experimental)</td>
<td>Degree</td>
<td>13.33</td>
<td>2.03</td>
</tr>
</tbody>
</table>

#### Table 2: Results of the Analysis of the Differences between the Cognitive Style (risk - caution) in experimental and control groups in the range tests of the cognitive achievement of volleyball

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Variables</th>
<th>Variation source</th>
<th>Total square</th>
<th>Free deg.</th>
<th>F- calculated value</th>
<th>Error rate</th>
<th>Error</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cognitive achievement</td>
<td>Among the groups</td>
<td>178.55</td>
<td>3</td>
<td>75.22</td>
<td>10.15</td>
<td>0.00</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inside the groups</td>
<td>133.34</td>
<td>28</td>
<td>6.12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sig. level at (0.05)

#### Table 3: The value of (TUKEY) between the variables in the range test of the cognitive achievement of the Cognitive Style (risk - caution) in experimental and control groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Groups</th>
<th>Means differences</th>
<th>Error rate</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risker–control</td>
<td>Cautioner (control)</td>
<td>1.08</td>
<td>0.82</td>
<td>Insignificant</td>
</tr>
<tr>
<td></td>
<td>Risker (control)</td>
<td>5.77*</td>
<td>0.00</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>Cautioner (experimental)</td>
<td>4.45*</td>
<td>0.00</td>
<td>Significant</td>
</tr>
<tr>
<td>Cautioner–control</td>
<td>Risker (experimental)</td>
<td>6.44</td>
<td>0.00</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>Cautioner (experimental)</td>
<td>5.10*</td>
<td>0.00</td>
<td>Significant</td>
</tr>
<tr>
<td>Risker–experimental</td>
<td>Risker (experimental)</td>
<td>0.32</td>
<td>.860</td>
<td>Insignificant</td>
</tr>
</tbody>
</table>

By conducting a comparison for the results of the range tests of cognitive achievement among those with cognitive control-style (risk - caution) in the experimental and control groups, which were presented in Table (10), which indicates that there was a significant difference between the Cognitive Style (risk - caution) in the experimental and control groups. Since it has been indicated that the significant difference was greatly in favor of the range of risk and caution in the two experimental groups. The researcher attributes the reasons for such differences of the variable subject to the research to the response of all the students to all the learning requirements within the learning units for a cooperative learning method since it is one of the most effective methods to highlight the
abilities, maintain the level and achieve the goals. Furtherly, the student participation in the work and responsibility is highly significant because the preparation, implementation and evaluation of the level give the student a hint to judge beside the organizational duties by which he is assumed. Accordingly, he/she must use the educational responsibilities and bear the responsibility to ensure learning and the teacher must follow the achievement of levels and help the students as well as the responsibilities entrusted must match, in following-up the performance, with other students.

The researchers also attribute the differences in cognitive achievement to the effectiveness of the generative learning strategy, which raises the level of cognitive achievement of students through the ability to develop and think. Moreover, the changing degree in the cognitive achievement depends on the nature of the situation in which the person obtains the information, its source, style and the degree of proficiency. In addition, the educational curriculum prepared by the researchers using the generative learning strategy, which has had a significant impact on making the process of knowledge development more effective and positive by what the strategy contains of steps that help in the development of the knowledge of the skills. This may be attributed to the fact that the researchers were keen to pay attention to the theoretical side, which has a great role in educating the students and guiding them to the most important strengths and weaknesses in learning skills that will make the student familiar with the technical stages of the skill before its application. While others believe that, although the acquisition of skills depends mainly on the method of teaching and on the team available for training on it, but it is connected with the efficiency of what is offered to the learner of information and knowledge and principles related to them[1].

Based on the aforementioned, we have found that the use of the generative learning strategy has led to an increase in the skill level of the players by retrieving the students’ knowledge and information once needed. Further, the participation in the discussion and dialogue has created an interactive learning environment that helps them to understand the concepts associated with the subject of educational unit and staying away of memorization. As a result, it leads to increased awareness and understanding; in addition, the questions asked to them have attracted their attention and focus as well as created a sense of challenge, which motivates them to get the information that helps them to answer the questions[2]. This has been reflected in the level of performance of the reception skill of volleyball. The cognitive domain is the first set of characteristics and attributes that establish and deepen knowledge, which takes the form of multiple skills and ranges that depend on thinking, in order to record, retrieve and process the information by the individual. Since the generative learning strategy depends on the collection of the ideas and calling them from previous knowledge, focusing on new knowledge, organization of what the student has learned and elaboration in the brainstorming as well as the constructive thinking, it leads to the significant differences.

2. Results and Analysis of Motor Compatibility Tests and the Efficiency of tribal and remote skills performance

Table 4: Arithmetic Mean and Standard Deviations of the range tests of tribal and remote skills of Motor Compatibility and the Efficiency of the Reception performance of those with Cognitive Style (risk vs. caution) in the control and experimental groups

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Groups</th>
<th>Risker (Experimental)</th>
<th>S</th>
<th>H</th>
<th>Cautioner (Experimental)</th>
<th>S</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Motor Compatibility</td>
<td>Tribal</td>
<td>4.22</td>
<td>2.12</td>
<td>Tribal</td>
<td>3.17</td>
<td>1.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remote</td>
<td>12.40</td>
<td>1.64</td>
<td>Remote</td>
<td>7.66</td>
<td>2.07</td>
</tr>
<tr>
<td>2.</td>
<td>Reception</td>
<td>Tribal</td>
<td>9.45</td>
<td>1.18</td>
<td>Tribal</td>
<td>7.50</td>
<td>3.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remote</td>
<td>20.16</td>
<td>2.87</td>
<td>Remote</td>
<td>15.16</td>
<td>2.65</td>
</tr>
</tbody>
</table>
Table 5: Calculated (T) value and the Error Rate for Tribal and Range Tests for Motor Compatibility and the Efficiency Reception Performance for those with Cognitive Style (risk vs. caution) in the Experimental Groups

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Skills</th>
<th>Cognitive style</th>
<th>Sample no.</th>
<th>ـه فـع</th>
<th>ـه فـع</th>
<th>Calculated (T)</th>
<th>Free deg.</th>
<th>Error rate</th>
<th>Level of sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Motor Compatibility</td>
<td>Risker</td>
<td>7</td>
<td>8.18</td>
<td>2.47</td>
<td>.870</td>
<td>3.28</td>
<td>6</td>
<td>.010 Significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cautioner</td>
<td>8</td>
<td>4.49</td>
<td>1.94</td>
<td>0.79</td>
<td>1.47</td>
<td>7</td>
<td>.010 Significant</td>
</tr>
<tr>
<td>2</td>
<td>Reception Skill</td>
<td>Risker</td>
<td>7</td>
<td>10.71</td>
<td>6.77</td>
<td>2.39</td>
<td>2.45</td>
<td>6</td>
<td>0.04 Significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cautioner</td>
<td>8</td>
<td>7.66</td>
<td>5.24</td>
<td>2.13</td>
<td>4.98</td>
<td>7</td>
<td>.000 Significant</td>
</tr>
</tbody>
</table>

Sig. level at <(0.05)

Table 6: It indicates the Arithmetic Mean and Standard Deviations of Tribal and Range Tests for Motor Compatibility and Efficiency Reception Performance for those with Cognitive Style (risk vs. caution) in the Control Groups

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Groups</th>
<th>Risker (Control)</th>
<th>S</th>
<th>H</th>
<th>Cautioner (Control)</th>
<th>S</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Motor Compatibility</td>
<td>Tribal</td>
<td>4.17</td>
<td>2.45</td>
<td>Tribal</td>
<td>3.12</td>
<td>1.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remote</td>
<td>7.37</td>
<td>0.81</td>
<td>Remote</td>
<td>6.00</td>
<td>3.09</td>
</tr>
<tr>
<td>2</td>
<td>Reception</td>
<td>Tribal</td>
<td>8.87</td>
<td>2.15</td>
<td>Tribal</td>
<td>7.83</td>
<td>2.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remote</td>
<td>14.75</td>
<td>1.81</td>
<td>Remote</td>
<td>12.00</td>
<td>1.09</td>
</tr>
</tbody>
</table>

The results of the experimental and control groups, that have been presented and analyzed for the efficiency of tribal and remote skills performance of the three skills subject of the search for those with Cognitive Style (risk vs. caution) in the experimental and control groups, indicated that there were statistically significant differences between the tribal and Range tests and in the favor of the range tests. Thus, the researcher achieved the first part of the second hypothesis of the research. In addition, the researcher has attributed the reasons for such differences to the impact of educational curricula; (the generative learning strategy and the method adopted by the teacher as we find that the impact of these curricula were effective in making progress in learning skills, which leads to the development of the efficiency of the skill performance of the student with Cognitive Style (risk vs. caution) in the experimental and control groups, but with different differences that are greater in the experimental group (risk (control) - caution). Since the use of the generative learning strategy and what is valid by this strategy of the participation of learners in the selection of the system and rules of the work. Moreover, their participation in the identification of their educational goals and the diversity of sources of learning. The most important characteristic of the strategy is to make the learner focus on the educational process, which is suitable with his/her abilities, interests and patterns of learning, and to connect them to new skills. Further, to learn each player according to his/her ability and help the player to understand himself/herself in addition to discovering the strengths and weaknesses, all of which lead to the availability of communication in all directions between the players and the coach. Following correct, systematic, sequential and logical scientific steps in the planning and implementation of the curriculum will inevitably result in the learning development[1]. The researchers also has attributed the reasons for such differences as a result of the practical practice and training on the variables (compatibility and reception) as well as playing within the educational units, which highly contribute in the improvement of the skill level and achieving better results in the range test[2].

By comparing the results of range tests for motor compatibility and reception of the ball among the people with cognitive style (risk - caution) in the experimental and control research groups that have been presented and analyzed in tables (21, 20, 22); it has been indicated that there is variation in the significant differences between those with cognitive risk style and caution style. The significant difference was found to be in favor of the risk and caution range in the two experimental groups and was greater in the risk and caution range in the control groups in the motor compatibility, efficiency and reception of the ball. This was due to the educational approach using the generative learning strategy developed.
by the researchers, which had a clear effect through the results shown in the development of the physical side. Such effect has been in turn reflected positively on the efficiency of the reception of the ball; moreover, the generative learning strategy is a new strategy for the students that create the spirit of struggle, cooperation, excitement, suspense and active participation among the students.

The learner gains more experience from the leader of the group on one hand and from the teacher on the other hand. Furthermore, the learner is supervised and observed by others such as the leader and members of the group in addition to the teacher while the implementation of the exercise. This positive interaction among them motivates the learner to achieve a better skill level in order to achieve the objectives of the group. Additionally, generative learning strategy makes the learner an active participant in the learning process and not just a receiver of the information, unlike traditional learning. Using new strategies, including generative learning strategy plays a significant role in the development of volleyball skills, as well as, the researchers’ keenness on applying them to the sample of the research and paying more attention to its terms and giving them sufficient time for their implementation. So that the student can remember, understand and retrieve them in a better way. Based on the foregoing, the use of the generative learning strategy, which begins with the introductory stage (the calling element), in which the teacher prepares for the learning unit through dialogue and raising questions that require thinking and experimentation tools. Then, the focus or core stage (focus element) where the teacher instructs the students to work in small groups. Therefore, it combines the prior knowledge and the target knowledge in addition to giving the chance for the students to hold a dialogue between the groups. After that, the conflicting or challenging stage (the organizing element) where the teacher leads the discussion with all groups and allows them to be aware of the achievements and perceptions of their colleagues and helping them by the proper educational support. In addition, holding the challenge between what is known by the learner in the introductory stage and what he learns in this stage. Finally, the stage of application (elaboration) in which the learner implements the new experience gained with his creative attempt to find strengthening and applications results in different situations as well as expansion of the application scope of this experience.

Conclusion

Generative learning strategy of those with cognitive risk style vs. caution has contributed to develop the cognitive achievement lesser than the followed strategy. The generative strategy and the followed one are deemed effective strategies in developing the research variations. Cooperative learning strategy of those with cognitive risk style vs. caution plays greater and more effective role than the followed strategy in developing the compatibility and learning the skill of volleyball reception. People with cognitive risk style who has learned under the generative learning strategy are more capable of learning skills subject to the study than the persons with caution style. There is a convergence of skill performance level between those with cognitive risk style and cognitive caution style that have acquired such skills according to the followed strategy. The best results of research groups were achieved by the experimental group which has adopted the cooperative learning strategy.

Recommendations

The necessity of practicing the educational method by following the generative learning strategy in acquiring the skills of volleyball reception. The need to develop the cognitive strategies that owned by the learners upon selecting the educational curricula. The educational methods that are followed by the teacher should be varied, in addition that the teacher should not rely only on the followed strategy. Conducting studies similar to the other cognitive strategies other than those are adopted in the research. Conducting studies similar to the other essential skills otherwise, those are adopted in the research.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Not require

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1. The Holy Quran.


Risk Factors of Rotavirus Infection among Children Hospitalised with Acute Diarrhoea in Sabah, Malaysia Borneo

Abraham Chin Zefong1, Mohammad Saffree Jeffree1,2, Syed Sharizman Syed Abdul Rahim1, Firdaus Hayati1, Khamisah Awang Lukman1, Mohd Yusof Ibrahim1, Kamrudin Ahmed2

1Department of Community & Family Medicine, Faculty of Medicine & Health Sciences, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia; 2Borneo Medical and Health Research Centre, 3Department of Surgery, Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia

ABSTRACT

Background: Diarrhoeal disease is one of the leading causes of morbidity in children under five years of age but the disease burden particularly of rotavirus and its epidemiology is currently unknown due to under reporting. Around 700–1,000 children were admitted every year due to acute diarrhoea. These admissions can be prevented if proper vaccination is done. This study aimed to determine risk factors of rotavirus infection among young children hospitalised with acute diarrhoea in Sabah.

Method: A comparative cross-sectional study was conducted in Sabah’s Women and Children Hospital from April to June 2018 and investigated 66 children less than five years of age admitted with acute diarrhoea using universal sampling method. Stool samples were collected and tested for rotavirus using Enzyme Immunoassay. Positive samples for rotavirus were then analysed using PCR method. A validated questionnaire was administered to determine risk factors associated with rotavirus infection and to determine the knowledge, attitude and practice of parents or caretakers on prevention of diarrhoeal disease among young children in Sabah.

Results: The response rate was 100% which give an overall proportion of rotavirus infection of 28.8%. The significant risk factors were male sex OR 4.3(95% CI 1.1–16.8), poor environmental sanitation OR 5.0 (95% CI 1.6–15.6), and poor diarrhoeal prevention practice OR 4.0 (95% CI 1.0–15.4). Rotavirus strains circulating in Sabah are comprised of G1 P(8), G4 P(8), G9, and other unknown genotypes.

Conclusion: The identification of risk factors for rotavirus infection and the circulating genotype in Sabah is beneficial for a more strategic preventive effort.

Keywords: rotavirus infection, acute diarrhoea, risk factors, rotavirus genotype

Introduction

Globally 450,000–550,000 children succumb to rotavirus infection every year, most of them in the developing countries of Asia and Africa1. Rotavirus infection is the single greatest cause of diarrhoea-related deaths among children. Multiple factors such as social, breastfeeding, nutritional status, age of first infection and contact with household pets have been associated with rotavirus infection2. Variation of rotavirus strains which is critically important for the effectiveness of rotavirus vaccine, cannot be understood totally unless we look at the problem critically. According to Sabah’s acute
gastroenteritis surveillance, 46,000–63,000 cases are attended by at health facilities across Sabah every year from 2012–2016 but only rectal swab for vibrio cholera test was performed due to the surveillance being a proxy for cholera cases. With the data obtained through this study, perhaps rotavirus vaccination can be introduced in the routine immunization schedule as an effort to reduce morbidity and mortality from acute gastroenteritis in young children. The study objectives are to determine the risk factors associated with rotavirus infection, the level of knowledge, attitude and practice of caretaker on prevention of diarrhoeal disease and to identify the rotavirus genotype distribution in Sabah Borneo Malaysia.

Material and Method

A comparative cross-sectional study was conducted in Sabah’s Women and Children Hospital from April to June 2018 and investigated 66 children less than five years of age admitted with acute diarrhoea using universal sampling method. Prior to the commencement of this study, about two to three children under five years of age were admitted into this paediatric ward daily due to acute gastroenteritis. Sabah’s Women and Children Hospital ward admission has more than 7,000 children under 5 years of age annually. Stool samples were collected and tested for rotavirus using Enzyme Immunoassay. Positive samples for rotavirus were then analysed using the PCR method to identify the genotype. A validated questionnaire was administered to determine risk factors associated with rotavirus infection and to determine the knowledge, attitude and practice of parents or caretakers on prevention of diarrheal disease among young children in Sabah. This study had compared two different groups of children less than five years of age attending the study site. The first group was the group who presented with acute gastroenteritis symptoms and required admission into the paediatric ward with positive rotavirus result. The second group was the group who presented with acute gastroenteritis symptoms and required admission into the paediatric ward with negative rotavirus result. Exclusion criteria were children with drug history of immunosuppressive or documented significant background disease such as immune-deficient syndromes, bloody diarrhoea, previously vaccinated against rotavirus, hospital stays more than 48 hours and duration of diarrhoea of more than 7 days.

“Sample youki” stool collector (Fujirebio Co. Ltd., Japan) for this study was supplied to the nurse-in-charge. A training session was held with the nurse prior to commencement of study to familiarize usage of the stool collection kit. Enough stool sample was collected in a wide mouth sterile screw container from each suspected subject during the acute illness, which was on the day of presentation and admission to study site. Stool samples were collected as soon after the onset of symptoms as possible from each patient. The stool specimen was properly labelled with information that includes a subject ID and date of collection and was immediately stored in a cold box with an ice pack. The samples collected from the ward had been transported with the cold box and transferred on the same day for storage at −70°C at the Universiti Malaysia Sabah laboratory for prolonged storage prior to testing by batches. Rotavirus was detected by enzyme immunoassay by using a commercial kit, Premier Rotaclone. The enzyme immunoassay (EIA) is a simple, highly sensitive method for the detection of rotavirus antigen, and is well suited for the analysis of large numbers of samples. The stool samples stored at −70°C were put at room temperature for thawing process then vortexed at 1800 rpm for 30 seconds each. 1 ml of Sample Diluent was added to properly marked tube, using a precision pipette. Then, the sample was resuspended in 1 ml of Sample Diluent in a 2 ml vial and stored at −70°C for RNA extraction in another day. The G and P genotypes were determined by reverse transcription polymerase chain reaction (RT-PCR) and confirmed by the nucleotide sequence of VP7 and VP8* portion of the VP4 genes. The whole genome sequence was done by amplifying all the segments separately then full genome sequence was read by using primer walking. Positive results by Spectrophotometric Determination: specimens with absorbance units (A450) greater than 0.150 were considered positive. Specimens with absorbance equal to or less than 0.150 were considered negative.

For data collection through questionnaire, “Good Sanitation”, a maximum score of five was given for each fulfilment of safe water supply, safe drinking water, scheduled waste disposal, owning a toilet and perfect form of a latrine. Subjects with a score of less than five will be labelled “Poor Sanitation”. “Good Diarrhoea Prevention Habits”, of which a maximum score of nine is given for combination of hand washing habit with use of soap and water, more frequent hand washing with sound reason for hand washing, breastfeeding status, cessation of breastfeeding after 2 years of age, and cleaning of milk bottle using soap, water and boiling technique. Subjects with a score of less than seven were labelled as “Bad Diarrhoea Preventive Habits”. As
for knowledge about diarrhoea, “Good Knowledge” was awarded to subjects who managed to get all three answers correctly namely definition of diarrhoea, main diarrhoeal symptoms, and the way to prevent diarrhoea. Subjects with less than three correct answers were labelled as “Poor Knowledge”. For “Good Attitude and Practice”, 17 marks are given for each answer of “Agree” or “Disagree”. Subjects with a score of less than 17 were labelled with “Poor Attitude and Practice”.

Statistical analysis was performed using SPSS software version 17.0 (SPSS, Chicago, IL, USA). The ethical clearance for this study was obtained from the National Medical Research Registry (NMRR) 18-266-39756 (IIR) and UMS ethical committee (1/18 – 14). Information regarding the study was explained to the parents or caretaker of the participating children before the collection of samples. Oral and written consent for participation in the study was obtained.

**Findings**

Response rate for the study was 100% \((n = 66)\). The median age of respondents was 15 months, interquartile range (8–24 months). The majority were from the age group of 7–12 months (28.8%). Most were boys which corresponded to 63.6%. The highest proportion of nature of the job of parents or caretakers were Professional with 31.8% \((n = 21)\), followed by Unemployed 28.8% \((n = 19)\). The mean monthly family income of children hospitalised with acute diarrhoea was RM 3,412 (SD RM 2330), with approx. USD1000=RM4000. Majority of the parents and caretakers of subjects has good knowledge of diarrhoea and prevention of diarrhoea \((n = 60)\) which corresponds to 90.9%. Majority of the parents and caretakers of subjects has Poor Attitude towards prevention of diarrhoea \((n = 41)\) which corresponds to 62.1%. Majority of the parents and caretakers of subjects has Poor Practice towards prevention of diarrhoea \((n = 43)\) which corresponds to 65.2% (Table 1). A total of 24 out of 66 children had fever upon admission but the majority was low-grade fever of less than 38.5°C. A total of 47 (71.2%) children had a short period of diarrhoea of three days or less, with 40 (60.6%) children had five to 10 times of watery stool per day, and three children had more than 10 episodes of watery stool per day. Majority of the children (65.2%) did not have vomiting and almost all children (97.0%) had moderate dehydration. Meanwhile, 19 (28.8%) respondents have positive rotavirus.

**Table 1: Association between Risk Factors and Rotavirus Infection**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Rota Virus Positive (%)</th>
<th>Rota Virus Negative (%)</th>
<th>(\chi^2)</th>
<th>OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years old)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\leq 2)</td>
<td>14 (28.0)</td>
<td>36 (72.0)</td>
<td>0.061</td>
<td>0.803</td>
<td></td>
</tr>
<tr>
<td>(&gt;2)</td>
<td>5 (31.2)</td>
<td>11 (68.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boy</td>
<td>16 (38.1)</td>
<td>26 (61.9)</td>
<td>0.046*</td>
<td>4.3 (95% CI 1.1–16.8)**</td>
<td></td>
</tr>
<tr>
<td>Girl</td>
<td>3 (12.5)</td>
<td>21 (87.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\leq)RM4000</td>
<td>12 (27.3)</td>
<td>32 (72.7)</td>
<td>0.148*</td>
<td>0.701</td>
<td></td>
</tr>
<tr>
<td>(&gt;)RM4000</td>
<td>7 (31.8)</td>
<td>15 (68.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Physical Contact with Pets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6 (28.6)</td>
<td>15 (71.4)</td>
<td>0.912</td>
<td>0.340</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>5 (45.5)</td>
<td>6 (54.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Sanitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>12 (50.0)</td>
<td>12 (50.0)</td>
<td>8.278</td>
<td>5.0 (95% CI 1.6–15.63)**</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>7 (4.1)</td>
<td>35 (95.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preventive Knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>2 (33.3)</td>
<td>4 (66.7)</td>
<td>1.000*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>17 (28.3)</td>
<td>43 (81.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The significant risk factors were male sex OR 4.3 (95% CI 1.1–16.8), poor environmental sanitation OR 5.0 (95% CI 1.6–15.6), and poor diarrhoeal prevention practice OR 4.0 (95% CI 1.1–15.4). Majority of typeable strains of rotavirus from children positive for rotavirus infection showed G4 P(8) type (six out of 19), followed by two G9, two unknown genotype P(8), one G1 P(8) and one G3. There were 7 un-typeable strains in the specimens. All parents and caretakers were willing to get rotavirus vaccine if it meant that their child’s diarrhoea can be prevented.

**Discussion and Conclusions**

There was a statistically significant association between male sex and rotavirus infection among young children hospitalised with acute diarrhoea with male children having a 4 times higher chance of getting rotavirus infection compared to being female children. Although there was almost double the number of admission of boys compared to girls due to acute gastroenteritis, we found that the proportion of boys with rotavirus infection is greater than the proportion of girls with rotavirus infection. Many studies have shown similar findings, but no specific reasons were given on this occurrence. The studies conducted in Nigeria and Vietnam showed a higher prevalence of rotavirus infection in male children.

The majority number of children admitted was from mean age of 19 months and below. This could explain the lack of association for younger age with rotavirus infection. Most literature states that rotavirus affects mostly children aged two years and below. It was documented as well that the number of rotavirus positive and diarrhoeal cases showed variations throughout the year in different countries. The highest incident of rotavirus has been associated with young children aged 6–24 months, particularly those who are placed at day care centres, while the greatest risk for developing severe rotavirus infection are those under 12 months of age.

Incidence of acute gastroenteritis of all causes were known to be related to environmental sanitation. Poor environmental sanitation which was found in this study includes unsanitary household garbage disposal and unimproved sanitation facility. The fact that most admissions to government hospitals were from low-income family could suggest that their living conditions are also poor. However, further analysis and research to correlate the living conditions with income level need to be conducted to prove this association. A review of current rotavirus management in Ghana has added that improved sanitation alone does not decrease the prevalence of rotavirus disease. It suggested that vaccination together with other preventive methods like breastfeeding, oral rehydration therapy, zinc treatment, environmental and water sanitation can reduce the effects of rotavirus infection.

The diarrhoeal prevention habits such as hand washing, and breastfeeding among others in combination are very effective and a proven way to reduce the incidences of acute gastroenteritis. The knowledge of parents or caretakers correlates with the recommended guidelines of prevention of diarrhoea. However, when it comes to their practice, much is left to be desired. Health promotion programs should be emphasized to empower the community to make informed choices on the maintenance of good health and prevention of diseases, especially with children at growing up stage, a life without diseases can mean that they are able to grow up to their maximum potential. Although this study was unable to prove the association of poor caretaker’s
knowledge and attitude with rotavirus infection, we were exposed to the fact that many parents and caretakers had sufficient knowledge on diarrhoeal disease, but are very much lacking in their attitude and practice when it comes to prevention of diarrhoea.

Malaysian Dietary Guidelines 2010 has outlined 14 Key Dietary Messages for the maintenance of good health. This includes exclusive breastfeeding from birth to six months of age, or when the infant is supplemented with other forms of feeding whilst breastfeeding is to be continued for up to the age of 2 years9. Although we could not prove the association between cessation of breastfeeding before age of two and rotavirus infection, we managed to point out that more than half of the children involved in this study had stopped breastfeeding before the age of two. Several barriers towards breastfeeding includes the inadequate training and education of clinicians and particularly community nurses who lack in personal breastfeeding experiences to educate as well as assisting mothers who are breastfeeding10. Mothers should be empowered to make the best choice for their infant by giving them breastfeeding which has proven to be beneficial for both mothers and children.

The genotype of rotavirus in Sabah was almost like that circulating worldwide such as G1 P(8), and G4 P(8). However, there were a total of 7 untypeable strains. The possibility for this to occur might be due to the different rotavirus strains circulating in Sabah which was not detected with existing primers. Hence, further analysis is needed with the extension of primers to detect other strains which are not commonly found circulating in the world.

In conclusion, this study provides the baseline data for the public health personnel and policymakers to evaluate the existing programs of rotavirus control and acute gastroenteritis surveillance among young children hospitalised with acute diarrhoea. There are pressing needs to identify the effective strategies and future programs for health promotion on prevention of diarrhoea. The introduction of rotavirus vaccination to not only reduce the incidence of rotavirus disease in Sabah but also to reduce the economic burden of rotavirus disease on our healthcare system.

Acknowledgement

We would like to thank Universiti Malaysia Sabah, specifically the Faculty of Medicine and Health Sciences for the opportunity to conduct this study. We would also like to thank the Director General of Health Malaysia for his permission to publish this article. The authors would also like to express our gratitude to the Sabah State Health Department as well as the Sabah’s Women and Children Hospital.

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REFERENCES


Factors Influencing Contraceptive Use among Reproductive-Age Women in East Java, Indonesia

Afif Kurniawan¹, Diyah Herowati², Kuntoro¹, Arief Wibowo³

¹Student Master of Public Health at Airlangga University, Surabaya, Indonesia; ²Department of Research and Development, National Population and Family Planning Board of East Java, Indonesia; ³Department of Biostatistics, Faculty of Public Health, Airlangga University Surabaya, Indonesia

ABSTRACT

One of the key for family planning is contraceptive. According to the most recent Indonesian Demography and Health Survey, 2017, women in reproductive age in east java province have relatively high participate in using contraceptive methods compared to west java province and middle java province. This study examines factors that influencing contraceptive use in east java. Logistic regression was used to finding factors that influencing with contraceptive use. Data come from Indonesia Demography and Health Survey (IDHS) 2017, which limited on 5371 married women/living with partner in east java. The findings show that age, number of living children and education attainment are associated with contraceptive use.

Keyword: family planning; contraceptive; married woman.

Introduction

Family planning is a continues and unfinished program and never. It attempts to regulate number of children and determine of pregnancies. It is achieved through use of contraceptive methods and the treatment of infertility(1). Therefore in this study, family planning is called contraceptive.

Figure 1 show that total population in 2010 is 37 million people and still develop. It’s make east java province as a number two largest population in Indonesia, which number one is west java(2). Population projection showed that in 2017 total population in east java is 39,292,972 people, and 0.46 percent is under 25 years old(2). Based on cohort study of young people enter the reproductive life span, the growth and size of population in a area/country depend on their reproductive behaviour. Because a considerable number of young adults get married every year(3).

According to the most recent Indonesian Demography and Health Survey, 2017, 70% woman in reproductive age in east java using contraceptive. It’s achievement is number 2 largest in Java(4). On the other hand, IDHS 2017 show that 33 percent of women in east java was discontinue using contraceptive after twelve month after using(4). Some reason for discontinue using contraceptive is side effect/health and desire to become pregnant(4). Discontinuation contraceptive may lead lower prevalence rate of contraception. Because of that, this study wanted to see the factors that influencing a woman in east java to using a contraceptive.

This study adopted from the part of theoretical framework of Precede-Proceed by Lawreens Green(5).
This study uses predisposing, reinforcing, and enabling factors and associated with “contraception”. Predisposing factors are age\(^6\), education level\(^7\), and number of living children\(^8\). Reinforcing factors are ideal number of children. Enabling factors are wealth index\(^8\), employment status\(^8\), and residence\(^8\). Therefore, the purpose of this study is to analyze and find the influencing factors of contraceptive use.

**Method**

This study was cross-sectional and used 2017 Indonesian Demographic and Health Survey (IDHS) data. Unmarried woman and individuals with missing data were excluded from the analysis. This study analysis was limited to those 5371 currently married woman aged 15-49 years at the time of data collection.

Data were analyzed descriptively and using logistic regression for multivariate analysis. Statistical analyses were performed using SPSS version 21.0; p <0.05 indicated statistical significance.

Dependent variable was current contraceptive method. Contraceptive use was measured as to current contraceptive method (0 = Not using; 1 = using any method). The independent variables were grouped as predisposing, reinforcing, and enabling Factors. The predisposing factors were age (years), number of living children, education level (0 = no education; 1 = incomplete primary; 2 = complete primary; 3 = incomplete secondary; 4 = complete secondary; 5 = higher).

The reinforcing factors are ideal number of children. Enabling factors are wealth index (1 = poorest; 2 = poorer; 3 = middle; 4 = richer; 5 = richest), employment status (by respondent work in last 12 months, 0 = no work; 1 = currently working) and residence (1 = urban; 2 = rural). In this study, we attempt to analyze some of these factors as indicated in the method section. Therefore, the purpose of this study is analyze and find the predictors of contraceptive use.

**Results**

One of three woman in east java didn’t yet using any contraceptive. By age, educational attainment, and wealth index, there is inverted U pattern in the percentage of woman who using a contraceptive. Women in 35-39 years old, complete primary, and in middle wealth index are more likely report to use contraceptive than women in other groups.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Non-use contraceptive (n)</th>
<th>Use contraceptive (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-19</td>
<td>53 (51.43)</td>
<td>50 (48.57)</td>
</tr>
<tr>
<td>20-24</td>
<td>171 (36.13)</td>
<td>303 (63.87)</td>
</tr>
<tr>
<td>25-29</td>
<td>283 (36.58)</td>
<td>490 (63.42)</td>
</tr>
<tr>
<td>30-34</td>
<td>256 (28.02)</td>
<td>658 (71.98)</td>
</tr>
<tr>
<td>35-39</td>
<td>254 (23.14)</td>
<td>843 (76.86)</td>
</tr>
<tr>
<td>40-44</td>
<td>208 (21.57)</td>
<td>756 (78.43)</td>
</tr>
<tr>
<td>45-49</td>
<td>379 (36.26)</td>
<td>667 (63.74)</td>
</tr>
<tr>
<td>Number of living children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>401 (94.43)</td>
<td>24 (5.57)</td>
</tr>
<tr>
<td>1-2</td>
<td>1026 (26.02)</td>
<td>2917 (73.98)</td>
</tr>
<tr>
<td>3-4</td>
<td>160 (17.40)</td>
<td>758 (82.60)</td>
</tr>
<tr>
<td>5+</td>
<td>17 (20.34)</td>
<td>68 (79.66)</td>
</tr>
<tr>
<td>Ideal number of children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>2 (11.33)</td>
<td>19 (88.67)</td>
</tr>
<tr>
<td>1-2</td>
<td>1066 (26.82)</td>
<td>2909 (73.18)</td>
</tr>
<tr>
<td>3-4</td>
<td>482 (39.54)</td>
<td>737 (60.46)</td>
</tr>
<tr>
<td>5+</td>
<td>54 (34.67)</td>
<td>102 (65.33)</td>
</tr>
<tr>
<td>Educational attainment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>59 (53.46)</td>
<td>51 (46.54)</td>
</tr>
<tr>
<td>Incomplete primary</td>
<td>127 (30.88)</td>
<td>285 (69.12)</td>
</tr>
<tr>
<td>Complete primary</td>
<td>334 (23.54)</td>
<td>1085 (76.46)</td>
</tr>
<tr>
<td>Incomplete secondary</td>
<td>372 (27.51)</td>
<td>982 (72.49)</td>
</tr>
<tr>
<td>Complete secondary</td>
<td>480 (33.14)</td>
<td>967 (66.86)</td>
</tr>
<tr>
<td>Higher</td>
<td>232 (36.89)</td>
<td>397 (63.11)</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No work</td>
<td>526 (27.92)</td>
<td>1359 (72.08)</td>
</tr>
<tr>
<td>Currently working</td>
<td>924 (29.70)</td>
<td>2187 (70.30)</td>
</tr>
<tr>
<td>Wealth index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poorest</td>
<td>186 (33.52)</td>
<td>369 (66.48)</td>
</tr>
<tr>
<td>Poorer</td>
<td>263 (25.40)</td>
<td>775 (74.60)</td>
</tr>
<tr>
<td>Middle</td>
<td>329 (27.33)</td>
<td>874 (72.67)</td>
</tr>
<tr>
<td>Richer</td>
<td>352 (29.74)</td>
<td>831 (70.26)</td>
</tr>
<tr>
<td>Richest</td>
<td>474 (34.06)</td>
<td>918 (65.94)</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>790 (30.96)</td>
<td>1763 (69.04)</td>
</tr>
<tr>
<td>Rural</td>
<td>814 (28.88)</td>
<td>2004 (71.12)</td>
</tr>
<tr>
<td>Total</td>
<td>1604 (29.87)</td>
<td>3766 (70.13)</td>
</tr>
</tbody>
</table>
Table 2 show that 2 model of logistic regression formed using the enter method. Model 1 is crude model dan model 2 is multivariate model. Model 2 show that every addition 1 number of living children, chance of woman using contraceptive will increase 3.264 times. In educational attainment, any attainment have significantly influencing of contraceptive use. Model 2 show that woman who have complete primary in educational attainment 3.497 times having contraceptive use than woman who have no education.

Both model 1 and model 2, age, number of living children, ideal number of children, and educational attainment show consistently influencing on contraceptive use. Model 2 show that employment status, wealth index, and residence is not significantly influencing contraceptive use.

Table 2: Multiple logistic regression of the effect of characteristics on contraceptive use

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cOR (95% CI)</td>
<td>aOR (95% CI)</td>
</tr>
<tr>
<td>Age</td>
<td>1.023 (1.020, 1.026)***</td>
<td>0.957 (0.944, 0.969)***</td>
</tr>
<tr>
<td>Number of living children</td>
<td>2.417 (2.099, 2.783)***</td>
<td>3.264 (2.759, 3.860)***</td>
</tr>
<tr>
<td>Ideal number of children</td>
<td>0.829 (0.731, 0.941)**</td>
<td>0.709 (0.606, 0.830)***</td>
</tr>
<tr>
<td><strong>Educational attainment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>1.00 (reference)</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>Incomplete primary</td>
<td>2.238 (1.618, 3.094)***</td>
<td>2.231 (1.152, 4.325)*</td>
</tr>
<tr>
<td>Complete primary</td>
<td>3.247 (2.675, 3.941)***</td>
<td>3.497 (2.009, 6.089)***</td>
</tr>
<tr>
<td>Incomplete secondary</td>
<td>2.635 (2.152, 3.225)***</td>
<td>3.072 (1.858, 5.083)***</td>
</tr>
<tr>
<td>Complete secondary</td>
<td>2.017 (1.767, 2.301)***</td>
<td>2.763 (1.687, 4.527)***</td>
</tr>
<tr>
<td>Higher</td>
<td>1.710 (1.345, 1.774)***</td>
<td>3.242 (1.883, 5.583)***</td>
</tr>
<tr>
<td><strong>Employment status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No work</td>
<td>1.00 (reference)</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>Currently working</td>
<td>0.997 (0.819, 1.214)</td>
<td>1.202 (0.964, 1.498)</td>
</tr>
<tr>
<td><strong>Wealth index</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poorest</td>
<td>1.00 (reference)</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>Poorer</td>
<td>1.481 (1.066, 2.056)*</td>
<td>1.485 (0.977, 2.259)</td>
</tr>
<tr>
<td>Middle</td>
<td>1.341 (0.980, 1.834)</td>
<td>1.367 (0.939, 1.992)</td>
</tr>
<tr>
<td>Richer</td>
<td>1.191 (0.893, 1.588)</td>
<td>1.096 (0.744, 1.617)</td>
</tr>
<tr>
<td>Richest</td>
<td>0.976 (0.730, 1.304)</td>
<td>0.863 (0.551, 1.355)</td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>1.00 (reference)</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>Rural</td>
<td>1.104 (0.910, 1.340)</td>
<td>1.009 (0.808, 1.260)</td>
</tr>
</tbody>
</table>

OR, odds ratio; CI, confidence interval. *p<0.05, **p<0.01, ***p<0.001

Discussion

Every married woman has decide how many children will be born. Seventy three percent of women said that 1-2 is ideal number’s of child. So, as long as their married and before menopause, they must have at least 2 children. Seventy four percent women who’s using contraceptive have at least 1-2 children. It show when number of living children is appropriate with their ideal number of children, they decide to spacing or stopping for having children. One way is using any contraceptive method, both modern contraceptive or traditional contraceptive. Number of living children is a biggest motivation for woman to using contraceptive. Woman will use a contraception when they felt enough to have a baby or want to spacing pregnancy. Age and family size was significantly influencing on contraceptive use. When woman in pre-menopause age and feel enough to have children, they will be use a contraceptive. the result show that the biggest proportion who use a contraceptive is the woman in 35-39 years old.
In otherwise, even though the woman in pre-menopause but have no children they are not using any method\(^9\).

Educational attainment was significantly influencing on contraceptive use. This result had been reported consistently in several studies\(^8,10\) More higher education, more easier to receive any information, especially information about family planning\(^9\) and reproductive health\(^11\). Education was related to low fertility rate because woman who have high education is tend to delay their marriage and want to increase their socioeconomic status\(^12\).

Employment status was not significantly influencing on contraceptive use. Generally, a woman who have a higher education will work in formal sector. In formal sector they feel difficult to access a public health facility because they have to work in work-hours. One way is using a private health facility to access family planning\(^13\). Private health facility that would be a private midwife, midwife in rural area, clinic, and private hospital.

In Indonesia, the cost of using any modern contraception method covered by National Health Care Insurance. Therefore, any woman from any wealth index can accessing family planning. If family planning services does in public health facility is free, or cheap fee if services does in private health facility. For example : In rural-midwife or private-midwife most contraceptive fee is adjusted by economic capability of woman\(^13\). Like in Nigeria where the contraceptive fee is free, but still fee for services in health facility\(^14\). Maybe that’s one of causes why wealth index not significantly influencing contraceptive use in east java.

Generally woman who live in urban area will have a good/higher education than woman in rural area. Beside that in urban area is easy for accessing family planning than in rural area\(^15\). But, in east java type place of residence is not significantly influencing on contraceptive use. Maybe it can be happen because of rural-midwife and family planning health workers help for promotion and supporting a family planning in a rural area. This result is different with studies in West Nusa Tenggara where place of residence influencing to contraceptive use\(^16\).

### Conclusion

Factors that influence of contraceptive use are age, number of living children, ideal number of children, and educational attainment. Employment status, wealth index, and residence is not significantly associated with contraceptive use. It can be happen because in family planning program is good, not lagging in any residence, and covered by National Health System.

### Acknowledgements

On this occasion the author would like to thank the Department of Research and Development, National Population and Family Planning Board of East Java.

### Conflict of Interest:

The author states that there is no conflict of interest regarding the publication of this article.

### Source of Funding:

Department of Research and Development, National Population and Family Planning Board of East Java

### Ethical Clearance:

This study was approved by Ethical Commission of Health Research, number 130/EA/KEPK/2019, Faculty of Public Health, University of Airlangga, Surabaya.

### REFERENCES


Processes of Change for Weight Control Behavior among Collegians

Ahmed Adil Ali Basha¹, Arkan Bahlol Naji²

¹Specialist Nurse (MSc), Child Welfare Hospital, Medical City Directorate, Baghdad, Iraq; ²Professor, Department of Community Health Nursing, College of Nursing, University of Baghdad

ABSTRACT

A randomized controlled trial was used to guide this study. This study aimed to examine the effect of the Transtheoretical of Change-based intervention (TTM) in bettering collegians’ readiness to adhere to weight control behavior.

The study was conducted at the College of Languages, University of Baghdad. The study included 152 students who were randomly selected and assigned into two groups; study and control groups. Each group included 76 students.

The study instrument consists of the sociodemographic sheet and the Processes for Change for Weight Control Scale. Data were collected by a self-report questionnaire. Data were analyzed using the statistical package for social science (SPSS) for windows, version 24.

The study results demonstrated that there is a statistically significant difference in the Processes of Change for weight control for students in the study group over time with an approximately 73% of variance in the value of the Decisional Balance that could be attributed to the administered TTTM-based intervention. There was a positively significant correlation between students’ BMI and each of Processes of Change over time.

The researcher concluded that the TTM-based intervention enabled students to employ more both the cognitive and behavioral Processes of Change for weight control behavior.

Keywords: Processes of Change; Weight Control Behavior

Introduction

The increase in the prevalence of obesity found in various countries characterizes this situation as an epidemic and a worldwide problem (1). Since the 1980s, the rates of obesity have increased by about three times, in regions such as the Middle East and countries such as China and Australia. Even in countries with a lower prevalence, the rates observed are considered high. It is estimated that, in the coming two decades, the increase in the number of new cases of obesity will be over hundreds of millions (2).

It is possible to observe that in countries where obesity affects a large proportion of the population, such as the United States, investments are made in public and private initiatives with the aim of preventing obesity among the young through Special Nutrition Programs, interventions, programs and actions encouraging healthy eating and the undertaking of physical activity (1).

It is known that genetic and metabolic factors directly influence weight gain; however, other factors, such as physical inactivity, an unhealthy diet and psychosocial stress increase the risk of developing obesity. As a result, interventions geared towards these factors must be undertaken to prevent or reverse the situation of obesity in the individual and population ambit (3).

In spite of obesity and the proposals for its treatment being widely publicized, as far as is known, there have been few intervention studies aiming for the control not
only of body mass, but principally changes in behaviors of risk. In this regard, as part of the therapeutic process, it is important to assess and determine how the individual feels in relation to a possible change in behavior, and how to motivate the person to change his or her lifestyle, as this will be reflected directly in the results desired and in healthier standards (4). Both women and men report dissatisfaction with their overall appearance and specific characteristics like weight and muscle tone (5), and weight-control behaviors are common (5).

As a result, the Stages of Readiness for Behavioral Change (SRBC) model, or trans-theoretical model (TM), is used for assessing behaviors related to the practice of physical activity and eating and to propose necessary intervention strategies. It allows one to classify the individuals in their respective stages of change, making a distinction between those subjects who are genuinely disposed to change their lifestyle, and those who do not have the intention of doing so. In the light of the above, this study’s objective was to ascertain the effectiveness of an intervention program on the anthropometric variables and on the Stage of Readiness for Behavioral Change among women with excess weight.

This study aims to (1) determine the efficacy of the TTM-based intervention in enhancing weight control for students, and (2) identify the association between students’ age, body mass index, family’s socioeconomic status and their weight control.

Method

Design: The research design for this study was an experimental, randomized controlled trial design. Control occurs to decrease the possibility of error and thus increase the probability that the study’s findings are an accurate reflection of reality and the researcher can reduce the influence or confounding effect of extraneous variables on the study variables, also controlling extraneous variables enable the researcher to identify relationships among the study variables accurately and examine the effects of one variable on another (Borglin & Richards, 2010). Quantitative research requires varying degrees of control, ranging from minimal control to highly controlled, depending on the type of study, experimental studies are highly controlled (Borglin & Richards, 2010; Forbes, 2009; Shadish et al., 2002).

Population: The study population included collegians. The target population for this study was drawn from College of Languages, University of Baghdad, male and female students, aged 18 to 24-years who met the inclusion criteria mentioned below.

Sampling: The study applied the randomized sampling method. The researcher distributed (296) copies of the study questionnaire to the accessible students. The returned questionnaires were 223; 71 of them were incomplete. So, they were excluded from the data analyses. The final sample size was 152.

Inclusion/Exclusion Criteria: The inclusion criteria were for collegians, male and female students, those who do not experience any physical disability, and those who were fluent in Arabic. Exclusion criteria addressed students who have physical disability, and non-Arabic speakers.

Instrumentation: In addition to collecting demographic data, the researcher used a survey based on three constructs of the TTM (Stage of change, Decisional balance, and Process of Change) and the handbook of participating in regular exercise for the female adolescents.

The Weight Control Processes of Change Scale (WCPOCS): The Weight Control Processes of Change Scale (Prochaska, 1979; Prochaska & DiClemente, 1982) was used to measure the experiences can affect the exercise habits of some people. This scale is a 5-point Likert type scale that is composed of 48 items self-report measure previously validated for use with adolescents. These items were measured on a 5-point Likert scale. Responses on this scale range from 1 (Never) to 5 (Repeatedly). Total scores range from 48 to 240, with a higher score indicating greater Processes of Change (University of Rhode Island, 2016). This scale has shown satisfactory reliability (Cronbach’s Alpha = 0.81) external validity as well as good to excellent internal validity (Blaney et al., 2012).

Setting: The accessible population included university students (College of Languages) in Bab Al-Muaadham Complex in Baghdad City. Participants were those who met the previously mentioned inclusion criteria and were willing to participate in the study. Data collection took place at these locations.

Data Collection Plan: The subjects were randomly assigned to either the control group and the study group. All measurements were taken by personnel who did not know if the subjects were in the active or the control group.
(the measurement technicians were blinded). The study questionnaire was given to participants to complete (self-reporting). The questionnaires were also used to collect the data in 3 time points (pre-intervention, post-intervention I after one month of intervention, post-intervention II after three month of intervention) in university. The researcher collected data throughout morning time of the day. The estimated time range for each participant to complete the study questionnaire ranged between 15-20 minutes, to be reaffirmed by the pilot study.

Data Analyses: The descriptive statistical measures of frequency, percent, mean, and standard deviation were used to describe participants’ demographics. The repeated measures analysis of variance (RM-ANOVA) was used to measure the difference in the constructs of the TTM over time.

The TTM-based intervention enabled students to employ more both the cognitive and behavioral Processes of Change for weight control behavior.

Students whose families have better socioeconomic status employ both cognitive and behavioral Processes of Change greater than students whose families are of poorer socioeconomic status.

Results

Table 1: Participants’ Sociodemographic Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Study (N = 76)</th>
<th>Control (N = 76)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td><strong>Age (Years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>19</td>
<td>12</td>
<td>15.8</td>
</tr>
<tr>
<td>20</td>
<td>26</td>
<td>34.2</td>
</tr>
<tr>
<td>21</td>
<td>17</td>
<td>22.4</td>
</tr>
<tr>
<td>22</td>
<td>5</td>
<td>6.6</td>
</tr>
<tr>
<td>23</td>
<td>8</td>
<td>10.5</td>
</tr>
<tr>
<td>24</td>
<td>8</td>
<td>10.5</td>
</tr>
<tr>
<td><strong>Mean (SD)</strong></td>
<td>20.93</td>
<td>1.56</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>24</td>
<td>31.6</td>
</tr>
<tr>
<td>Female</td>
<td>52</td>
<td>68.4</td>
</tr>
<tr>
<td><strong>SES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower class</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Upper lower class</td>
<td>11</td>
<td>14.5</td>
</tr>
<tr>
<td>Lower middle class</td>
<td>17</td>
<td>22.4</td>
</tr>
<tr>
<td>Upper middle class</td>
<td>45</td>
<td>59.2</td>
</tr>
<tr>
<td>Upper class</td>
<td>3</td>
<td>3.9</td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>4</td>
<td>5.3</td>
</tr>
<tr>
<td>Normal body weight</td>
<td>51</td>
<td>67.1</td>
</tr>
<tr>
<td>Overweight</td>
<td>20</td>
<td>26.3</td>
</tr>
<tr>
<td>Class I Obesity</td>
<td>1</td>
<td>1.3</td>
</tr>
</tbody>
</table>

The age mean for participants in the study group is 20.93 ± 1.56; more than a third age 20-years-old (n = 26; 34.2%), followed by those who age 21-years-old (n = 17; 22.4%), those who age 19-years-old (n = 12; 15.8%), and those who age 23-years-old and 24-years-old (n = 8; 10.5%) for each of them, and those who age 22-years-old (n = 5; 6.6%).
For the control group, the age mean is 19.98 ± 1.03; around two-fifth age 18-years-old (n = 30; 39.5%), followed by those who age 19-years-old (n = 25; 32.9%), those who age 20-years-old (n = 15; 19.7%), those who age 21-years-old (n = 5; 6.6%), and one who ages 24-years-old (n = 1; 4.2%).

Concerning gender, most in the study group are females (n = 52; 68.4%) compared to males (n = 24; 31.6%). For the control group, most are females (n = 55; 72.4%) compared to males (n = 21; 27.6%).

Regarding the SES, more than a half in the study group are of the upper middle class (n = 45; 59.2%), followed by those who are of the lower middle class (n = 17; 22.4%), those who are of the upper lower class (n = 11; 14.5%), and those who are of the upper class (n = 3; 3.9%). For the control group, less than a half are of the upper middle class (n = 35; 46.1%), followed by those who are of the lower middle class (n = 25; 32.9%), those who are of the lower middle class (n = 14; 18.4%), and those who are of both the lower class and upper class (n = 1; 1.3%) for each of them.

Regarding the BMI, Regarding the BMI, most of participants in the study group are of normal range (n = 51; 67.1%), followed by those who are overweight (n = 20; 26.3%), those who are underweight (n = 4; 5.3%), and one who has class I obesity (n = 1; 1.3%). For the control group, most are of normal range (n = 50; 65.8%), followed by those who are overweight (n = 19; 25.0%), those who are underweight (n = 5; 6.6%), and those who have class I obesity (n = 2; 2.6%).

| Table 2: Tests of Within-Subjects Effects for the POC for weight control |
|-------------------|-----------------------------|------|--------|------|------------|
| Source            | Type III Sum of Squares     | df   | Mean Square | F    | Sig.       | Partial Eta Squared |
| POC (Study)       | Sphericity Assumed          | 269500.500 | 2 | 134750.250 | 207.448 | .000       | .734 |
|                   | Greenhouse-Geisser          | 269500.500 | 1.931 | 139540.220 | 207.448 | .000       | .734 |
|                   | Huynh-Feldt                 | 269500.500 | 1.981 | 136011.344 | 207.448 | .000       | .734 |
|                   | Lower-bound                 | 269500.500 | 1.000 | 269500.500 | 207.448 | .000       | .734 |
| Error (POC Study) | Sphericity Assumed          | 97434.167 | 150 | 649.561    |        |            |            |
|                   | Greenhouse-Geisser          | 97434.167 | 144.851 | 672.651    |        |            |            |
|                   | Huynh-Feldt                 | 97434.167 | 148.609 | 655.640    |        |            |            |
|                   | Lower-bound                 | 97434.167 | 75.000 | 1299.122   |        |            |            |
| POC (Control)     | Sphericity Assumed          | 11.430   | 2 | 5.715      | 12.877  | .000       | .147 |
|                   | Greenhouse-Geisser          | 11.430   | 1.339 | 8.537      | 12.877  | .000       | .147 |
|                   | Huynh-Feldt                 | 11.430   | 1.354 | 8.440      | 12.877  | .000       | .147 |
|                   | Lower-bound                 | 11.430   | 1.000 | 11.430     | 12.877  | .001       | .147 |
| Error (POC Control) | Sphericity Assumed      | 66.570  | 150 | .444       |        |            |            |
|                   | Greenhouse-Geisser          | 66.570  | 100.411 | .663       |        |            |            |
|                   | Huynh-Feldt                 | 66.570  | 101.562 | .655       |        |            |            |
|                   | Lower-bound                 | 66.570  | 75.000 | .888       |        |            |            |

There was a (a priori p = 0.01) significant difference (F (1.931, 144.851) = 207.448, p = 0.01) in the POC for weight control over time for participants in the study group. The omnibus effect (measure of association) for this analysis is .734, which indicates that approximately 73% of the total variance in the POC for weight control values is accounted for by the variance in the administered intervention.

For the control group, there was a (a priori p = 0.05) significant difference (F (1.339, 100.411) = 12.877, p = 0.01) in the POC for weight control over time. The omnibus effect (measure of association) for this analysis is .147, which indicates that approximately 14% of the total variance in the POC for weight control values is accounted for by the chance.
Table 3: Correlations among students’ age, socioeconomic status, BMI, birth order and their Processes of Change for weight control

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. SES</td>
<td>-.066</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3. BMI</td>
<td>.150</td>
<td>.184</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4. Birth Order</td>
<td>-.058</td>
<td>-.079</td>
<td>.020</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5. POC Pre</td>
<td>.161</td>
<td>-.025</td>
<td>.463**</td>
<td>.127</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6. POC Post I</td>
<td>-.103</td>
<td>.148</td>
<td>.329**</td>
<td>.052</td>
<td>.631**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7. POC Post II</td>
<td>.138</td>
<td>.062</td>
<td>.337**</td>
<td>.098</td>
<td>.414**</td>
<td>.583**</td>
<td>-</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

There are positively significant correlations between students’ BMI and each of Processes of Change over time ($r = .463$; $p < 0.01$; $r = .329$; $p < 0.01$; $r = .337$; $p < 0.01$) respectively.

Discussion

This randomized controlled trial was used to enhance collegians’ behaviors for weight control. The values of the POC for weight control for the study group noticeably increase by time. For the control group, such values slightly decrease by time with significant differences in the values of the POC over time for participants both in the study and control groups.

There was a significant difference in the POC for weight control over time for participants in the study group. The omnibus effect (measure of association) for this analysis was .734, which indicates that approximately 73% of the total variance in the POC for weight control values is accounted for by the variance in the administered intervention.

For the control group, there was a significant difference in the POC for weight control over time. The omnibus effect (measure of association) for this analysis was .147, which indicates that approximately 14% of the total variance in the POC for weight control values is accounted for by the chance. This finding reflects the TTM-based intervention enabled the students to employ both behavioral and cognitive processes that help them in changing unhealthy behavior (uncontrolled weight behavior) to a healthy behavior (weight control).

There were positively significant correlations between students’ BMI and each of Processes of Change over time. This finding could be explained as that students with higher body mass index think more about using both the cognitive and behavioral processes of change that could help them in exerting control over their weight control behavior.

Implications for Educations: There is a need to incorporate educational materials that focus on the behavioral change models into the curricula of nursing students in different educational levels.

Implications for Research: There is a need to replicate this study on larger sample size on broader geographical areas across Iraq.

Conflict of Interest: The researchers report no conflict of interest.

Source of Funding: This study did not receive any funding from any agency.

Ethical Clearance: A permission to conduct this study was obtained from the ethical committee in the College of Nursing, University of Baghdad

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Estimation of the Width of Un-Erupted Canines and Premolars in Basrah Population: A Cross Sectional Study

Ali S. Thedan¹, Hasanen A. Alnamel², Rafid M. Albadr³

¹M.Sc. Orthodontic Dentistry, ²M.Sc. Prosthetic Dentistry, ³PhD. Dental Material, College of Dentistry, University of Basrah, Basrah, Iraq

ABSTRACT

Exact prophecy of the space gives a significant portion of an orthodontic valuation in the mixed dentition. However, the most frequently used procedures of space analysis are built on data established on Caucasian populations, so the purpose of the present study is to appraise the applicability of the method of Moyers to estimate the mesiodistal widths of permanent canines and premolars in an assemblage of young people from south of Iraq represented by Basrah city individuals and to associate the predicted teeth widths from this formula with those gotten from Moyers' tables and Tanaka and Johnston's equations. From a complete list of schools, 20 were randomly selected and a random sample of 207 school children was identified according to predefined selection criteria. The width of lower incisors unit, maxillary canine and premolar unit and mandibular canine premolar units were measured and used to create a regression model and a prediction equation. There was an apparent agreement between Moyers model and the present study in estimating the width of canine and premolar segments in both maxillary and mandibular arches and in both sexes. However, dimorphism in both sexes was noticed in the lower incisors widths. Moyers model of predicting canine and premolar widths was used as a comparative model for many studies worldwide. Applicability of Moyers model in Basrah seems valid from the results of this study although there is an apparent underestimation of the widths when Moyers model is applied. It is recommended to carefully use Moyers model for Basrah population.

Keywords: Un-erupted canines, Premolars, Basrah population, Maxillary canine

Introduction

Mixed dentition analysis is the prediction of the tooth size of un-erupted permanent canine and premolars, It's plays an important step of orthodontic diagnostic procedures through defining the difference between the available and necessary space in each dental arch. It’s become clear in orthodontic treatment that a noteworthy quantity of cases of dental discrepancies start at the mixed dentition phase, which locate at the time interval from the 6.5th year to the 13th year of life. Doubtless many of these cases may be reduced in severity or eliminated at all by at time management. In the meantime, an inappropriate and invalid mixed dentition space analysis results could lead to withdrawal decisions that prime to detrimental changes of patient’s soft-tissue and facial profile.

Measurement of the un-erupted teeth on radiographs was studied; however, radiographs are suggested by many authors including considerable accuracy, but it is time consuming requires an expensive setup and a well-trained operator which makes this prediction method difficult to be applied to predict the accurate mesiodistal widths of un-erupted canine and premolars. On the other hands, probability tables are more reliable and less sensitive when it’s based on accurate and related racial data.

Supremely, the mesiodistal dimensions of un-erupted canines and premolars have been appraised from widths of the erupted permanent mandibular incisors using the Tanaka and Johnston prediction equations or Moyers probability tables. At each prediction procedures were established using a populace of North European descent or Caucasian populations that brands prediction procedures built on a solo racial sample that may not be considered for other races.
The persistence of this study is to investigate the reliability of prediction tables of Moyers mixed dentition analysis in selected school children of at south of Iraq, Basrah city, and to produce regression equations to be used for space analysis in this specific population. There is no published mixed dentition analysis for the south Iraqi population.

**Methodology**

This is a cross-sectional study accomplished in Basra city. It is based on measuring the width of mandibular and maxillary incisors together with those of the canines, first and second premolars in both jaws using casts of both two arches.

The study population is composed of intermediate and secondary school children aging 13-17 years old. Twenty schools were randomly selected from the list of 198 schools after giving numbers and entered into SPSS version 20 to obtain random sample. From each school 11 pupils were selected and the headmasters obtained verbal consent from their parents to take the measures of their teeth. Because some children were excluded from the study as they do not fulfill the inclusion criteria, the final number that was included in the study is 207 after exclusion of 13 children. The sample was composed of 118 male and 89 female children.

**The Exclusion Criteria Include:** Dental caries, Dental deformity of any cause, missing of any tooth, History of surgical intervention including tooth extraction, Abrasion and bruxism any degree of malocclusion

**Measuring the Width of the Teeth:** The mesiodistal dimensions of the permanent incisors, canines and premolars were measured on all the study models in all four quadrants. Themesiodistal dimension of the teeth measured at the contact area by using a calibrated caliper (Figure 1).

Reliability of measuring the width of teeth was assured through repeating the measurement of every 10th cast and the results were correlated to the original readings. This manoeuvre confirmed a high reliability with a correlation coefficient of 0.81 (confidence interval 0.76-0.86).

The collected information was fed into an SPSS spreadsheet including the sex and the measurement of the teeth. The values gotten from right and left canines premolar sections in each arch were averaged so that there would be one unit value for the mandibular canine-premolar segments (LCPMs) and a corresponding maxillary one (UCPMs) for each mandibular unit of incisors (LIs). The LIs unit is considered as the autonomous variable or the predictor. Therefore, the two dependent variables are the upper and lower units separately.

The rays of analysis are: Predicting LCPM unit, Predicting UCPM unit and comparing the results to Moyers probability tables to the 35th, 50th and 75th percentiles.

Statistical management of data used regression analysis to develop the prediction equation and independent sample t-test/ANOVA to ascertain the significance of the variability. P value of 0.05 is considered as a level of significance for all tests.

The obtained data were compared with Moyer’s probability tables to 35th, 50th and 75th percentiles using paired t-test.

**Results**

The sample is composed of 118 male and 89 female children aging 13-17 years. The mean and standard deviation of the basic units of the teeth are shown in Table 1.

**Table 1: Average measurements in male and female children**

<table>
<thead>
<tr>
<th>Teeth Unit*</th>
<th>Male (N = 118)</th>
<th>Female (N = 89)</th>
<th>t-test value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIs</td>
<td>22.033 ± 0.803</td>
<td>21.867 ± 0.830</td>
<td>1.443</td>
<td>0.151</td>
</tr>
<tr>
<td>LCPMs</td>
<td>20.991 ± 0.913</td>
<td>20.400 ± 0.967</td>
<td>4.493</td>
<td>0.001</td>
</tr>
<tr>
<td>UCPMs</td>
<td>21.782 ± 0.728</td>
<td>21.038 ± 0.662</td>
<td>7.561</td>
<td>0.001</td>
</tr>
</tbody>
</table>

*All measures were made by (Millimetres, mm)*
Regression model of the LIs and each of LCPMs and UCPMs units was done through correlation and linear regression after validating the data to fit the model. The data were tested for normality and size to ensure proper model building. Tables 2, 3 and 4 present the parameters of regression analysis.

**Table 2: Regression analysis in male children**

<table>
<thead>
<tr>
<th>R</th>
<th>Constants</th>
<th>R²</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxilla</td>
<td>0.61</td>
<td>12.10</td>
<td>0.35</td>
</tr>
<tr>
<td>Mandible</td>
<td>0.41</td>
<td>11.5</td>
<td>0.37</td>
</tr>
</tbody>
</table>

All measures were made by (Millimetres, mm)

**Table 3: Comparing predicted widths of LCPMs with Moyers models in boys and girls**

<table>
<thead>
<tr>
<th>Percentile probability (%)</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean difference (mm)</td>
<td>SD</td>
</tr>
<tr>
<td>35</td>
<td>0.501</td>
<td>0.271</td>
</tr>
<tr>
<td>50</td>
<td>0.152</td>
<td>0.043</td>
</tr>
<tr>
<td>95</td>
<td>0.412</td>
<td>0.525</td>
</tr>
</tbody>
</table>

All measures were made by (Millimetres, mm)

**Table 4: Comparing predicted widths of UCPMs with Moyers models in boys and girls**

<table>
<thead>
<tr>
<th>Percentile probability (%)</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean difference (mm)</td>
<td>SD</td>
</tr>
<tr>
<td>35</td>
<td>0.614</td>
<td>1.008</td>
</tr>
<tr>
<td>50</td>
<td>1.145</td>
<td>0.358</td>
</tr>
<tr>
<td>95</td>
<td>0.414</td>
<td>3.409</td>
</tr>
</tbody>
</table>

All measures were made by (Millimetres, mm)

**Discussion**

This study faced the difficulty of obtaining a large sample size. However, the sample size obtained was proved sufficient through sample size estimation calculations with the consideration of statistical methods which are mean, standard deviation, correlation and regression analysis. (11)

Some studies have larger sample size. (12-13) Other studies included a similar average of participants as this study did. (14-15) However, a considerable number of studies had sample sizes lower than the current study. (16-17-18-19)

The choice of sex distribution was determined by the random selection of schools and subsequent use of candidates to include in the study (exclusion criteria in methodology section, as well as sampling procedures). Initial comparison of measurements in both sexes revealed that the predictor unit (LIs) is not statically different contrast to LCPMs and UCPMs and this was also revealed by Vanesa et al. (20) and in agreement certain studies of Chinese and Indian population. (14)

Sex distribution was not intentionally predetermined in the comparative studies as far as the search of the researcher yielded. However, sex distribution was equal in some studies (21-22-23) and disproportionate in other studies. (24-25-26)

Genetic and environmental factors play role in determining the size of the teeth. It is necessary to study indentation in terms of race and gender at generation intervals (30 years) because of changing trend of malocclusion. (27)
It is critically important to correctly estimate the width of unerupted teeth so that an accurate diagnosis is made. The frequently followed approach of estimating the width of unerupted teeth is prediction via regression equations. Researchers identified permanent mandibular incisors as the best predictor.

This study aimed to measure applicability of Moyers model to Basrah population.

Regression model of the LIs and each of LCPMs and UCPMs units was done through correlation and linear regression after validating the data to fit the model. The data were tested for normality and size to ensure proper model building. Tables 2, 3 and 4 present the parameters of regression analysis. Because of the variability among male and female children, the statistical analysis was split accordingly.

In male children, the correlation coefficient is almost fair for both Maxilla and Mandible 0.61 and 0.41 respectively. However, the attributed variability of these values is lower in the mandible than in the maxillary teeth widths. In the female counterpart, the correlation coefficient is slightly lower and the induced variability ($r^2$) is marginal. Overall of the sample revealed higher values for both correlation coefficient and the attributed variability.

Table 5: Regression analysis estimated the values to develop the regression equation. The following equations were developed

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maxilla</td>
<td>Mandible</td>
<td>Maxilla</td>
</tr>
<tr>
<td></td>
<td>$Y = 12.10 + 0.35X$</td>
<td>$Y = 11.50 + 0.37X$</td>
<td>$Y = 12.13 + 0.34X$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$Y = 13.03 + 0.40X$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This study estimates that regression equation and prediction tables that are significantly different from Moyers model.

For the male children, the actual and predicted width of LCPMs was correlated significantly at 35th and 50th percentiles with $r$ values of 0.947 and 0.999 respectively (p value < 0.001). However, it was different at 95th percentile with an $r$ of 0.452 (p value = 0.121). Paired t test confirms these results (Table 9 and table 10).

**Conclusions**

Basrah city students represent a cooperative population from which a representative sample can be drawn. Moyers model of predicting canine and premolar widths was used as a comparative model for many studies worldwide. Applicability of Moyers model in Basra seems valid from the results of this study although there is an apparent underestimation of the widths when Moyers model is applied. It is recommended to carefully use Moyers model for Basra population. It is also recommended to have other studies in other governorates like Thiqar and Maysan so that a comparative and unified model for Southern Iraq is developed.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Not Required

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An Analysis of Factors Associated with the Relapse History of Clients with Schizophrenia at an Outpatient Polyclinic

Alifiatul Oza Hamanu, Ah. Yusuf, Rizki Fitryasari Patra

1Community and Mental Health Department, Faculty of Nursing, Universitas Airlangga, Jl. Mulyorejo, Surabaya city, Jawa Timur

ABSTRACT

Introduction: Schizophrenia is a chronic illness with which the sufferer may experience remission, recovery, and, at times, relapse. Relapse per se is affected by varied factors. Relapse in patients with schizophrenia may put themselves and their environment into danger. This research aimed to analyze factors associated with the relapse history of clients with schizophrenia who took outpatient medication.

Method: This research was a descriptive correlational study with a cross-sectional design. This research's population consisted of 75 people, 45 of whom were enrolled as respondents by the consecutive sampling technique. Data were collected using questionnaires. The independent variables in this research included medication adherence, family knowledge, family support, and social stigma, while the dependent variable was schizophrenia relapse history. The data were analyzed using the Spearman’s Rho calculation at a significance level (α) of ≤ 0.05.

Results: The research results show that there was a relationship between medication adherence and schizophrenia relapse history (p = 0.00), that there was no relationship between family knowledge and schizophrenia relapse history (p = 0.255), that there was a relationship between family support and schizophrenia relapse history (p = 0.00), and that there was a relationship between social stigma and schizophrenia relapse history (p = 0.01).

Conclusion: Medication non-adherence was the biggest factor that caused relapse in schizophrenia patients, followed by family support and stigma from society.

Keyword: schizophrenia, medication adherence, family support, social stigma

Introduction

Schizophrenia is a disabling, chronic illness with repeated exacerbation episodes and psychotic relapses. Many factors are responsible for this illness, including genetic factor, biochemical factor, psychosocial factor, socioeconomic status, stress, and drug abuse. In 2016 as many as 268 million people worldwide suffered from depression. The prevalence rate of schizophrenia stood at 0.2%–0.45% with an estimated 21 million people in the world suffering from schizophrenia. Fifty percent of clients with schizophrenia experienced relapse in the first year, 70% in the second, and over 70% in the fifth after withdrawal from hospital.

Schizophrenia sufferers may experience remission, recovery, or relapse. Relapse is a normal thing in the progression of an illness. In clients with schizophrenia, relapse refers to the exacerbation of symptoms or behavior that may put themselves as well as their environment into danger. Relapse rates are measured by calculating the time passed between the last medication and the next and the number of hospitalizations in a given period.

Relapses often occur in schizophrenia. With or without medical treatments, a schizophrenia patient may come into a relapse. International guidelines highlight prevention as a key to therapy for this illness. Symptoms
of schizophrenia relapse include clients feeling scared, losing appetite, having difficulties concentrating, experiencing sleep disorders, having depression, lacking interest, and engaging in self-withdrawal.

Many factors can be attributed to schizophrenia relapse. Such factors include medication adherence, work activity, age, gender, marital status, and family. In many cases, social stigma as well as other unidentified factors are also responsible in schizophrenia relapse.

This research aimed to analyzed factors associated with the relapse history of clients with schizophrenia at an outpatient polyclinic.

Method

Research Design: This research is a quantitative study of descriptive correlational type with a cross-sectional design. This research has obtained ethical approval as evidenced by the ethical clearance number 08/KKEPK.FKG/1/2016 from the Faculty of Dental Medicine, Universitas Airlamga, Surabaya, Indonesia.

Sampling: Out of a population of 75 schizophrenia clients with a relapse history who visited the outpatient polyclinic of RSJD Dr. Soedjarwadi, Central Java, Indonesia, 45 people were enrolled as respondents by the consecutive sampling technique. The independent variables in this research included medication adherence, family knowledge, family support, and social stigma, while the dependent variable was the relapse history of clients with schizophrenia.

Research Instruments: This research used 5 instruments to analyze the factors associated with relapse, namely the MARS (Medication adherence Rating Scale), a modified questionnaire about family knowledge, Friedman’s family support questionnaires, an instrument for measuring social stigma, and an instrument for measuring schizophrenia relapse.

Analysis Technique: The data from every questionnaire were numbered. Afterwards, tabulating and scoring were carried out for every instrument used. The data in this research were analyzed using Spearman’s Rho calculation at p < 0.05.

Results

1. Medication Adherence: The relationship between medication adherence and the relapse history of clients with schizophrenia can be seen in Table 1.

2. Family Knowledge: The relationship between family knowledge and frequency of schizophrenia relapse can be seen in Table 2.
3. Family Support: The relationship between family knowledge and frequency of schizophrenia relapse can be seen in Table 3.

Table 3: Relationship between family support and relapse frequency

<table>
<thead>
<tr>
<th>Relapse Frequency</th>
<th>Family Support</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Low</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>High</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>20</td>
</tr>
</tbody>
</table>

Spearman’s test (P) = 0.000
Correlation coefficient (r) = -0.599

From the Spearman’s rho calculation, a p value of 0.00 was obtained. As the p value was lower than the predetermined p value (p < 0.05), H1 was accepted, and H0 was rejected. This means that there was a relationship between family support and schizophrenia relapse history. The correlation coefficient (r) identified was 0.599 in a negative direction. This suggests that there was a fairly strong relationship between family support and schizophrenia relapse history. The stronger the family support, the lower the schizophrenia relapse rate.

4. Social Stigma: The relationship between social stigma and the frequency of schizophrenia relapse can be seen in Table 4.

Table 4: Relationship between social stigma and relapse frequency

<table>
<thead>
<tr>
<th>Relapse Frequency</th>
<th>Social Stigma</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Low</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>High</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>24</td>
</tr>
</tbody>
</table>

Spearman’s test (P) = 0.010
Correlation coefficient (r) = 0.557

From the Spearman’s rho calculation, a p value of 0.010 was obtained. As the p value was lower than the predetermined p value (p < 0.05), H1 was accepted, and H0 was rejected. This means that there was a relationship between social stigma and schizophrenia relapse history. The correlation coefficient (r) identified was 0.557 in a positive direction. This suggests that there was a fairly strong relationship between social stigma and schizophrenia relapse history. The higher the social stigma, the higher the schizophrenia relapse rate.

Discussion

Many factors may influence relapse in patients with schizophrenia. Antipsychotics are among schizophrenia medications that are effective in treating positive symptoms in acute episodes (e.g., hallucination, delusion) and preventing relapse20. Adherent consumption of antipsychotic therapy enables clients with schizophrenia to minimize symptoms and relapse21. Thus, medication adherence becomes a relapse factor and will influence the progression of the illness toward chronicity22.

Relapse risk often occurs after discontinuation of antipsychotics consumption, and it is unrelated to the duration of medication23. This research is in line with a previous study which found that medication non-adherence becomes one of factors that influence relapse, accompanied by other symptoms such as lack of social support and high emotional expression24. But although antipsychotics are effective in reducing relapse, 30%–40% schizophrenia patients experienced relapse 1 year after withdrawing from hospital while taking outpatient treatments regularly25.

Schizophrenia is a problem that not only affects the patients, but also affects the family26. Family plays a prominent role in financially supporting clients’ lives as they are fully responsible for the clients and in caring for the clients27,28. Patients with chronic illness may elude relapse if they take medicines regularly and receive social support fully. Social support serves as an intervention that is needed to overcome them29. The outpatient medications family gets patients with mental disorders shows improvement in the patients’ conditions30.

Social stigma is a negative interaction with the environment clients with schizophrenia often come into contact with31. Social stigma has such elements as avoidance, rejection, moral judgment, stigma of association, unwillingness, discrimination, and abuse32. More than a few people confront people with schizophrenia with stigmatization32. This certainly can cause relapse in clients with schizophrenia, either directly or indirectly. Clients with schizophrenia who
have better individual coping with social stigma have better-quality life with better functional proportion toward recovery.\(^{33,34}\)

More factors associated with schizophrenia relapse history remain unknown in this study. Four factors that have an association with relapse history include medication adherence, family knowledge, family support, and social stigma. Further study, thus, is needed to investigate other factors.

**Conclusion**

Many factors can cause relapse in clients with schizophrenia. Medicine non-adherence became one of the most important factors to cause relapse in schizophrenia patients. Family support and social stigma also have an effect on relapse, albeit less dominant.

**Ethical Clearance:** This research has obtained ethical approval as evidenced by the ethical clearance number 08/KKEPK.FKG/I/2016 from the Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.

**Conflict of Interest:** There was no conflict of interest in this study

**Source of Funding:** This study is done with individual funding.

**REFERENCES**


ABSTRACT

Euthanasia (eu means good and thanatos means dead) which literally means death well without suffering. Euthanasia brings many pros and cons from various aspects, both medical, social, cultural and religious.

Design: The first part is formulating the initial theory (draft stage of the moral development of the problem of euthanasia) hereinafter abbreviated as TPM2BS. The second part is designing data collection instruments and product testing (instruments).

Results: The results of this assessment indicate that written theories and assignments that are arranged theoretically are very valid, meaning the written stages and assignments are in accordance with the theory revealed, and the researchers’ mindset to construct that stage is acceptable. This means that the content validity and construct of the theory is sufficient, so that it can be implemented and verified in the field.

Conclusion: 1. Content validity and hypothetical construct theory Phase of Moral Development of Euthanasia Problems already fulfilled and can be verified in the field, 2. Validation test of 4.81 with a very valid category and reliability of 98.13% shows written assignments arranged theoretically are very valid it means they can be implemented and verified in the field.

Keywords: Morality, Euthanasia, Problem, A dilemma, Students

Introduction

Current development produces various thoughts and technology inventions which had an impact on shifting perspectives, social and cultural values. In 1945 Constitution of the Republic Indonesia written that health is one of the fundamental rights of every human being. So many people who suffer from serious illness, undergo long-term treatments and conditions with morbidity and high mortality are at risk for depression and hopeless thought that pain will ended by death. Based on that thought, people finally found a new way of death, in Greek term known as euthanasia (eu means good and thanatos means dead) which literally means death well without suffering. According to Sutarno, euthanasia is the act of killing a patient or letting the patient die naturally, where the patient suffers from an incurable disease according to medical science, with the aim of shortening the patients suffering.

Euthanasia brings many pros and cons from various aspects, both medical, social, cultural and religious. In terms of religion, in Indonesia it has been regulated in the MUI fatwa that euthanasia is murder based on media considerations for people with diseases that are no longer possible to be cured. However, the essence of life is entrusted by the Almighty God so that it must not be ignored. The law of killing in the Qur’an is very clear forbidden, as in surah Al-An’am verse 151 which means “And do not kill a soul that is forbidden by Allah (to kill it) but with a right cause.” Killing in this verse is all forms and types of murder including euthanasia especially active euthanasia, while what is meant by the right cause is for example in the war against infidels. Whereas the prohibition to do passive euthanasia is one of them in surah An-Nisa verse 29 which means “And do not kill yourself, verily Allah is Merciful to you.” Even in the conditions of infectious diseases, euthanasia is avoided as much as possible. For example for sufferers of AIDS, isolation action on sufferers is seen as a better solution than eliminated his life (euthanasia).

The issue of euthanasia when viewed from the aspect of criminal law and human rights in Indonesia
is still caused the endless debate between the provision of human rights and the contradiction of national law, especially the Criminal Code which is applied in Indonesia. Basically, euthanasia is still prohibited in the criminal law system or health law in Indonesia, no matter whatever the reason is and whoever request it individually for their own selves or those who request euthanasia for their families are all still forbidden.12

Every efforts that have been made of course lead to pros and cons, moreover South Kalimantan has been known as “religious regions and have many theologians”. Moreover, it will give an impact to the community especially “students” who have family members who suffer from chronic illness while there is a desire of family members to choose euthanasia as the way out of pain.

According to it has become an axiom in education that education will achieve the most Dewey said that morality is related to moral is things that are related to prohibitions and actions that speak incorrectly or correctly.2,9,14

Martin Hoffman complements of Piaget and Kohlberg’s work by paying the attention to the role of cognitive abilities and reasoning skills in explaining moral behavior. Hoffman argues that empathy for the suffering of others or called emphatic distress. Cognitive abilities determine the types of emphatic distress that a person can experience and as a consequence, empathic abilities develop in a pattern resembling levels.15 Thus all stages of moral development proposed by Piaget and Kohlberg can be predicted, taught and identified in students.10,18,19,21

Based on above description, research studies on moral development have not been carried out in Biology science learning field. Meanwhile, in biology we cannot be separated from things that related to God’s power and good morals towards disease and its treatments.22,23 Biology teaches how to behave towards ourselves and others. Biology instills these values without patronizing, obtained consciously by students through a process, so that it can increase the power to receive/store that information.

This problem has never been examined before, therefore moral dilemma research in the issue of euthanasia is expected to produce a moral representation of students about euthanasia. This also will contribute to biology study in Junior High School level in psychotherapy substance uses, treatment aspect assessments, law and human rights aspects.

The purpose of this study was to produce an overview of the moral development of Junior High School students in the problem of euthanasia through problem solving.

Method

This research is a type of research and development. The aims to develop research instruments about the stages of students’ moral development for each stage through solving the problem of euthanasia.

Design: This study uses a model of ASSURE development which developed by Heinich, Molenda, Russell and Smaldino.3 Broadly speaking this research was carried out in two parts of the series of instrument development activities. The first part is formulating the initial theory (draft stage of the moral development of the problem of euthanasia) hereinafter abbreviated as TPM2BS.

The second part is designing data collection instruments and product testing (instruments), followed by expert validation and readability tests for students.

Developed Instruments: The developing instruments include Defining Issue Test (DIT) which adapted from Rest (1999), this used to measure the stage of student moral development. DIT was modified by using a moral dilemma discourse on the problem of euthanasia. Discourse related to science-biology learning material that has been taught by the teacher is Addictive and Psychotropic Substances.

Research Subjects: The subjects of the study consisted of learning experts and educational practitioners as validators of the research instruments which amounted 5 (five) persons. While the research subjects for readability test came from VIIIth grade students of junior high school. Determination of research subjects came from class 8th junior high school with considerations: a) subjects were at a formal level who were able to think more abstractly, b) moral development of subjects tended to be more rigid in looking at right and wrong than older children, c) material about Various Organ Systems in humans, chemicals in the fields of industry and health, as well as chemicals in foodstuffs have been studied by students on grade 7th in the previous material.
Data Analysis Technique: Analysis of data from DIT validation, written assignments, and interview guidelines was carried out based on Table 2. The results of validation from the validator or expert if the research instrument was declared valid, then the research instrument was feasible to use based on the validator’s suggestion. Readability test, analysis activities carried out by identifying research instruments that are not well understood by students, then make revisions based on the results of the identification.

### Table 1: Assessment criteria

<table>
<thead>
<tr>
<th>No.</th>
<th>Validity Criteria</th>
<th>Validity Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>4 ≤ P &lt; 5</td>
<td>Very worthy/Valid</td>
</tr>
<tr>
<td>2.</td>
<td>3 ≤ P &lt; 4</td>
<td>Decent/Valid</td>
</tr>
<tr>
<td>3.</td>
<td>2 ≤ P &lt; 3</td>
<td>Middle</td>
</tr>
<tr>
<td>4.</td>
<td>1 ≤ P &lt; 2</td>
<td>Less</td>
</tr>
</tbody>
</table>

Calculation of the reliability of device assessment instruments uses the following formula:

$$R = \frac{A}{D + A} \times 100\%$$

**Explanation:**

- $R$ = Instrument Reliability (percentage of agreement)
- $A$ = Frequency of match between the two assessors (agree)
- $D$ = Frequency of discrepancy between the two assessors (disagree)

Device assessment instruments are said to be reliable, if the reliability is $\geq 75\%$.

### Results and Discussion

#### a. Results of Hypothetical Theory Validation

**TPM2:** Validation of the draft stage of moral development the problem of euthanasia to experts to find out the validity of the content and the theoretical constructs developed. Content and construct validity is obtained through the assessment of 3 experts. Assessment is given through a validation sheet with a suggestion/comment column. The results obtained and the summary are presented in Figure 2 and Table 3.

![Fig. 2: Graph of Validation Results TPM2E by Experts](image)

The results of the validation carried out by the expert, obtained an average score for the stage assessment aspects as much as 4.50(very valid), for the content aspect getting a score 4.67(very valid), and language assessment aspects getting score 4.67(very valid). The overall average results obtained for TPM2E based on the expert validation test amounted to 4.61 with a very valid category.

Based on the results of the validation carried out by the expert, the average score for the stage assessment aspect was 4.50(very valid), the content aspect got a score of 4.67(very valid), and the language assessment aspect got a score of 4.67(very valid). The overall average results obtained from this TPM2E based on the expert validation test amounted to 4.61 with a very valid category, while for reliability obtained 96.31%.

The results of this assessment indicate that TPM2E and the theories compiled theoretically are very valid, it means that the stages and theories are in accordance with what was revealed, and the researchers’ mindset to construct that stage is acceptable. This is consistent with the opinion of Rest\(^{13}\) that some researchers have tried to develop new methods to identify someone’s moral development. The moral that is held and believed by a person does not run stagnant, but
experiences the stages of moral development found four prominent moral developments in one’s development based on spiritual life factors, moral awareness, moral emotion, and post-conventional morality. Thus the content validity and construct of the theory is sufficiently fulfilling, so it can be implemented and verified in the field.

The results of this assessment indicate that written theories and assignments that are arranged theoretically are very valid, meaning the written stages and assignments are in accordance with the theory revealed, and the researchers’ mindset to construct that stage is acceptable. This means that the content validity and construct of the theory is sufficient, so that it can be implemented and verified in the field.

b. Written Validation Results: Validation of written assignments of discourse moral dilemma to experts to find out whether this moral dilemma discourse is appropriate and feasible to be used as a written task with the problem of euthanasia in junior high school. Assessment is given through a validation sheet and a suggestion/comment column. The results obtained are presented in Figure 3.

The draft written assignment was then validated to two teachers as presented in Table 2 and tested on 3 students in each school. The results of the revision of draft 2 are the final instruments that will be used in the next research. Task validity is known from the results of content and construct validation by lecturers/experts, teachers and students.

Table 2: Results of Validation of Written Tasks by the teacher

<table>
<thead>
<tr>
<th>Problem</th>
<th>Validator 1</th>
<th>Validator 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin disease</td>
<td>Worth using with small revisions</td>
<td>Worth using (without revision)</td>
</tr>
<tr>
<td>The impact of sand mining</td>
<td>Worth using (without revision)</td>
<td>Worth using with small revisions</td>
</tr>
<tr>
<td>Critical land</td>
<td>Worth using (without revision)</td>
<td>Worth using (without revision)</td>
</tr>
</tbody>
</table>

The first written assignments using the discourse of skin disease related to the concept of Negative Impact Use of Psychotropic Substances that are made in the discourse of the first task is authentic problems that often occur among people, thus providing problem solving alternatives for students. The format is quite simple and is expected to help students make solutions according to their stages.

The scores obtained only come from two validators, because there are validators who do not fill in the validation sheet. However, the non-writing validator continued to write the recommendations in writing, ie the assignments were each suitable to be used with repairs and then validated by two teachers.

Based on the results of the validation carried out by the experts, obtained an average score for the aspect assessment which is 5.00(very valid), for the construction assessment gets a score of 4.83(very valid), and the material assessment gets a score of 4.67(very valid), and language assessment 5.00(very valid). The overall results obtained from this written assignment based on the expert validation test is 4.88 with a very valid category.
obtained from this written assignment based on the expert validation test are 4.81 with a very valid category and 98.13% reliability.

The results of this assessment indicate that written assignments arranged theoretically are very valid, meaning that the written assignments are in accordance with the mindset of the researcher to construct written assignments that are acceptable. Thus the content validity and construct of the theory is sufficiently fulfilling, so it can be implemented and verified in the field.

**Conclusion**

a. Content validity and hypothetical construct theory Phase of Moral Development of Euthanasia Problems already fulfilled and can be verified in the field.

b. Validation test of 4.81 with a very valid category and reliability of 98.13% shows written assignments arranged theoretically are very valid it means they can be implemented and verified in the field.

**Source of Funding:** Domestic government

**Conflict of Interest:** There is no conflict of interest in this study.

**Ethical Clearance:** This study obtained a label of ethics escaped by the number: 780/KEPK-FKUNLAM/EC/VIII/2018 on August 10, 2018

**REFERENCE**


Effect of *ChannaStriata* Extract on the Expression of Tumor Necrosis Factor-α (TNF-α) in Rat Experience Periodontitis

Andi Mardiana Adam¹, Hasanuddin Thahir¹, Harun Achmad²

¹Periodontics Department, ²Department of Pedodontic, Faculty of Dentistry, Hasanuddin University, Makassar, South Sulawesi, Indonesia

**ABSTRACT**

Chronic inflammatory processes in periodontal disease are triggered by a number of bacteria that stimulate the body’s immune response, resulting in the release of inflammatory mediators namely cytokines which reduce the ability of cells to repair damaged tissue. Mechanical or anti-infective periodontal therapy is focused on eliminating the inflammatory process and stopping the development of the disease using certain ingredients. *Channasstriata* extract has a substantial content, such as albumin, Zn, Cu, and Fe which accelerates the healing process of inflammation and tissue regeneration. This study aimed to measure the effect of *Channasstriata* extract on inflammatory healing in Wistar rats induced by periodontitis through immunohistochemical examination on day 3 and 7 to see expression of tumor necrosis factor (TNF-α). This is an experimental study with a post-test and control group design. The sample consisted of 2 treatment groups, namely the *Channasstriata* extract treatment group, and the negative control group. The average TNF-α expression peaked on day 3 in both the control and treatment groups but was lower in the treated group. T-test showed a significant decrease in TNFα expression [p < 0.05] on day 7 the group used albumin as an additional treatment. In conclusion, the application of snakehead fish extract significantly reduced TNF-α expression.

**Keyword**: *ChannaStriata extract, Periodontal pocket, Periodontitis. TNF-α expression.*

**Introduction**

Chronic inflammation in periodontal disease is triggered by a number of bacteria that stimulate the body’s immune response, resulting in the release of inflammatory mediators namely cytokines which reduce the ability of cells to repair damaged tissue. As a result, there will be an inflammatory pathway that stimulates the process of osteoclastogenesis that causes alveolar bone destruction. The inflammatory pathway of periodontitis stimulates the secretion of inflammatory mediators including interleukin-1, interleukin-6, prostaglandin E (PGE), tumor necrosis factor alpha (TNF-α), receptor activator of nuclear factor B ligand (RANKL), and matrix metalloproteinase (MMP-8, MMP-9, and MMP-13) which aggravate chronic inflammatory reactions in the periodontal tissues. Collagen fibers become damaged so that a periodontal pocket is formed between the gingiva and teeth.¹

Mechanical or anti-infective periodontal therapy is focused on eliminating the inflammatory process and stopping the development of the disease. To restore the supporting structure of missing teeth, various regenerative procedures have been proposed, tested and evaluated in the past two decades. Previous research has supported the idea that various sources of albumin are relevant substrates for tissue regeneration applications. Albumin synthesis is stimulated by hormones, such as insulin, cortisol and growth hormone, and is inhibited by pro-inflammatory media, including interleukin-6 and tumor necrosis factor-α.²

The use of *ChannaStriata* and its products, empirically in the community and not as a source of animal protein can also be used as an alternative supplementary therapy in the process of wound healing after surgery, increasing endurance, increasing albumin and hemoglobin levels, eliminating edema, accelerating the healing process. Some previous studies have shown that *ChannaStriata* is a type of fish which has a high enough albumin content.⁴ *ChannaStriata* extract significantly increases albumin levels in hypoaalbuminemia and accelerates the wound healing process in postoperative patients.
Another study on the content of ChannaStriata extract by Santoso, et al. stated that ChannaStriata extract also contains ingredients that are essential for the human body, such as zinc [Zn], copper [Cu], and Iron [Fe], which play a role in wound healing.5

This study aims to measure the healing mechanism in periodontitis using ChannaStriata extract as an additional treatment material in periodontal treatment, by calculating and comparing the number of TNFα expressions.

**Method**

This research is an experimental study with pre-post design and control only. The study was conducted on Wistar rat samples using simple random sampling based on Federer’s formula. This study was approved by the Medical Research Ethics Committee.

Twenty-four male Wistar rats, weighing 200-250 gr, 2-2.5 months of age with 24 healthy conditions performed groin anesthesia, then induced periodontitis using silk ligature and porphyromonasgingivalis. After 14 days periodontitis, rats were divided into 2 groups of treatment, namely negative control and 100% Gabus extract. Rats were given inhalation anesthesia then curettage with gracey curette and application of albumin extract. Decapitation was carried out on days 3 and 7 after extract aplicated. Subsequently immunohistochemical histological preparations were made and examined under a microscope with 400x magnification.

**Result**

The results of statistical analysis using the t-test, showed a significant difference (p <0.05), which can be seen in table 1.

**Table 1: TNFα between control group and albumin group**

<table>
<thead>
<tr>
<th>Group</th>
<th>Hari 3</th>
<th>Hari 7</th>
<th>Mean</th>
<th>SD</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td>36.67</td>
<td>2.08</td>
<td>0.005*</td>
</tr>
<tr>
<td></td>
<td>28.33</td>
<td>1.53</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albumin</td>
<td></td>
<td></td>
<td>27.60</td>
<td>1.82</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>17.00</td>
<td>2.12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* t-test Independen

In table 1 it can be seen that there are significant differences between days 3 and 7 in the treatment group compared to the control group. This shows a decrease in TNFα expression more significantly in the treatment group than in the control group.

**Table 2: TNF Albumin and Control group in day 3 and 7**

<table>
<thead>
<tr>
<th>Hari 3</th>
<th>Kontrol</th>
<th>Albumin</th>
<th>Mean</th>
<th>SD</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>36.67</td>
<td>27.60</td>
<td>0.001*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28.33</td>
<td>17.00</td>
<td>0.000*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* t-test Independent

Table 2 shows there was a decrease in TNFα expression in periodontal pockets control group and albumin on day 3 and day 7 but lower in the group using albumin on day 7.

**Discussion**

Periodontal diseases varies by age onset, the bacteria and the host response. The host response has been identified as the primary factor determining periodontal disease progression and is influenced by other factors. The host response to antigens and irritants released by bacteria includes the local release of antibodies, lymphocyte and netroufil activation and their infiltration into the gingival tissues. The activation of lymphocytes and neutrophils is defensive and involves bacterial as well as possible tissue destruction. The cytokines like tumor necrosis factor (TNF) and chemokines produced by leucocytes lead to inflammation which is followed by attachment loss and bone resorption. TNF also reduces fibroblast activity.7,8

Serum albumin, a major plasma protein, is ubiquitous and complex in ways that are still being uncovered. By elucidatinmechanisms of the albumin molecule’s multiple roles as bindingprotein, carrier, scaffold, and active agent, we can harnesss potential for functional healing and tissue remodeling. It acts as a pro-attachment protein for mammalian cells, especially stem cells, while at the same time blocking bacterial colonization.5,9

The results showed that TNFα expression increased significantly in the negative control (SRP without Chanasta triata extract) on the 3rd and 7th days. This indicates that the 7th day in this group was still in an
inflammatory phase due to the release of TNFα as a pro-inflammatory cytokine. The negative control group showed lower TNFα expression and decreased again on day 7 indicating the inflammatory process had subsided and transformed into the proliferation phase.

Research in groups given snakehead fish extract showed lower expression of TNFα than other groups on day 3 and decreased day 7. This proves that cork fish extract has several components, including albumin, iron, zinc, and copper, proven to be able to accelerate wound healing. Research results from Restiana, et al. showed that Haruan extract is one type of fish that is rich in albumin. Albumin is needed by the body every day, especially for the healing process.

It is still largely unknown which bioactive compound(s) of Haruan had involved in the anti-inflammatory mechanism. It had been suggested that high content of docosahexaenoic acid (DHA) in Haruan could have contributed to the anti-inflammatory action. Notably, DHA had been shown to suppress the production of some inflammatory mediators including TNF-α, IL-1β and COX-2. It is also possible that several major fatty acids including palmitic acid, stearic acid and linoleic acid, which are abundant in Haruan, have contributed to the anti-inflammatory effect of Haruan as they had been reported to inhibit both COX-1 and COX-2.10,11

Conclusion

ChannaStriata extract can decrease TNF expression in periodontal pocket so it can be use as a adjunct in periodontal treatment.

Conflict of Interest: There is no conflict of interest in this study.

Source of Funding: Domestic government

Ethical Clearance: This study obtained a label of ethics escaped by the number: 0101/PL09/KEPKFKG - RSGMUNHAS/2018 and register number UH 17120068 on Oktober 9, 2018.

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Effect of Moringa Leaf Extract (Moringa Oleifera) on Increasing the Number of Osteoblasts as a Marker of Bone Remodeling

Arni Irawaty Djais¹, Hasanuddin Thahir¹, Muchammad Hatta², Harun Achmad³, Melyanti Sari⁴
¹Department of Periodontology, Faculty of Dentistry, ²Department of Microbiology, Molecular Biology and Immunology Laboratory, Faculty of Medical, ³Department of Pedodontia, ⁴Professional Program Students, Faculty of Dentistry, Hasanuddin University, Makassar

ABSTRACT

Introduction: The process of bone remodeling will continue to occur when a balance between cell activities such as osteoblasts and osteoclasts also occurs. This process is controlled by hormones such as estrogen. Estrogen is known to increase the process of osteoblast differentiation and bone formation so that estrogen therapy is currently considered an effective therapy in preventing bone damage. The activity of estrogen hormone is similar to phytoestrogen activity. One type of phytoestrogens is quercetin. One of the plants in nature which contains the most quercetin is Moringa oleifera.

Objective: To determine the effect of quercetin obtained from natural ingredients namely Moringa leaf extract to increase the number of osteoblasts as a marker for bone remodeling.

Literature Review: Leaf extract of Moringa oleifera plant contains many flavonoids. One of the most common types of flavonoids found in Moringa plants is quercetin. Quercetin is proven to increase bone formation by suppressing osteoclast formation and activity. Quercetin also has anti-oxidant and anti-inflammatory effects.

Conclusion: Leaf extract of Moringa oleifera plant can increase the number of osteoblasts as a marker of bone remodeling.

Keywords: Moringa leaf extract, quercetin, osteoblasts, osteoclasts, bone remodeling

Introduction

The process of bone remodeling is likened to a “circle” that will continue to occur when a balance between cell activity also occurs. These cells are osteoblasts and osteoclasts. Osteoblasts are cells that can produce bone organic matrices and stimulate the mineralization process. Whereas osteoclasts are one type of exocrine cell that prevents bone mineralization and can chemically damage the extracellular matrix. The process of bone resorption by osteoclasts is systemically controlled by four main hormones, calcitonin, PTH, vitamin D³ (1,25 vitamin D³), and estrogen. The main role of estrogen in the skeletal system is bone-sparing hormone which acts as a receptor produced by osteoblasts and osteoclasts. This hormone is very crucial in regulating the survival of osteoclasts and can cause osteoclast apoptosis.¹ The activity of estrogen hormone is similar to the activity of phytoestrogens (estrogen-like activity), but the effect is still under the hormone estrogen. However, phytoestrogens are known to be safer in long-term use because they come from plants.²

Quercetin is the largest polyphenol compound in nature, which belongs to the flavonoid group. Flavonoids have antioxidant effects and have bioactivity as a drug. These compounds can be found in stems, leaves, flowers, and fruit. Quercetin is also categorized as water-soluble pigments that cannot be produced by humans. Quercetin is also called phytoestrogen. Phytoestrogens are components of non-steroidal plants that can bind to estrogen receptors (ERs) and have estrogen-like action. As is known, estrogen is known to increase the process of osteoblast differentiation and bone formation so that estrogen therapy is currently considered an effective therapy in preventing bone damage.³ One of the plants in nature which contains the most quercetin is Moringa oleifera.
Based on this description, this paper is a literature review about effect of quercetin (phytoestrogens) obtained from natural ingredients namely Moringa leaf extract on increasing the number of osteoblasts as markers of bone remodeling so that it can be used as literature for the development of research for bone remodeling therapy in humans and utilization of herbal ingredients, especially Moringa oleifera.

**Bone Structure and Bone Remodeling Process:**

Bone is a dynamic network that has a complex cellular regeneration system. Bone consists of 4 types of cells namely osteogenic cells (osteoprogenitor), osteocytes, osteoblasts, and osteoclasts.4

**a. Osteogenic cells (osteoprogenitor):** Osteogenic cells are pluripotent stem cells that have not differentiated and originate from mesenchymal connective tissue. These cells are usually found on the surface of the bone in the inner layer of the periosteum, in the endosteum, and in the vascular ducts of the fracture bone. There are two types of osteoprogenitor cells: 1) preosteoblasts that have little endoplasmic reticulum and will produce osteoblasts; and 2) preosteoclasts which contain more free mitochondria and ribosomes, and produce osteoclasts.

**b. Osteocytes:** Osteocytes or bone cells are osteoblasts which are buried in the bone matrix. The amount ranges from 90-95% of the total number of cells. It is the most cell and has the longest life span in bone (up to 25 years). Electron microscopy shows that the osteocytes and branches do not attach directly to the surrounding matrix, but are separated from the walls of the lacuna and canaliculi by thin amorphous regions. This area seems to function as a metabolite exchange medium.

**c. Osteoblast:** Osteoblasts are cuboidal cells along the bone surface. The amount is about 4-6% of the total number of cells in the bone and the cell that has the most role in bone formation. Osteoblasts are derived from mesenchymal stem cells (MSC), but can also be derived from osteogenic cells. Osteoblasts make, secrete, and precipitate organic elements of the new bone matrix called osteoid. Osteoblast contains an alkaline phosphatase enzyme which indicates that these cells are not only related to matrix making, but also to their mineralization. Osteoid is a bone matrix that has not calcified, is newly formed, and does not contain minerals, but shortly after deposition, the osteoid is immediately mineralized and becomes bone.

**d. Osteoclasts:** Osteoclasts are large multinuclear cells located along the bone surface where resorption, remodeling, and bone repair occur. Osteoclasts are often found in a shallow curve in bone that is absorbed or enzymatically eroded called lakuna Howship. Osteoclasts which were originally inside the bone came from monocyte-like precursors. These cells secrete collagenase and other proteolytic enzymes which cause the bone matrix to release part of the calcifying base substance. After the resorption process is complete, the osteoclasts disappear, degenerate or change again into their original cells.

The remodeling process is two stages of cellular activity that occur cyclic, namely the resorption of old bones by osteoclasts and new bone formation by osteoblasts. First of all, osteoclasts will resorb through a proteolytic acidification and digestion process. As soon as osteoclasts leave the resorption area, the osteoblasts invade the area and begin the formation process by secreting osteoid (matrix of collagen and other proteins) which then undergo mineralization. Normally, the speed of resorption and bone formation takes place at the same speed so that bone mass remains constant.

Resorption activity and bone formation are regulated by various complex systemic factors. The balance between osteoclastic and osteoblastic activity is maintained by a constant supply of steroid hormones in bone cells. Disruption in the regulation is evident in aging and estrogen hormone deficiency. In addition to age and menopause, risk factors also known to affect bone mass and density include initial bone density (brought at birth) and calcium availability. Another factor that plays a role in regulation of bone remodeling is vitamin D, where vitamin D supplementation has been shown to increase bone density, even in menopausal women. Parathyroid hormones can increase bone resorption by releasing calcium from the bone matrix into the blood circulation to keep blood calcium levels normal. Other regulators are parathyroid hormones and various cytokines and enzymes which act as coregulators and coreceptors in the differentiation and activity of bone cells.1,4
**Moringa oleifera and Quercetin leaves extract:**

*Moringa oleifera* is one of the herbal plants, belonging to the family Moringaceae and is native to South Asia.5 All parts of this plant such as leaves, roots, stems, fruits and flowers are beneficial for health. Leaves from Moringa plants are the most frequently processed parts for consumption as well as herbal medicines.5

The largest chemical content in Moringa leaf extract is flavonoids. Flavonoids have the benefit of overcoming microbial infections due to the presence of benzo-γ-pyronone bonds in flavonoids. Flavonoids have been shown to have a positive effect on chronic diseases associated with oxidative stress. Most flavonoids are found in the leaves of Moringa plants. One of the most common types of flavonoids found in Moringa plants is quercetin, with a concentration of 1362.6 mg/kg).9 Quercetin is a strong anti-oxidant. This is because quercetin consists of three clusters that help maintain stability and act as antioxidants when reacting with free radicals. The three groups are: O-dihydroxyl group on ring B, 4-oxo group in conjugation with 2,3 alkenes, and 3- and 5-hydroxyl groups. The functional group can donate electrons to the ring which will increase the number of resonances of the benzene structure of quercetin compounds. Another benefit possessed by quercetin is that it can reduce oxidative stress reactions (ROS) in the brain neuron, effective as an antiviral agent (such as HSV-1, parainfluenza type 3, pseudorabies, and cardio viruses), as anti-cancer, as well as anti-inflammatory.8

**Correlation of Quercetin and Bone Remodeling:**

Based on the results, leaves of Moringa plants are very rich in flavonoids. Flavonoids are chemicals in plants which are very important in health. The most common type of flavonoids found in Moringa leaves is quercetin.9,10

Quercetin is the main phytoestrogen found in plants. Phytoestrogens are components in non-steroidal plants that can bind estrogen receptors (ERs) and have estrogen-like activities.11 Estrogens have an important role in bone tissue hemostasis in the form of estrogen levels decreasing during menopause is the main cause of bone damage and osteoporosis. The mechanism of action of estrogen in bone tissue is completely unknown, but several studies have reported that estrogen preserves bone hemostasis by inhibiting osteoblast and osteoclast apoptosis and preventing excessive bone resorption. Estrogen suppresses the formation and activity of osteoclasts as estrogen inhibits osteoclast apoptosis. Estrogen inhibits osteoclast formation by inhibiting the synthesis of osteoclasogenic cytokine RANKL by osteoblasts and osteocytes. In addition, estrogen inhibits osteoclast formation through reducing levels of other osteoclasogenic cytokines such as IL-1, IL-6, IL-11, TNF-α, TNF-β, and M-CSF.12,13

The estrogen activity described above is the same as phytoestrogen activity, the difference lies in the source. Estrogen cannot be produced by plants, while phytoestrogens can only be produced by plants, except algae. Therefore, phytoestrogens began to be developed in skeletal therapy. Interesting phytoestrogens are studied because they have the potential to prevent and treat diseases such as osteoporosis, menopausal symptoms, and so on. Kanno et al. reported that there were effects of phytoestrogens and estrogen on the differentiation of osteoblasts using MC3T3-E1 cells, an osteoblast cell in mice. Phytoestrogens increase alkaline phosphate activity and stimulate bone mineralization in these mouse cells. This shows that there is a possibility that quercetin can improve the process of bone formation locally. The effect of quercetin on the differentiation and proliferation of human adipose tissue-derived stromal cells (hADSC) also began to be investigated.14

Quercetin also has anti-oxidant and anti-inflammatory effects. In a study conducted by Napimoga et.al., quercetin can inhibit bone damage in mice that experience periodontitis. The mechanism of action of quercetin is to reduce the production of inflammatory molecules, inhibit intracellular entry pathways such as mitogen-activated protein kinase (MAPK) and NFKB so that inflammation and oxidative stress decrease, and inhibit cytokine production (IL-1β, TNF-α).15 As it is known, increasing the amount of TNF-α will lead to increased osteoclast activity. In another study it was stated that TNF-α was actually produced by osteoblasts and superimposed by binding to RANK receptors (receptor activator for nuclear factor kB) macrophages which would later lead to differentiation of macrophages into osteoclasts and increase bone resorption. TNF-α production by either macrophages or osteoblasts alone caused by infection can cause an increase in the number of osteoclasts which in turn causes an increase in bone resorption activity and decreases bone density. If the production of TNF-α can be inhibited, then of course osteoclast production can also be inhibited.16
Quercetin is found to increase osteogenic differentiation at certain doses (the dose of flavonoids in the body is around 23 mg, of which 60-75% is quercetin). Quercetin in excessive amounts can also cause toxic effects. A case report states that a 69-year-old man was diagnosed with carcinoma of the heart after consuming quercetin (400 mg/day) and bromelain (100 mg/day). Normally, the supply of quercetin from fruits and vegetables in the body is 15-40 mg/day. However, for therapeutic purposes such as allergic, anti-inflammatory, and other diseases, quercetin can be prescribed. The therapeutic dose of quercetin ranges from 250-500 mg three times a day. Quercetin is available in capsules (250 mg, 300 mg and 500 mg) and tablets (50 mg, 250 mg and 500 mg). Recommended quercetin doses for adults vary depending on the patient’s health condition during treatment.

Conclusion

Based on the literature review that has been done it can be concluded that the leaves of *Moringa oleifera* are rich in flavonoids. The most common type of flavonoids is quercetin. Quercetin is proven to increase bone formation by suppressing osteoclast formation and activity. Quercetin also has anti-oxidant and anti-inflammatory effects. Quercetin can reduce the production of inflammatory molecules, inhibit intracellular entry pathways such as mitogen-activated protein kinase (MAPK) and NFkB so that inflammation and oxidative stress decrease, and inhibit cytokine production (IL-1), TNF-α. As is known, increase the amount of TNF-α will increase osteoclast activity.

Conflict of Interest: There is no conflict of interest in this study.

Source of Funding: Domestic government

Ethical Clearance: This study obtained a label of ethics escaped by the number: 0038/PL09/KEPKFKG - RSGMUNHAS/2018 and register number UH 17120029 on Oktober 8, 2018.

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Oral Health Condition among Kindergarten Children in Relation to Salivary soluble Cluster of Differentiation 14 and Tool Like Receptor 2 (Comparative study)

Aseel Taha Khaudyer¹, Ahlam Taha Mohammed², Batool Hassan Al-Ghurabi³
¹Department of Pedodontic, ²Department of Pedodontic and Preventive Dentistry, ³Department of Basic Science, College of Dentistry, University of Baghdad. Iraq

ABSTRACT

Oral health of preschool children can be deteriorating by dental caries and periodontal disease. Early childhood caries is highly prevalence dental public health problem that affect the primary tooth in children below the age of 71 months. Salivary soluble cluster of differentiation 14 and salivary toll like receptor 2 are proteins that have the ability to recognize different bacterial component and play role in prevention of infection. This study was conducted to determine the salivary levels of soluble cluster of differentiation 14 and soluble toll like receptor 2 in children with active dental caries and caries-free controls and found the correlation with gingival parameter. Sixty children with an age range between (4-5) years were participated in this study; they categorized into two groups, 30 children with severe stage of early childhood caries as the study group and 30 caries free children as the control group. Oral examination done by recording decay, missing, filled surfaces, measuring dental caries severity, gingival health status was assessed by using gingival index, in addition to plaque index. Saliva samples were collected from both groups. Enzyme-linked immunosorbent assay was carried out to estimate the salivary level of soluble cluster of differentiation 14 and soluble toll like receptor 2. The present study found significant elevation in the mean level of soluble cluster of differentiation among early childhood caries group, moreover there are no differences in mean level of soluble cluster of differentiation between caries severity groups. On the other hand, a positive non-significant correlation was found between the concentration of soluble cluster of differentiation in both groups and each of plaque index and gingival index. Regarding the soluble tool like receptor 2 a higher level in caries active group than caries free group was revealed without significant difference between them. Significant differences in soluble tool like receptor 2 mean levels was found between caries severity group. Furthermore, positive significant correlation was observed between salivary level of soluble tool like receptor 2 and gingival index in both groups, on the other hand, positive non-significant correlation was found between the levels of soluble tool like receptor 2 and plaque index. It can be conclude that the levels of salivary soluble cluster of differentiation 14 and tool like receptor 2 increased as the oral disease progress and they may have a suspected protective role against microbial burden. Salivary soluble cluster of differentiation 14 could be an important biomarker of caries activity.

Keyword: CD14, TLR2, ECC

Introduction

Dental caries and periodontal disease are the most popular and widely spread diseases affecting populations at different ages including children. Over the past 50 years ECC has been argued so widely as a most common clinical disease occur in preschool children seven times more than fever and five times more than asthma (⁰). American Academy of Pediatric Dentistry (AADP, 2016) (⁰) defined ECC as any a sign of presence of one or more decayed (non cavitated or cavitated lesions), missing (due to caries), filled tooth surfaces in any primary tooth in a child under the age of six. The definition of severe ECC (S-ECC) is any sign of smooth-surface caries in a child younger than three years of age, and from ages three through five, one or more cavitated, missing (due to caries), or filled smooth
surfaces in primary maxillary anterior teeth or a decayed, missing, or filled score of greater than or equal to four (age 3), greater than or equal to five (age 4), or greater than or equal to six (age 5). Although the etiology of ECC similar to other types of dental caries, there is no clear recognition of its predisposing factors. However, there is no suspicion that the disease has an infectious origin, and the immunologic response by the host has effective role in its development. Salivary proteins have been revealed to have a role in the development of caries, one of these proteins is cluster of differentiation 14 (CD14). Soluble (sCD14) is a glycoprotein predominantly expressed on the surface of macrophages, monocytes and neutrophils. It plays a critical role in the recognition of multiple microbial products, such as lipopolysaccharides, peptidoglycans and endotoxins, which are main components of cell wall of Gram-negative and Gram-positive bacteria. In addition, toll like receptor (TLRs) family are part of the innate immune system that responds to the microbial associated molecules. TLR-2 is a key mediator in the innate immunity against Gram positive bacteria which is the most common cariogenic bacteria. TLR-2 have the ability to recognize the peptidoglycan of Gram positive and Lipopolysaccharide of the Gram negative bacteria respectively either alone or in organization with the common co-receptor CD14. Cytokines produced by human odontoblast-like cells in response to ligands that interact with TLR-2. These molecules are essential in coordinate the intensity of pulp response to Gram positive bacteria which are infiltrating to dentine during decay formation. Gingival diseases affecting children are various and may continue to jeopardize the periodontium of the adult. Periodontal health can also be a mirror expressing some of the systemic diseases and disorders. Early screening, diagnosis and treatment of the disease could assist rule out the cause in initial stage.

Materials and Method

Sixty children with an age of 4-5 years old were enrolled in this study during the period from December 2018 to February 2019, they were chosen from kindergartens in Tikrit city, Iraq. They were divided into two groups; 30 child with sever type of ECC according to Wyne (1999) category as the study group and 30 free caries child according to World Health Organization (WHO, 2013) criteria as the control group. Exclusion samples were children who were taking antibiotic, or any medication, children who were ate during one hour before sample collection, children who had flu or any systemic disease, any child with ECC but not as sever type. ELISA sCD14 kit (Al-shkairate establishment for medical supply. Amman, Jordan) and ELISA TLR2 kit (Al-shkairate establishment for medical supply. Amman, Jordan) were used to quantify the biomarkers. At 9-11 am at the day of the examination the selected child from the kindergarten was invited to separate room with sufficient room light and comfortable position. The examination start by measuring the dentition status by recording the decay, missing and filled surfaces according to criteria of WHO (2013) using Community periodontal probe (CPI); dental caries severity was measured according the International Caries Detection and Assessment System (ICDAS) plaque Index (PI) was measured according to plaque index criteria of Silness and Löe (1964). Gingival Index (GI) was measured according to criteria of Löe and Silness (1963). After ensuring that child not drink ate or at least 1 hour before the procedure, the method of saliva collection was explained clearly to the children, 3-5 mm of unstimulated saliva was collected by drooling method into sterilized plane tube, then the samples were transported to ice box. The whole collected samples were transferred to the laboratory immediately for centrifuge the sample to inhibit the hydrolysis of proteins. Each sample was centrifuged for 10 minutes at 400 rpm at 2-8°C. The supernatant which is about 1-2 ml was removed to eppendorf tube. The sample was stored at -20°C for further analysis. Level of sCD14 and TLR2 was quantified by sandwich Enzyme-Linked Immune-Sorbent Assay (ELISA) technology. Data description, analysis and presentation were performed using Statistical Package for social Science (SPSS version 21).

Results

Salivary sCD14 level in the study group was significantly higher than the control group (P<0.05) (Table 1). Positive non-significant correlation between sCD14 level and caries experience (ds and dmfs) was reported (Table 2), a non-significant differences in the relation of sCD14 level in study group between two different stages of caries progression (d5, d6) was revealed in Table 3, also positive non-significant correlation was found between sCD14 level and caries severity (Table 4) and a positive non-significant correlation between the concentration of sCD14 in both group with GI and PLI as shown in Table 5.
Table 1: The level of scD14, sTLR 2 among groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Study group</th>
<th>Control group</th>
<th>T-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>scD14 (ng/ml)</td>
<td>0.6028 ± 0.1288</td>
<td>0.2005 ± 0.1325</td>
<td>2.177</td>
<td>0.034*</td>
</tr>
<tr>
<td>sTLR 2 (ng/ml)</td>
<td>5.1877 ± .7315</td>
<td>3.9816 ± 0.5112</td>
<td>1.351</td>
<td>0.182</td>
</tr>
</tbody>
</table>

*Significant differences

Table 2: The correlation of scD14, sTLR2 with caries experience

<table>
<thead>
<tr>
<th>variables</th>
<th>scD14(ng/ml)</th>
<th>sTLR2(ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>P</td>
</tr>
<tr>
<td>ds</td>
<td>0.209</td>
<td>0.110</td>
</tr>
<tr>
<td>dmfs</td>
<td>0.186</td>
<td>0.154</td>
</tr>
</tbody>
</table>

*Significant correlation

Table 3: The Relation of scD14,sTLR2 with caries severity

<table>
<thead>
<tr>
<th>Severity</th>
<th>scD14 (ng/ml)</th>
<th>sTLR2(ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SE</td>
</tr>
<tr>
<td>d6</td>
<td>0.7144</td>
<td>0.1940</td>
</tr>
<tr>
<td>d5</td>
<td>0.4099</td>
<td>0.0917</td>
</tr>
<tr>
<td>d6</td>
<td>7.2305</td>
<td>.7859</td>
</tr>
<tr>
<td>d5</td>
<td>1.6592</td>
<td>.5879</td>
</tr>
</tbody>
</table>

**High significant

Table 4: The Correlation coefficient of scD14, sTLR2 and Caries Severity

<table>
<thead>
<tr>
<th>Variable</th>
<th>Severity of caries</th>
<th>r</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>scD14</td>
<td></td>
<td>0.092</td>
<td>0.628</td>
</tr>
<tr>
<td>sTLR2</td>
<td></td>
<td>0.723</td>
<td>0.000**</td>
</tr>
</tbody>
</table>

**High Significant correlation

Table 5: The correlation coefficient of scD14, sTLR with GI, PLI

<table>
<thead>
<tr>
<th>Groups</th>
<th>Variables</th>
<th>scD14</th>
<th>sTLR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>r</td>
<td>P-value</td>
</tr>
<tr>
<td>Study</td>
<td>PLI</td>
<td>0.035</td>
<td>0.853</td>
</tr>
<tr>
<td></td>
<td>GI</td>
<td>0.096</td>
<td>0.614</td>
</tr>
<tr>
<td>Control</td>
<td>PLI</td>
<td>0.012</td>
<td>0.950</td>
</tr>
<tr>
<td></td>
<td>GI</td>
<td>0.065</td>
<td>0.734</td>
</tr>
</tbody>
</table>

*Significant correlation

Regarding TLR2 level, it was higher in the study group than the control group, although the difference was not significant (P>0.05) (Table-1). Positive significant correlation between TLR 2 and each of (ds) and (dmfs) (Table-2), also highly significant differences (P<0.001) in TLR 2 concentration between different stages of caries severity (d_{6}, d_{5}) (Table-3). Positive highly significant correlation was found between the TLR2 level and caries
stage of severity (Table-4), also positive significant correlation between salivary level of TLR2 and GI in both group, while positive weak non-significant correlation was found between TLR2 with PLI (Table-5).

**Discussion**

Although ECC and gingival problem are usually not life threatening, it should be remembered that oral health is one of the most important part of the general body health\(^{(12)}\). Early childhood caries is an infectious, chronic disease affecting young children, comprises an important public health problem \(^{(13)}\). The identification of possible biomarkers to oral disease, allowing the intervention in a pre-symptomatic condition. To the best of our knowledge this is the first study in Iraq to investigate the association between ECC and biomarkers of innate immunity (sCD14 and sTLR2).

The present study revealed that the level of sCD14 was significantly higher in ECC group, also positive correlation was found between sCD14 level with (dmfs) scores and caries severity and higher level of sCD14 was found in \(d_5\) severity score than \(d_4\). This finding was in accordance with previous studies \(^{(14-15)}\). The elevation in level of sCD14 could be due to the fact that 3-5 year old children have not yet been developed specific immune responses completely. sCD14 stimulate immune response by recognizing several microbial products, such as endotoxins, LPS and peptidoglycan, which are major ingredient of Gram-ve and Gram+ve bacteria, respectively \(^{(16)}\). On the other hand this finding disagreement with the some studies \(^{(17-18)}\), the discrepancy of results among various studies may be due to sample size, type of sample (saliva or GCF) and selection of the subjects, or could be attributed to the difference in the methodology and socioeconomic status. Interestingly, this finding reinforced the hypothesis that sCD14 is an inflammatory protein that is increased in response to the ECC bacterial stimulus and fill the gap between innate and specific immune responses \(^{(19)}\). Positive weak correlation was shown between the concentration of sCD14 and PLI and GI, which was in accordance to previous study \(^{(20)}\). This findings can explained by the fact that the microbial biofilm, composed from different microbial community, one of them is Gram–ve bacteria which LPS one of the important cell wall component, as sCD14 responsible for recognize LPS and other microbial cell wall component this cleared the elevation of concentration of sCD as the gingival disease develop.

The current data also revealed that TLR2 level was higher in study group than control group but the differences was statically not significant, this contradictory to some studies \(^{(16-21)}\) that revealed there is significant increase in mean concentration of TLR-2 in ECC group. The incompatibility in the results between current study and other studies may attributed to the differences in sample age, size and the way of saliva collection. Positive significant correlation was cleared between TLR 2 level and ds and dmfs. This result was in accordance to other study \(^{(22)}\). In general the increase in sTLR-2 in carries active saliva may represent a host strategy to counter the increased Gram + ve cariogenic bacteria. This study reported a positive highly significant correlation with carries severity, as well there was a high significant differences in TLR2 concentration between \(d_5\) severity stage as compared to \(d_4\). However, there was no previous data to compare the current result with it. Positive correlation was shown between TLR and (GI) and positive non-significant correlation with (PLI). Regarding the correlation of TLR with gingival parameter in preschool children is absent. Research has determined that along with immune cells, periodontal tissues also expressed TLRs \(^{(21)}\). Since the gingiva is always exposed to bacteria present in plaque biofilm and as TLR is responsible for recognize the peptidoglycan of Gram+ve bacteria, TLR signaling play a significant role in the innate response and preservation of periodontal health \(^{(22)}\).

**Conclusion**

Dental caries and periodontal disease are the major component of oral disease. In this report, two soluble proteins, sCD14 and sTLR-2 modified in carries active saliva and in accordance carries severity, in addition a positive correlation with gingival parameter was shown. Therefore sCD14 and sTLR2 are potential biomarker for oral diseases.

**Conflict of Interest:** None

**Source of Funding:** Self

**Ethical Clearance:** Not required.

**REFERENCES**


Determination of Serum and Seminal Gamma Glutamyl transferase (GGT) on Sperm Parameter in Infertile Patients

Asmehan Adnan Al-LNaqeeb¹, Muhammed Baqir M- R.Fakhrildin²

¹Department of Basic a Science, College of Nursing, University of Baghdad; ²Prof., Jabir ibn Hayyan Medical University, Iraq

ABSTRACT

One of the enzymes created in the bile ducts is known as Gamma-Glutamyl Transpeptidase, abbreviated as GGT. It is a kind of cell surface protein, advantageous for Glutathione extracellular catabolism. The core aim of the research is to research the clinical value of seminal and serum levels of GGT in infertile and normozoospermia men, specifically in men having azoospermic (NOA) and asthenozoospermic (A) It has been noticed that the renal tissue produces maximum GGT but hepatobiliary system creates the enzyme and thus the efficacy of GGT is enhanced in the form of liver disease. The present study included 3 sections of infertile males, the total was 58, from which normozoospermia were 38, asthenozoospermia were 7 and NOA were 13, experimented in High Institute of Infertility Diagnosis and Assisted Reproductive Technologies of Al-Nahrain University, situated in Baghdad, Iraq. The considerable value of (P≤0.05) was obtained in men having Normozoospermia when they were compared with other factors of infertility. A considerable decrement (P≤ .05) was also obtained in men having asthenozoospermia in comparison to other. Assessment of seminal GGT appeared more important than serum GGT and its associated with the safety of accessory genital glands.

Keywords: Gamma-Glutamyltransferase, Asthenozoospermia, non-obstructive azoospermia (NOA).

Introduction

A great group of enzymes is found within the seminal and blood plasma, but in a lot of situations, the gland responsible for their creation hasn't been recognized yet. The seminal stages of enzymes are especially major designed for metabolism and functions of sperms in addition (2).

In the year 1973, Rosalki and Rowe obtained a greater level of GGT action in the human seminal fluid and it is linked with the existence of Semen (11, 9).

Nakanishi et al. (10) have indicated that a link exists among serum GGT and the factors of lifestyle. It was concluded that obesity, cigarette smoking, and drinking alcohol are fully linked with enhanced serum GGT and on the other hand, drinking coffee is inversely linked with serum GGT. A relationship study conducted among semen factors in Arabian horses and seminal plasma enzyme action obtained an insignificant relationship, excluding HOST and PH. Another investigation calculating the enzyme action in bovine semen specified that the enzymes are connected in bovine sperm metabolism and suggested that they can indicate the subtle symbol for the calculation of the semen quality after and before the storage, time-dependent inactivation, the seasonality assessment in the association among conservative semen factors, and enzyme activity. This is the cause to increase the enzyme tool for the purpose of evaluating the quality of semen. It has been noticed that it is not compulsory to demonstrate GGT for productive purpose but GGT has a significant part in cysteine homeostasis in the mouse procreative axis (4, 8).

Materials and Method

The case-control investigation of infertility was conducted in “High Institute of Infertility Diagnosis and Assisted Reproductive Technologies of Al-Nahrain
University in the duration of Mar-Dec 2014. The experiment was conducted in accordance with the rules of WHO (14). The study included 7 asthenozoospermic, 38 normozoospermic, and 13 azoospermic men. The analysis of semen was also conducted in accordance with the rules of the WHO (14).

The sample was gathered after the absence period of 3 to 5 days in a petri dish that was sterilized, disposable, and non-toxic. This was done in a secret room, adjacent to the laboratory to decrease the effect of temperature and to regulate the duration between the analysis and collection. The sample was marked with lab number and the name of the patient and it was then liquefied using an incubator at the temperature of 37 degrees and then the sample was mixed with care by a pipette and in the end, it was investigated deeply using microscopic and macroscopic analysis.

**Seminal Plasma Preparation and Storage:** The centrifugation was applied to the sample for a duration of 15 minutes at around 3000 revolutions per minute. The supernatant of the sample was carefully and quickly obtained and then inserted in the freezer at the temperature of around -20°C for later analysis. The CPK concentrations estimated with the help of enzymatic procedure (5).

**Blood Collection:** The blood of around 5 ml was aspirated from all the men. It was gathered in plain tubes and was permitted to clot and then it was centrifuged at around 2500 revolution per minute for the duration of 10 minutes. The samples were classified in accordance with the analysis into two main groups. The AMH concentrations were calculated using the ELISA method.

**Statistical Analysis:** The obtained data were assessed statistically with the help of SPSS software (SPSS, Chicago). Complete Randomized Design (CRD) was employed to analyze the seminal and serum amylase AMH levels and sample parameters. The Duncan multiple ranges test was then employed for testing the differences (Duncan, 1955).

**Results**

Table 1 presents the parameters of semen for men involved in the investigation. According to the macroscopic investigation, the sample, its volume, liquefaction time, and PH were normal and according to the WHO criteria (14). The microscopic examination also revealed normal results and matched with the WHO criteria. The microscopic examination includes simple grade mobility, concentration, total progressive sperm, sperm agglutination and normal sperm morphology (11).

The table one also presents the results of microscopic investigation of semen factors of asthenozoospermia which includes sperm volume, liquefaction, viscosity and PH and these results also found to be normal and matched with the WHO criteria. Moreover, the progressive sperm motility percentage was found to be minor as compared to the standard values of WHO criteria. The count of round cells was greater as compared to the normal WHO values, while all other microscopic investigation parameters were found to be normal and matched with the WHO criteria.

Moreover, the microscopic investigation of sample parameters for azoospermic men pointed out normal values for sperm liquefaction, PH and volume and they also matched with the WHO (2010) criteria, while the concentration of sperm was almost zero in comparison to the WHO (14) standard criteria. However, the count of round cells was found to be normal.

**Table 1: Sample factors for Asthenozoospermic, Azoospermic and Normozoospermic men involved in the investigation. Macroscopic Inspection**

<table>
<thead>
<tr>
<th>Semen parameters</th>
<th>Normozoospermia (no. 38)</th>
<th>Infertile patients</th>
<th>WHO (2010) criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Asthenozoospermia (no.8)</td>
<td>Azoospermia (no.13)</td>
</tr>
<tr>
<td>Semen volume (mL)</td>
<td>2.589 ± 0.17</td>
<td>1.886 ± 0.27</td>
<td>2.162 ± 0.22</td>
</tr>
<tr>
<td>Semen liquefaction (min)</td>
<td>44.026 ± 1.94</td>
<td>56.429 ± 1.80</td>
<td>44.620 ± 2.97</td>
</tr>
<tr>
<td>Semen viscosity</td>
<td>Norma</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Semen pH</td>
<td>7.711 ± 0.04</td>
<td>7.829 ± 0.09</td>
<td>7.508-0.08</td>
</tr>
</tbody>
</table>
Conted…

<table>
<thead>
<tr>
<th>Microscopic Examination</th>
<th>Sperm Concentration</th>
<th>Sperm motility (%)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>48.824 ± 3.32</td>
<td>45.571 ± 15.89</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sperm motility (%)</td>
<td>73.324 ± 1.09</td>
<td>51.143 ± 5.97</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microscopic activity (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progressive sperm motility</td>
<td>23.429 ± 3.28</td>
<td>41.750 ± 0.67</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non Progressive sperm motility</td>
<td>27.714 ± 3.18</td>
<td>25.875 ± 2.61</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immotile sperm</td>
<td>48.857 ± 5.97</td>
<td>32.750 ± 2.84</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Progressive sperm (millions/ejaculate)</td>
<td>48.969 ± 4.31</td>
<td>23.171 ± 9.29</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal sperm morphology (%)</td>
<td>37.921 ± 0.51</td>
<td>33.429 ± 1.11</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sperm Agglutination (%)</td>
<td>3.079 ± 1.03</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round cells count (HPF)</td>
<td>5.500 ± 0.55</td>
<td>8.714 ± 1.60</td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The serum GGT levels were classified in accordance with the male infertility factors and are represented in figure 1. The men having norozoospermia indicated considerable increment that is P value less than or equal to 0.05 in comparison to the other infertility factors groups and a considerable decrement was found for men having asthenozoospermia.

The seminal GGT levels were classified in accordance with the male infertility factors and are represented in figure 2. The men having normozoospermia indicated a considerable increment that is P value less than or equal to 0.05 in comparison to azoospermia groups. An insignificant difference of (P > .05) was noticed in the seminal GGT fluid level in men having normozoospermia in comparison to asthenozoospermia.

The relationship between seminal plasma and serum GGT were also classified in accordance with the male infertility factors and are represented in figure 3. A considerable decrement of (P ≤ .05) was noticed in the serum GGT level in comparison to the seminal plasma GGT.

![Figure 1: Serum GGT level (IU/L) categorized in accordance with male infertility parameter](image)

- Means dissimilar superscripts in each column are considerably diverse (P ≤ .05).
- Means alike superscripts in each column are insignificantly diverse (P > .05).
Means dissimilar superscripts in each column are considerably diverse (P ≤ .05).

Means alike superscripts in each column are insignificantly diverse (P > .05).

Discussion

It is commonly known that the prostate gland secretes GGT in seminal fluid and it is around 200x greater in comparison to the blood. The contribution of GGT in male infertility is not presented well and the stages of GGT in abnormal and normal seminal fluids are contradicting (1, 12).

The current investigation indicated a considerable decrease in the serum GGT levels in comparison to the seminal GGT levels of all age groups. A recent investigation indicated little GGT changes with age for men, however, serum GGT is linked with parameters such as age, drinking alcohol, smoking cigarette, and BMI and they are definitely related with the levels of serum GGT. The clinical variables comprise diastolic and fasting insulin, fasting plasma glucose, systolic BP, and cholesterol also specified a relationship with a baseline level of GGT (7).

A substantial decrement was found in the serum GGT level when comparing to the seminal GGT level of all infertility period groups. It has been noticed that the strong GGT activity is due to the seminal fluid and not due to the sperms. These results are found to be consistent...
with functional GGT view in which multiple factors are involved such as “blood-brain barrier”, transport at cell membranes, and the safety of the atmosphere in which the sperm is created and kept while considering the oxidation damage (13).

The prostate gland secretes GGT and its estimation in the seminal fluid can be noted for the assessment of the operation of this gland.

A considerable decrement was found in the serum GGT level of all infertility groups in comparison to the seminal plasma GGT level, however, it was noticed that GGT has an impact on the viability and production of sample because it has a great part in the glutathione structure in reducing oxidative stress on spermatozoa (6). The seminal fluid GGT level is a good indication for the recognition of contagion in the genital glands (3). The experiment found that the extensive creation of GGT seminal fluid is linked with the safety of genital glands.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Not required

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**REFERENCE**


Utilization of Lactobacillus Acidophilus FNCC-0051 Microencapsulation: Potential Benefit of Giving Combination of Sodium Alginate and Gelatin to Attributes and Role of Probiotic Against Staphylococcus Aureus

Arumentin Diana¹, Tutiek Purwanti¹, Isnaeni¹
¹Department of Pharmacy, Faculty of Pharmacy, Universitas Airlangga, Jl. Airlangga No.4 - 6, Airlangga, Gubeng, Surabaya, East Java

ABSTRACT

Background: The use of Lactobacillus acidophilus as an antimicrobial is still not optimal, even though this type of probiotic has benefits for skin health. One of bacteria causesthe turnaround cause effects of the skin is Staphylococcus aureus.

Objective: To evaluate the effect combination of sodium alginate and gelatin matrix 2.25%: 0.75% to the characteristics, viability, and antibacterial activity of probiotic microparticles.

Method: The experimental study used the ratio of sodium alginate and gelatin 2.25%: 0.75% (FI), 3% sodium alginate (FII) and 3% gelatin (FIII). Tests were carried out to assess viability (TPC method), making microparticles by extrusion method and antibacterial activity (agar diffusion method). The data obtained was analyzed by statistical tests.

Results: Particle size distribution was obtained, including 8.85 μm (FI), 9.69 μm (FII) and 5.40 μm (FIII). The viability of probiotics after being made microparticles is still in the range of probiotic minimum requirements despite a decrease. The lowest decrease in viability was 1.32% ± 0.06 (FI) and the highest decrease in viability was 14.77% ± 1.21 (FIII) which was significantly different (p <0.05). The lowest antibacterial activity test 9.27 ± 0.19 mm (FIII) and the highest antibacterial activity 10.83 ± 0.51 mm (FI) which was significantly different from FIII.

Conclusion: The combination of sodium alginate and gelatin 2.25%: 0.75% can increase the role of Lactobacillus acidophilus probiotic as antimicrobial against Staphylococcus aureus and can be an alternative in preventing infection.

Keywords: Lactobacillus acidophilus FNCC-0051, role, attributes, sodium alginate, gelatin

Introduction

Studies of probiotics and their use in various products have developed in recent years.¹ Probiotics provide health benefits if given in sufficient quantities.² Lactobacillus and Bifidobacteria are common microbes used as probiotics.³ Probiotics are widely used in the form of nutrients and orally.⁴ Probiotics can also provide health benefits such as antimicrobial activity, immunomodulators, and anti-diare.⁵ Probiotics is used in the fields of dermatology, cosmetics and preventive or therapeutic benefits, especially Lactobacillus acidophilus as an antimicrobial.⁶
The probiotic suspension has more optimal antimicrobial activity compared to probiotic supernatants. In this study *Lactobacillus acidophilus* was used in the form of probiotic suspensions that being cultured on MRS media. In topical use, it is expected that the active ingredient’s stability must be maintained, that last long enough in the skin, and released gradually by means of encapsulation in the form of microparticles.

The matrix that commonly used in microencapsulation is alginate, carrageenan, Chitosan, and protein. Gelatin is a matrix in the form of proteins that are often used in making microparticles. Gelatin is biocompatible, biodegradable, non toxic, inexpensive, swelling index good and easy to experience cross linking. Sodium alginate is also common, used as a microencapsulation matrix of probiotic bacteria. The advantage of microencapsulation using sodium alginate is easy, safe and cheap. Microencapsulation can be done by several methods, namely, emulsification, coacervation, spray drying, and extrusion.

Sodium alginate evidently has a disadvantage, namely the particles produced were too porous to protect probiotics from environmental factors. So that an alternative is needed through a combination with gelatin. The commonly used gelatin concentration is between 5-15%, the concentration of sodium alginate is 0.5-4% and calcium chloride is 0.05-1.5 M. In this effort a Crosslink is needed. Crosslinking commonly used in gelatin and sodium alginate is calcium chloride. The effectiveness of *Lactobacillus acidophilus* needs to be improved as an effort to prevent skin infections in health services. This study aimed to determine the effect of sodium alginate and gelatin combination with a ratio of 2.25%: 0.75% on particle shape and size, viability, and antibacterial activity of *Lactobacillus acidophilus* microparticles, by extrusion method, and CaCl2 1.5M cross linker.

**Method**

This study was an experimental study. Microbiological examination was carried out at the Health Laboratory Center in Surabaya and *Lactobacillus acidophilus* material came from the Center for Food and Nutrition Studies at Universitas Gajahmada. This study consisted of 3 formulas namely formula I (Probiotics + sodium alginate and gelatin combination with a ratio of 2.25%: 0.75%), formula II (Probiotics + 3% sodium alginate) and formula III (Probiotics + 3% gelatin). Sodium alginate and single gelatin were used as a comparison, compared with a combination of sodium alginate and gelatin.

The procedures in this study were carried out in several stages. The first stage was the examination of the materials, including probiotics, gelatin, sodium alginate and CaCl2. The second stage was carried out for the preparation of probiotic *Lactobacillus acidophilus* starter, optimization of growth at 0, 6, 12, 14, 18, 24 and 48 hours. In this phase the viability test was carried out by the TPC (Total Plate Count) method. Probiotics were mixed into the matrix (sodium alginate - gelatin) then viability tests are carried out using the TPC method. The next step was the formation of formula I (Probiotics + sodium alginate and gelatin combination with a ratio of 2.25%: 0.75%) , formula II (Probiotics + sodium alginate 3%) and formula III (Probiotics + gelatin 3%). Making microparticles with an extrusion method with cross linker CaCl2 1.5 M, pH checked at pH 8.5. Evaluation of the characteristics of the microparticle including the shape examination, viability and particle size distribution using an optical microscope. Activity test for *Staphylococcus aureus* bacteria with the agar well diffusion method set after preparation of *S. aureus* bacteria. Antibacterial activity tests were carried out before and after microencapsulation by measuring the diameter of the inhibition zone (mm) against *Staphylococcus aureus*. Next, to find out the equivalence of probiotic concentrations in microparticles with antibiotics, then comparing probiotic inhibitory zones that have been encapsulated with antibiotic inhibition zones (gentamicin) at various concentrations.

Qualitative examination carried out for the *Lactobacillus acidophilus* bacteria is by gram staining. Qualitative examination was also carried out an in the sodium alginate and calcium chloride matrix including organolectic examination, FTIR and DTA, and also in a gelatin matrix including organolectic examination and FTIR. The data obtained were then analyzed through statistical tests with the One-Way ANOVA variance analysis method, then analyzed by Tukey’s Honesty Significant Difference (HSD) test with a confidence level of 0.95 (α = 0.05).
Results

Identification results of *Lactobacillus acidophilus* FNCC-0051 showed that gram-positive bacteria were formed. Sodium Alginate, Type B Gelatin and Calcium Chloride used in this study have met the requirements as listed in the literature monograph. The results of pH showed in the range $5.22 \pm 0.08$ in 48 hours and $6.49 \pm 0.07$ in early hours. The minimum TPC is $1.14 \times 10^8 \pm 0.36 \times 10^8$ cfu/ml while the maximum is $3.82 \times 10^7 \pm 3.05 \times 10^7$. The highest log TPC of *Lactobacillus acidophilus* is $8.46 \pm 0.17$ log cfu/ml while the lowest is $7.09 \pm 0.13$ log cfu/ml.

Interactions between polymers and Crosslink CaCl2 solutions are characterized by the wave number of $C=O$ either shifted or disappears from alginate and gelatin. Sodium alginate-gelatin combination (2.25%: 0.75%) has the wave number of 3432.0 for the Sodium Alginate hydroxyl group and 1633.6 for $C=O$ Streching in Gelatin. The measurement results of a single raw material were found that IR spectrum (cm-1) of the sodium alginate Hydroxyl group was 3466.38 and gelatin $C=O$ is stretching was 1651.63. The results obtained from an optical microscope of 400x magnification are presented in Figure 1.

![Formula I](image1)
![Formula II](image2)
![Formula III](image3)

**Figure 1:** Microparticles form of probiotic Formula I, II, and III with 400x magnification optical microscope

The mean size of probiotic microparticles in each formula, as follow; formula I (8.85µm), formula II (9.69 µm) and formula III (5.40 µm). Based on the particle size, percentage calculation of microparticles between formulas, FIII (3% gelatin) has the smallest particle size and FII (3% sodium alginate) has the largest particle size, while the combination between the two polymers causes smaller size than just single sodium alginate and larger from gelatin. The particle size obtained from the microparticles of each formula has an unequal distribution, the smallest particle size is 3.06 µm found in formula I, II, III while the largest particle size is 18.38µm at FI, 24.5µm at FII, and 15.31µm on FIII.

The microparticle viability test results were obtained from viability percentage, which compared the TPC and Log TPC values of *Lactobacillus acidophilus* at Formula I, Formula II, and Formula III before microparticles and after microparticles. The smallest TPC value after manufacturing process of dry microparticles found in Formula III, but it still covered the required viability requirements, namely $10^6 - 10^7$ cfu/ml or log results which was 6-7 cfu/ml.

The viability decrease of *Lactobacillus acidophilus* in probiotic microparticles on the manufacturing process of microparticles (extrusion and oven). The highest decrease in viability was obtained in Formula III at 14.77% and the lowest decrease in viability was obtained in Formula I at 1.32%. The entrapment efficiency of *Lactobacillus acidophilus* in probiotic microparticles on the manufacturing process of microparticles (extrusion and oven) was decreasing compared to viability before microparticles manufacturing process. The highest entrapment efficiency obtained in Formula III at 87.94% and the lowest entrapment efficiency was obtained in Formula I at 76.35%. Viability and entrapment efficiency of *Lactobacillus acidophilus* against the microparticles manufacturing process were presented in Table 1.

<table>
<thead>
<tr>
<th>Group</th>
<th>Viability decrease</th>
<th>Entrapment Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula I</td>
<td>1,32 ± 0,06</td>
<td>76,35 ± 0,22</td>
</tr>
<tr>
<td>Formula II</td>
<td>7,27 ± 0,19</td>
<td>84,20 ± 0,16</td>
</tr>
<tr>
<td>Formula III</td>
<td>14,77 ± 1,21</td>
<td>87,94 ± 0,43</td>
</tr>
</tbody>
</table>

The results of the One-Way ANOVA test with Tukey test, it can be seen that Formula III has the highest reduction in viability against the manufacturing process of microparticles and has a significant difference with Formula I and Formula II. From the results of the One Way ANOVA test with post hoc Tukey, it can be seen
that Formula I produces the highest inhibitory activity compared to other Formulas and has a significant difference with Formula III. Table 2 presents the Tukey test results of \textit{Lactobacillus acidophilus} viability against the manufacturing process of microparticles (extrusion and oven) and One Way ANOVA test with post hoc Tukey on inhibition zone diameter for each formula against \textit{Staphylococcus aureus}.

### Table 2: Tukey’s test results of \textit{Lactobacillus acidophilus} viability on the microparticles manufacturing process (extrusion and oven) and One Way ANOVA test with post hoc Tukey of inhibition zone diameter in each formula against \textit{Staphylococcus aureus}

<table>
<thead>
<tr>
<th>Group</th>
<th>Formula I</th>
<th>Formula II</th>
<th>Formula III</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-Way ANOVA with Tukey’s test</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Formula I</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Formula II</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Formula III</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>One Way ANOVA with post hoc Tukey</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formula I</td>
<td>-</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Formula II</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Formula III</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Description: (+) = there is significant differences (-) = there is no significant differences

The highest inhibition zone produced by Formula I with value of $10.83 \pm 0.51$ mm compared to other formulas. The lowest inhibition zone produced by Formula III with value of $9.27 \pm 0.19$ mm. The results of the inhibitory activity test for each probiotic microparticles formula against \textit{Staphylococcus aureus} are presented in Table 3.

### Table 3: Diameter of inhibition zone against \textit{S. aureus} (test bacteria)

<table>
<thead>
<tr>
<th>Group</th>
<th>Inhibition Zone (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microparticles of Formula I</td>
<td>10.83 ± 0.51</td>
</tr>
<tr>
<td>Microparticles of Formula II</td>
<td>9.80 ± 0.57</td>
</tr>
<tr>
<td>Microparticles of Formula III</td>
<td>9.27 ± 0.19</td>
</tr>
<tr>
<td>Positive Control</td>
<td>12.15 ± 0.05</td>
</tr>
<tr>
<td>Negative Control</td>
<td>0</td>
</tr>
</tbody>
</table>

Description: The Data is the mean value of 3x replication ± SD, Positive Control = Gentamicin 6 ppm, Negative Control = Microparticles without \textit{Lactobacillus acidophilus}

### Discussion

This study showed the effect of a sodium alginate and gelatin combination with concentration of 2.25%: 0.75%. The effect that occurs is the size difference of the \textit{Lactobacillus acidophilus} FNCC-0051 microparticles and an increase in the role and effectiveness seen from the increase in viability and antibacterial activity against \textit{Staphylococcus aureus}. This study showed that the effect of the matrix ratio (sodium alginate - gelatin) on the rate of decline percentage in the viability of \textit{Lactobacillus acidophilus} per formula and it can be seen that FIII had the highest reduction in viability which had significant differences with FI and FII. Although there was a decrease in the viability of probiotics during the manufacturing process of microparticles from all three formulas, the number of probiotic TPCs in the three formulas still met the requirements of probiotics as antibacterial. The results of the microparticle entrapment efficiency test were obtained from percentage data on viability, the results of the viability percentage of formulas I, II, and III were 76.35%, 84.20%, and 87.94%. This can be related to the smaller particle size, the entrapment efficiency is greater because of the large surface area of the matrix.

The reason for gelatin was chosen in this study, because it has a good swelling index ability and is useful as a thermally reversible gelling agent for encapsulation. Besides the compact structure between alginate and gelatin will give small particle size and small particle size because of gelatin can fill these pores when cross links occur with CaCl$_2$, besides, gelatin has the ability of self-assembly, so that more compressed particles can be formed when compared to the use of a single alginate matrix that has very porous microparticle properties.

The method used in this study was the extrusion method because it is suitable for sodium alginate and gelatin matrix. The method is simple and inexpensive, does not damage probiotic cells, produces a high probiotic viability, and can be carried out in aerobic or anaerobic conditions. A few factors that affect microparticles formation, including the diameter of the syringe needle and the distance between the syringe needle and the cross-linked solution can affect the shape and size of the microparticles, the stirring speed also affects the microparticles, the faster the stirring speed, the smaller the particles produced.

Qualitative examination of probiotic, namely gram staining on \textit{Lactobacillus acidophilus} FNCC-0051.
was obtained from gram-positive bacteria, according to the morphological characteristics of *Lactobacillus acidophilus*, which were classified as gram-positive and rod-shaped. The results of organoleptic examination of gelatin shows that it was in the form of powder, with pale yellow granules to dark yellow, odorless and tasteless. The results of the infrared spectrum showed the same results with the literature so that it can be concluded that these results meet the characteristics of gelatin. Qualitative analysis on Calcium chloride as a cross linker also carried out, namely organoleptic and thermal analysis using DTA. The organoleptic analysis of calcium chloride showed that it was white, crystalline powder, hard, odorless and hygroscopic, whereas according to literature it was white or almost white crystalline powder, hard, odorless and hygroscopic.

**Conclusion**

Not only there is a difference in the size characteristics of *Lactobacillus acidophilus* FNCC-0051 microparticles with a combination of sodium alginate-gelatin 2.25%: 0.75% but there is an increase in role and efficacy that observed from increased viability and antibacterial activity against *Staphylococcus aureus*.

**Ethical Clearance:** This research has gone through ethical tests from Faculty of Pharmacy Universitas Airlangga

**Conflict of Interest:** The author reports no conflict of interest of this work.

**Source of Funding:** This study is done with individual funding.

**REFERENCES**


The Correlation of Sleep Quality Factors in Overweight Adolescents in a Developing Country

Nur Faizah¹, Elida Ulfiana¹, Setho Hadisuyatmana¹

¹Department of Nursing, Faculty of Nursing, Universitas Airlangga, Jl. Airlangga No.4 - 6, Airlangga, Gubeng, Kota SBY, Jawa Timur

ABSTRACT

Introduction: Good sleep quality is a significant health indicator that needed by people, especially overweight adolescence. The case of overweight adolescents in developing countries is quite significant where earlier studies suggested that overweight adolescents who have poor sleep quality will increase the risk of obesity. So an understanding of the correlation between the sleep quality factors in overweight adolescents is needed.

Objective: This study aimed to find out the factors associated with sleep quality in overweight adolescent in a developing country.

Method: The research used descriptive corelative design. Fifty overweight adolescents respondents were involved using total sampling technique. The data were collected with questionnaires and analyzed using Spearman’s Rho test (α<0.05).

Result: The results showed that stress and diet have significant correlation with sleep quality (Pstress =0.020, pdiet = 0.000) However, physical exercise and fatigue, environment, illness, drug and substance and habits before sleep (p>0.05) are not explainable because the respondents didn’t have the habits and conditions that may be correlated with their sleep quality.

Conclusion: This study suggested the factors of sleep quality in overweight adolescents related to stress and diet. The other related factors that examined did not show any association.

Keywords: Sleep quality, adolescence, overweight, obesity

Introduction

The World Health Organization (WHO) defines obesity and overweight as two different things, but both of them mean an accumulation of excessive fat in the body, which is indicated by an increase in the value of the Body Mass Index (BMI) above normal. Adolescents is one group that experiences significant overweight in decades ¹ including the number of cases of obesity in adolescents in developing countries ²³, one of them is in Indonesia. Overweight in adolescents is currently evidenced by the existence of national prevalence based on data from the Baseline Health Research of Indonesia, called Riset Kesehatan Dasar ⁴. The prevalence of adolescents who experience overweight are 7.3% (5.7% overweight and 1.6% obese). This result is far higher than year of 2010, which was only 1.4% of adolescents who were overweight. Based on a previous study in a group of adolescents at SMAN 1 Gresik, Indonesia, showed that 8 out of 10 overweight students had poor sleep quality, so an understanding of factors which related to sleep quality was needed, especially for overweight adolescents.

Overweight and obesity are nutritional problems that can occur in all age groups including adolescents. Adolescents are active individuals with a rapid growth rate (growth spurt), both height and weight. However,
multiple studies have shown that adolescents who are overweight have a greater risk of obesity in their adulthood. Adolescents who are overweight and have poor quality sleep can increase the risk of obesity.

Adolescents who are overweight tend to have poor sleep quality than normal-weight teens both submitted to polysomnography. The samples were matched for age, sex, and apnea-hypopnea index. Body mass index (BMI). Poor sleep quality refers to the insufficient NREM and REM cycle. The NREM cycle lasts for approximately one hour and the person can still listen to the sounds around him. Meanwhile in the REM cycle, it lasts for approximately 20 minutes for 6-8 hours in a night’s sleep. Both these cycles (NREM and REM) occur alternately 4-6 cycles. The impact on poor sleep quality in adolescents will affect the learning process such as experiencing decreased concentration, drowsiness during learning, and being late for school. Poor sleep quality will also have a negative impact on physical conditions, especially in overweight adolescents, namely excessive daytime sleepiness and sleep-disorder breathing. Furthermore, stress, physical exercise and fatigue, environment, illness, drugs and substance, habits before going to bed, and diet are determinants of a person’s sleep quality. Therefore, this study aimed to determine factors related to sleep quality in overweight adolescents in one of developing countries, Indonesia. The study will evaluate factors related to overweight adolescents.

**Method**

This study was conducted at SMAN 1 Gresik, Indonesia. The study used descriptive correlative design. The study used cross sectional approach. In this study used total sampling technique, by taking all members of the target population into a sample so that the final number of respondents involved in this study was 50 overweight student. The overweight category calculated based on the quarelet index (weight in kilograms divided by the square of height in meters (kg/m2)) with BMI based on The International Obesity Task Force, namely: 25-30kg/m2.

Demographic data of respondents consisted of gender, age, class, weight, and height. The instrument of this study was a questionnaire containing closed questions. The data was collected from respondents by asking to answer questions and wrote the answer on the questionnaire sheet. The study used questionnaire instrument in which contained questions consist of three parts, namely: 1. Respondent data consists of gender, age, class, weight, and height. 2. The Pittsburgh Questionnaire Sleep Quality Index (PSQI), The third part is a question related to the variable quality of sleep, namely by using The Pittsburgh Sleep Quality Index (PSQI), to measure sleep quality. 3. Questionnaire factors that affect sleep quality. Variables of factors that influence sleep quality include stress, environment, physical exercise and fatigue, illness, drugs and substance, habits before going to bed, and diet. This questionnaire consisted of 20 questions, while stress factors consist of 14 questions using the DASS questionnaire (Depression Anxiety Stress Scale). The dependent variable in this study was the quality of sleep. The data then gathered and calculated using the Rho spearman statistical test with the level of significance $\alpha = 0.05$.

**Results**

**Demographic characteristics of respondents**

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>Category</th>
<th>Amount (N)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gender</td>
<td>Women</td>
<td>29</td>
<td>58%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Men</td>
<td>21</td>
<td>42%</td>
</tr>
</tbody>
</table>

Table 1 showed the demographic data taken on men and women with the highest percentage of sex variables, namely women as many as 29 respondents (58%) and 21 men respondents (42%).
Variables measured:

Table 2: Sleep quality distribution in overweight adolescents

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sleep quality</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>Poor</td>
<td>36</td>
<td>72</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td><strong>Stress</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>22</td>
<td>44</td>
</tr>
<tr>
<td>Mild</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Moderate</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td><strong>Physical exercise and fatigue</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>No</td>
<td>34</td>
<td>68</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comfortable</td>
<td>44</td>
<td>88</td>
</tr>
<tr>
<td>Not comfortable</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td><strong>Disease</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>23</td>
<td>46</td>
</tr>
<tr>
<td>No</td>
<td>27</td>
<td>54</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Conted…

Table 2 showed that the distribution of respondents mostly had poor sleep quality as much as 36 people (72%). A total of 20 respondents (40%) experienced mild stress, and 8 respondents (16%) with moderate levels. Most of the respondents who did not do physical exercise and did not experience fatigue were 34 people (68%). Most respondents felt comfortable with the environment while sleeping as many as 44 people (88%). 27 people (54%) did not have the disease. A total of 47 people (94%) respondents did not consume drugs and substance. Most respondents had a habit before going to bed, which were 34 people (68%). Habit before sleep include watching television and praying. Most of the respondents consumed food and beverages such as eating heavy foods and drinking milk and water before going to bed as many as 40 people (80%).

Relationship between sleep quality and factors that affect sleep

Table 3: Cross tabulation of the relationship between sleep quality and factors that affect sleep

<table>
<thead>
<tr>
<th>Factors</th>
<th>Sleep Quality</th>
<th>Sleep Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baik</td>
<td>%</td>
</tr>
<tr>
<td>Stress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Mild</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Moderate</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>28</td>
</tr>
</tbody>
</table>

Sperman rho P=0,020 R=0,329

<table>
<thead>
<tr>
<th>Physical exercise and fatigue</th>
<th>Sleep Quality</th>
<th>Sleep Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>No</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>28</td>
</tr>
</tbody>
</table>

Sperman rho P=0,752
Spearman Rho statistical analysis showed that there was a relationship between stress levels and sleep quality (p = 0.020) with a correlation coefficient r = 0.329 which indicated that the strength of the relationship was weak and the direction of positive relationships meant that the higher the stress level the worse the quality of sleep. There was a relationship of diet with sleep quality (p = 0.000) with a correlation coefficient r = -0.579 which indicated that the strength of the relationship was moderate and the direction of the negative relationship meant the lower level of food consumption, the better quality of sleep. It indicated a relationship between stress factors and diet with sleep quality. There were 17 respondents (34%) who experienced mild level stress with poor sleep quality while respondents who underwent moderate stress with poor sleep quality were 7 respondents (14%). However, the factors of physical exercise and fatigue, environment, disease, medicine and substance, and habits before going to bed were not related to sleep quality (p> 0.05).

**Discussions**

The study showed stress and diet have a significant relationship with sleep quality in overweight adolescents. The results were supported by previous studies where stress experienced and eating habit or food intake before going to bed can affect difficulty in going to sleep. Most people who are under stress will eat more often because they believe that eating can overcome stress. Sleep quality is very important for the body, one of which is normal metabolic function and hormonal processes. Hormones play an important role in triggering stress and appetite for sleep quality. The cortisol is a hormone that regulates stress. In someone who experiences a high level of stress will experience an increase in cortisol levels so that it will increase the level of one’s appetite. This condition indicates a correlation between stress and weight. However, the relationship between the two factors cannot be explained through research that has
been carried out especially on the scope of sleep quality. Hormones have an important role in regulating one’s appetite due to an imbalance in the hormones leptin and ghrelin. The hormone leptin functions to capture the signal of how much fat is in the body so that it can be regulated in the breakdown of fat metabolism and the hormone ghrelin serves as a regulation of appetite, if the quality of sleep is bad there will be a decrease in leptin and an increase in ghrelin is likely to increase appetite. This indicates that adolescents who have poor quality sleep will cause an imbalance between the hormones leptin and ghrelin, which are hormone absorbers and appetite stimulants which cause metabolic disorders in the body.

The results also showed that physical exercise and fatigue, environment, disease, drugs and substance and habits before going to bed did not have a significant relationship with the quality of sleep in overweight adolescents. This is consistent with previous studies which suggested that physical exercise during the day will help a person sleep soundly at night. But heavy physical exercise can cause fatigue that will disrupt someone’s sleep patterns. However, most respondents did not do physical exercise and experience fatigue, so this study could not prove the relationship between physical exercise and fatigue with sleep quality in overweight adolescents.

Based on the distribution of data shows that as many as 88% of respondents have a comfortable environment with mostly poor quality sleep. The environment in which a person sleeps influences a person’s ability to fall asleep. Sound, level of lighting, room temperature can affect sleep quality. Furthermore, most respondents were comfortable with the room environment, so that this study could not prove the relationship between the environment and sleep quality in overweight adolescents. The disease also does not have a significant relationship to the quality of overweight adolescent sleep considering that 54% of respondents did not have a disease or physical comfort disorder both good and bad sleep quality. Based on the questionnaire filled out by respondents, they did not experience physical problems, but thought of problems before going to bed so that they were difficult to start and wake up in the morning so that good quality sleep was not achieved. There is a problem before going to bed like thinking about personal problems with friends can also interfere with the quality of sleep respondents. Physical pain and discomfort can cause sleep problems. This indicates that physical discomfort during sleep can affect a person’s sleep quality. However, the presence of other factors such as diet and stress that more affect sleep quality in respondents so that the disease factor does not prove to have a relationship with sleep quality in overweight adolescents.

Drugs and substances showed no correlation to sleep quality in overweight adolescents, given that 94% of respondents did not consume drugs and other substances that had good and bad sleep quality. Medications can affect the sleep process. Some types of drugs that affect the sleep process are types of diuretic drugs that cause insomnia, anti-depressants can suppress REM, caffeine can increase sympathetic nerves that cause sleep difficulties, beta blockers can have insomnia, and narcotics can suppress REM so easily drowsy. However, in the absence of facts about the consumption of drugs and other substances in the respondents, this study cannot prove the relationship between drugs and other substances with the quality of sleep in overweight adolescents.

This study also showed that there was no association between eating habits before sleep and sleep quality in overweight adolescents. Based on the distribution of data showed that as many as 68% of respondents have a habit before going to bed that is watching television and most have poor sleep quality. The theory stated earlier that effective bedtime habits can reduce the awakening time of someone between their sleeps. Based on the theory and results of this study states that someone who has a habit before going to bed like watching television late at night will cause the poor sleep quality. However, respondents mostly had the habits before going to bed, but in the presence of other factors that affect sleep quality such as stress and diet so this study could not prove the relationship between habits before going to bed and the quality of sleep in overweight adolescents.

**Conclusion**

The results of this study indicated that the most of respondents have poor sleep quality. Stress and diet have a relationship with sleep quality in overweight adolescents but physical exercise and fatigue, environment, disease, drugs and substance, and bedtime habits have no association with sleep quality in overweight adolescents.
Ethical Consideration: This study has obtained the feasibility of ethical review in the Health Research Ethics Commission of the Faculty of Nursing, Airlangga University, Surabaya, Indonesia with No. 130-KEPK.

Conflict of Interest: The author reports no conflict of interest of this work.

Source of Funding: This study is done with individual funding

REFERENCES


Carbon Emission Disclosure in Manufacturing Companies in Indonesia

Bangun Tri Saputro¹, Basuki¹
¹Department of Accounting, Faculty of Economics and Business, Universitas Airlangga, Jl. Airlangga 4, Surabaya, East Java

ABSTRACT

Background: Industries that are established in Indonesia with the materials of coal, oil, and gas are the largest contributors to environmental pollution. Rapid industrial development in Indonesia has a negative impact on the decline in environmental quality. Companies' participation in preventing environmental pollution creates carbon emission disclosure in contributing to reducing greenhouse gases.

Objective: This study aimed to determine the effect of firm size, media exposure, profitability, and leverage on carbon emission disclosure in companies listed on the Indonesia Stock Exchange with PROPER criteria.

Method: This study was conducted by taking samples of 144 companies from 2011 to 2013. Company samples were selected through a purposive sampling method with PROPER criteria obtained from the Ministry of Environment Publication and have been listed on the Indonesia Stock Exchange from 2011 to 2013. This study used quantitative types of research. Data were then analyzed using regression analysis.

Results: Mean carbon emission disclosure during 2011-2013 was 0.588 which showed that there was no extreme variation in carbon emission disclosure data. Mean total assets of the company in this study was 29.49. Mean profitability with Return On Asset was 0.08. The mean company revealed in the media from 2011-2013 was 0.32 (32.4%). The mean value of leverage was 0.42 (42.4%), and there was no extreme value.

Conclusion: Variables that affected carbon emission disclosure are firm size, media exposure, and leverage that significantly influence partially. However, the profitability variable did not show a significant effect on carbon emission disclosure.

Keywords: Carbon Emission Disclosure, Company, PROPER, Environmental Pollution

Introduction

Human involvement in climate change is currently a concern for some people. The Industrial Revolution that occurred in the 18th century in England caused significant changes to the development of the industry in the world, including in Indonesia. The revolution succeeded in transforming the industry which initially moved slowly into rapidly. However, these changes have a negative impact on the environment. Retention of carbon and greenhouse gases has always increased from year to year. This happens because of industrial activities that cause the transition of forest functions and the use of non-renewable natural resources, such as natural gas and coal. Environmental pollution is one of the causes of global warming until now.

In 1997, a protocol was held in Japan called the Kyoto Protocol which regulated the reduction of greenhouse gas emissions, and also established procedures, targets, mechanisms for reduction, and procedures for structuring and resolving disputes. Kyoto Protocol explained that there are three types of emission reductions that are flexible for industrial countries, namely clean development, joint development, and emission trading. In 2004, Indonesia signed the Kyoto

Corresponding Author:
Basuki
Department of Accounting,
Faculty of Economics and Business,
Universitas Airlangga
Jl. Airlangga 4, Surabaya, East Java, 60286
Email: basuki.basuki10@yahoo.com
Protocol as written in Law Number 17 of 2004. This proves that Indonesia’s efforts to participate in protecting the environment are because Indonesia has industry as large as other developed countries.

Participation in protecting the environment must also be considered by every company by reducing greenhouse gases so as to create a Carbon Emission Disclosure. Disclosure of carbon emissions has been carried out in several industrial countries, such as Australia, China, Brazil, the European Union, Mexico, India, and America. Most countries that disclose carbon emissions are developed countries. However, in Indonesia, this is still rarely found because there are still several factors that must be considered in the disclosure of carbon emissions. There are factors that influence the disclosure of carbon emissions, i.e. firm size, leverage, company performance, market to book ratio, Kyoto Protocol, Return On Assets, and Return On Equity.

The independent variables are developing country basis, leverage, profitability, growth, firm size, carbon emission, the legal system, emission trading scheme, and asset newness.

One theory that relates to disclosure of environmental social responsibility is legitimacy theory. The theory can disclose social and environmental information which then becomes a consideration in economic, social, and political factors in the business context. Legitimacy is a fact that the company discloses as a reaction to environmental, economic, social and political factors. The legitimacy will be considered in the economic performance of a company as long as the company produces profits. According to the viewpoint of legitimacy theory, the higher the leverage of a company, the greater the amount of emission disclosure. The positive coefficient has an increase in the leverage ratio of 2.14, thus increasing the level of carbon emission disclosure.

Stakeholder theory indicates that organizations get differences in demand and pressure from stakeholders. Each has different views and expectations regarding the desires of the organization that have an impact on the decision-making process. This theory is used to determine the behavior patterns of other actors other than shareholders who have an interest in each company’s activities and obtain information related to the activities of other companies. Disclosure of carbon emissions is a relatively new reporting concept and includes voluntary disclosure. In PSAK 1 of 2015 paragraph 14, it is stated that there are reports that add to the value of the company relating to the disclosure of carbon emissions.

In this study, there were four independent variables that influence the disclosure of carbon emissions, including firm size, media exposure, profitability, and leverage. The size of the firm or company has a positive influence between firm size and total assets on carbon emission disclosure because companies that have good finance will disclose information that signals that the company can prepare itself for certain times, especially regarding environmental issues to respond more timely and effectively. Submitting news about environmental disclosures involves the role of both electronic and printed media. The media has a positive influence on the disclosure of carbon emissions and is considered as the driver of the emergence of several environmental groups. Another predictor that acts as an independent variable is profitability. Profitability using Return of Asset has a strong influence on disclosure of carbon emission. In a legitimacy perspective, the relationship between leverage and disclosure of carbon emissions has a level that is inconsistent and is considered a constraint factor. Based on the background above, this study aimed to examine the factors that influence the broad disclosure of carbon emissions in companies in Indonesia.

Method

The data sources were from the Indonesia Stock Exchange which consist of the company’s annual report and sustainability report. Sampling was done by selecting the PROPER recipient companies. PROPER is a Corporate Performance Rating Program published by the Indonesian Ministry of Environment and Forestry. The company is divided into five categories which are represented in color, namely gold, green, blue, red, and black. The dependent variable used was the disclosure of carbon emissions which in its measurement used a checklist containing an information request sheet. The checklist sheet has been developed by the Carbon Disclosure Project, a non-profit organization that holds information on climate change in the world.

The category of companies chosen in this study were companies that had gold, green and blue PROPER listed on the Indonesia Stock Exchange during the 2011-
2013 period with the category of manufacturing and mining companies. The gold color indicates that the company has demonstrated environmental excellence in production or service and has ethics and is responsible for the surrounding community. Green indicates that the company has carried out environmental management more than is required through the implementation of an environmental management system and utilizing resources efficiently and carrying out social responsibility well. The blue color indicates that the company has made environmental management efforts. The data that had been collected were then analyzed using SPSS software using multiple linear regression analysis with the equation model as follows:

\[ Y = \alpha + \beta_1 \text{Size} + \beta_2 \text{Med}_\text{Exp} + \beta_3 \text{ROA} + \beta_4 \text{Leverage} + e \]

**Annotation:**
- \( Y \) = Carbon Emission Disclosure
- \( \alpha \) = Constant
- \( \beta_1 - \beta_4 \) = Regression coefficient
- \( \text{Size} \) = Firm size
- \( \text{Med}_\text{Exp} \) = Media Exposure
- \( \text{ROA} \) = Return On Asset
- \( \text{Leverage} \) = Total debt/Total asset
- \( e \) = Error

The number of samples in this study was 38 companies for three periods so that total observations were obtained as many as 114 observational data.

**Results**

In table 1, it can be seen that the disclosure of carbon emissions that have been carried out by the company in the annual report and the sustainable report is at least 0. Of the 114 samples of the company studied, there were several companies that did not report or disclose carbon emissions. Only companies with gold and green PROPER ratings have made ongoing reports. In the annual report, the company had actually provided information related to Corporate Social Responsibility but had not revealed the disclosure of carbon emissions that were outlined by companies that were the object of study. It can be said that the awareness of carbon emissions disclosure was still very low.

**Table 1: Overall Variable Data**

<table>
<thead>
<tr>
<th></th>
<th>Carbon Emission Disclosure</th>
<th>Size</th>
<th>Media Exposure</th>
<th>ROA</th>
<th>Leverage</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.58</td>
<td>29.49</td>
<td>0.32</td>
<td>0.08</td>
<td>0.42</td>
<td>114</td>
</tr>
<tr>
<td>Median</td>
<td>0.72</td>
<td>29.74</td>
<td>0.00</td>
<td>0.06</td>
<td>0.41</td>
<td>114</td>
</tr>
<tr>
<td>Maximum</td>
<td>1.00</td>
<td>32.67</td>
<td>1.00</td>
<td>0.41</td>
<td>1.49</td>
<td>114</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.00</td>
<td>26.61</td>
<td>0.00</td>
<td>-0.41</td>
<td>0.00</td>
<td>114</td>
</tr>
<tr>
<td>Std. Deviasi</td>
<td>0.32</td>
<td>1.54</td>
<td>0.47</td>
<td>0.11</td>
<td>0.22</td>
<td>114</td>
</tr>
</tbody>
</table>

**Table 2: Carbon Emission Disclosure Data for the 2011-2013 Period**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Std. Deviation</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>0.51</td>
<td>1.00</td>
<td>0.00</td>
<td>0.31</td>
<td>114</td>
</tr>
<tr>
<td>2012</td>
<td>0.60</td>
<td>1.00</td>
<td>0.00</td>
<td>0.31</td>
<td>114</td>
</tr>
<tr>
<td>2013</td>
<td>0.64</td>
<td>1.00</td>
<td>0.00</td>
<td>0.34</td>
<td>114</td>
</tr>
</tbody>
</table>

In table 2 it can be seen that the average disclosure of carbon emissions during the 2011-2013 period is 0.58. The companies as the samples of this study had made disclosures of \( 7.64 = 7-8 \) of the 18 items disclosed by the Carbon Development Program. Variations in carbon emissions disclosure data had a standard deviation value of 0.32 which indicated that there was no extreme data because the value was below the mean. Table 3 shows that the average is 29.49. The minimum value in table 4 shows a negative value. This is because the company’s ability to generate profits through the assets used had a loss.
Table 3: Data on Firm size for the 2011-2013 Period

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Std. Deviation</th>
<th>Observasi</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>29.35</td>
<td>32.67</td>
<td>26.61</td>
<td>1.58</td>
<td>114</td>
</tr>
<tr>
<td>2012</td>
<td>29.53</td>
<td>31.84</td>
<td>26.71</td>
<td>1.49</td>
<td>114</td>
</tr>
<tr>
<td>2013</td>
<td>29.60</td>
<td>31.98</td>
<td>26.65</td>
<td>1.57</td>
<td>114</td>
</tr>
</tbody>
</table>

Table 4: Data on Profitability for the 2011-2013 Period

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Std. Deviation</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>0.10</td>
<td>0.41</td>
<td>-0.03</td>
<td>0.10</td>
<td>114</td>
</tr>
<tr>
<td>2012</td>
<td>0.09</td>
<td>0.40</td>
<td>-0.05</td>
<td>0.10</td>
<td>114</td>
</tr>
<tr>
<td>2013</td>
<td>0.06</td>
<td>0.40</td>
<td>-0.41</td>
<td>0.13</td>
<td>114</td>
</tr>
</tbody>
</table>

Table 5 shows that in 2011 and 2012 the means are the same, which is equal to 0.28 and in 2013 the mean is 0.39. This shows that the company revealed in the media on average from 2011-2013 was 0.32 (32.4%). Analysis with media exposure variables is used to see the value of the role of the media in revealing every event related to carbon emissions disclosed by the company.

Table 5: Data Exposure Media for the 2011-2013 Period

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Std. Deviation</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>0.28</td>
<td>1.00</td>
<td>0.00</td>
<td>0.45</td>
<td>114</td>
</tr>
<tr>
<td>2012</td>
<td>0.28</td>
<td>1.00</td>
<td>0.00</td>
<td>0.45</td>
<td>114</td>
</tr>
<tr>
<td>2013</td>
<td>0.39</td>
<td>1.00</td>
<td>0.00</td>
<td>0.49</td>
<td>114</td>
</tr>
</tbody>
</table>

Mean leverage in the 2011-2013 period in table 6 is 0.42 (42.4%) and the standard deviation is 0.22. It showed that the mean value was higher than the standard deviation so there was no extreme value on the leverage variable.

Table 6: Leverage Data for the 2011-2013 Period

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Std. Deviation</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>0.42</td>
<td>1.49</td>
<td>0.02</td>
<td>0.27</td>
<td>114</td>
</tr>
<tr>
<td>2012</td>
<td>0.41</td>
<td>0.78</td>
<td>0.03</td>
<td>0.19</td>
<td>114</td>
</tr>
<tr>
<td>2013</td>
<td>0.43</td>
<td>0.90</td>
<td>0.03</td>
<td>0.20</td>
<td>114</td>
</tr>
</tbody>
</table>

Table 7: Data Panel Regression Test Results with Random Effect Models

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>CED</td>
<td>-1.80</td>
<td>0.69</td>
<td>-2.59</td>
<td>0.01</td>
</tr>
<tr>
<td>Size</td>
<td>0.07</td>
<td>0.02</td>
<td>3.44</td>
<td>0.00</td>
</tr>
<tr>
<td>ROA</td>
<td>-0.17</td>
<td>0.19</td>
<td>-0.86</td>
<td>0.38</td>
</tr>
<tr>
<td>Med_Exp</td>
<td>-0.07</td>
<td>0.03</td>
<td>-2.12</td>
<td>0.03</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.19</td>
<td>0.09</td>
<td>2.14</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Based on table 7, the regression analysis equation is obtained as follows:

CED = -1.80 + 0.07Size - 0.17ROA - 0.07Med Exp + 0.19Leverage
The carbon emissions disclosure constant was -1.80. This is because there was a considerable difference between the scale on the dependent variable and the independent variables. The constant value of each variable is the intersection between the x and y-axes. The value of C is the intercept value for all existing companies. The intercept value of the variables in the model explains the intercept together on the model, while the intercept value for each sample company explains the intercept for each company. To determine the value of disclosure of carbon emissions of each company, the value of C is reduced by the value of each company intercept.

Disclosure of carbon emissions has been explained by independent variables (12.87%) and other variables (87.13%) which were not mentioned in the research model. Partial panel data regression analysis on the independent variables on the dependent variable with a confidence level of 0.05 ($\alpha = 5\%$) showed that the Return On Asset variable did not significantly influence the disclosure of carbon emissions for three periods. The size of the company, media exposure, and leverage had a significant effect on the disclosure of carbon emissions for three periods.

**Discussion**

Firm size showed a significant positive effect on disclosure of carbon emissions because the larger the size of the firm, the higher the disclosure of carbon emissions. Large scale companies have greater social and political pressure compared to smaller companies. This pressure comes from the spotlight of stakeholders who want more relevant and reliable information, including information on the disclosure of carbon emissions. Large companies will do more disclosures to get high expectations in terms of the environment and the demand from several stakeholders. The size of the firm has a positive and significant effect on disclosure of greenhouses because large companies will be more open and do more disclosures to face any criticism from the public. Large companies are very aware of disclosures other than any environmental disclosures because companies with large sizes tend to be higher in disclosure compared to small companies. Media exposure showed significant and negative influence so that it had a reverse relationship with carbon emission disclosure. The media doesn’t overly expose companies that have published disclosures on carbon emissions. Companies that reveal a little will be highlighted by the media. This is not in line with the legitimacy theory which states that companies exposed to the media will tend to make disclosures as a motivational basis for companies to be better.

Profitability with a Return on Asset proxy showed a non-significant effect on disclosure of carbon emissions disclosure. The condition of the study sample showed that many companies were in a high-profit condition, but there were 6 companies that suffered losses. Return on Asset is not included in the aspect that sufficiently affects the disclosure of carbon emissions so that it is not significant and has a negative effect. The higher Return On Asset, the less disclosure of carbon emissions will be. The significance test value of the t-statistical test with the Random Effect Model estimation model with a probability value of 0.03 was less than the required significance of 0.05 ($\alpha = 5\%$). According to the theory of legitimacy, the higher the leverage ratio, the higher the amount of disclosure disclosed.

**Conclusion**

Firm size showed a significant positive effect on carbon emissions disclosure. Media exposure as an assessment criterion showed a significant negative effect on carbon emissions disclosure. Proxy profitability using Return On Asset showed insignificant results on carbon emissions disclosure. Leverage calculated by using total liabilities divided by firm size showed positive significant results. The implications of this research can be used as consideration in choosing a place to invest in companies that are more concerned about environmental conditions and preserving nature.

**Ethical Clearance:** This research is in accordance with ethical clearance, has not been published before and is not being considered for publication elsewhere.

**Conflict of Interest:** There is no conflict of interest in this study.

**Source of Funding:** This research was carried out by a team and funded independently.
REFERENCES


The Effectivity of Brain Gym and Memory Games Therapy for Improving Cognitive Function in Elderly People with Dementia

Maulana Arif Murtadho¹, Elida Ulfiana¹, Setho Hadi Suyatmana¹
¹Faculty of Nursing, Universitas Airlangga, Mulyorejo street, Surabaya (60115), Indonesia

ABSTRACT

Background: The aging process impacts cognitive impairment can cause dementia. Elderly with dementia will experience a disruption in daily activities. Dementia leads to spatial disorientation (indoor), resulting in the tendency of wandering and lost. Precautions are needed to impede the negative impact of dementia, such as an activity that can enhance the cognitive ability of elders. Brain Gym and therapeutic memory games can become a way to reduce dementia’s effect because they can stimulate the memory and cognitive ability of elders.

Objective: The purpose of this study was to compare the efficacy of therapy Brain Gym and memory games against cognitive therapy elderly with dementia

Method: This study is comparative study using sample of 16 people. The sampling technique used was total sampling. The independent variables in this study were the Brain Gym and therapeutic intervention of Memory Games. The dependent variable in this study was the cognitive function of the elderly. The instruments for this research used MMSE form and statistical tests Paired-Samples T-Test and Independent Samples T-Test.

Result: The results showed the value of the cognitive function in the intervention group therapy Memory Brain Gym and Games with the result that significant p = 1.000 p > 0.05, which means there was no difference effectiveness of an increase in cognitive function after being trained Brain Gym and therapeutic Memory Games. Both of them can improve the cognitive function of the elderly with dementia.

Conclusion: Brain Gym and therapeutic Memory Games equally improve cognitive function in older adults with dementia

Keywords: Cognitive function of elderly, dementia, Brain Gym, Therapy Memory Games

Introduction

Dementia can have an impact on emotional, physical, and psychological disorders (¹). Elderly with dementia will experience a disruption in daily activities and result in the disorientation of spatial (room), so that there is a tendency to wandering and (²). Dementia occurs due to various things. First, dementia is caused by amyloid mutations. Amyloid plaques come from larger proteins, amyloid precursor proteins or Amyloid Precursor Proteins (APP) and cause brain tissue damage. Secondly, dementia is caused by neurofibril tangling. A neurofibrillary node is a group of twisted nerve cell fibers, called helical filament pairs. Third, acetylcholine and other neurotransmitters are chemicals that are needed to send messages across the nervous system (³). Neurotransmitter deficits cause the breakdown of complex communication processes between cells in the nervous system associated with Behavioral and Psychological Symptoms of Dementia.

Corresponding Author:
Elida Ulfiana
Faculty of Nursing, Universitas Airlangga, Mulyorejo street, Surabaya (60115), Indonesia
Phone: +6281999201024
Email: elidaulfiana@yahoo.com

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In the elderly, memory is one of the cognitive functions that are often to be declined. Long-term memory is rarely changed, while short-term memory can be instantaneously deteriorates in 0-10 minutes. Some studies stated that brain gym and memory games therapy can prevent dementia. Brain gym and memory games can be used to stimulate cognitive function at every stage of the game, and are proven effective in improving cognitive function in the elderly (4).

The benefits of brain gym include reducing emotional stress and clearer mind, improving the relationship between humans and learning atmosphere/work more relaxed and happy, increasing the language and memory skills, causing people become more enthusiastic, more creative and efficient, people will feel healthier because of reduced stress and improving their learning and work performance (2). While Memory Games therapy can activate sensory functions both visual, auditory and touch receptors from the body’s surface and even provide psychomotor stimulation. The various sensory organs become thousands of information that received by the nervous system. Then integrated to determine an immediate body reaction. The memories can be stored in the brain for minutes, weeks or years and they can help determine the body’s reaction in the future (5).

Memory Games therapy is an activity that focuses on tasks or games that lead to cognitive (memory) in which the therapist guides members of therapy to take the prescribed steps (6). Memory capabilities only occur in human learning, which is a crucial process for humans by flowing information captured by the senses, forwarded, reduced, collaborated, rediscovered, and utilized (7). The purpose of this activity is to make closer the relationship between the participants, to stimulate the cognition and communication in every stage of the game, and to foster cohesiveness and sharing, and participants can socialize (8).

This study aimed to find out whether there were significant differences in the effectiveness of brain gym therapy and memory games for elderly people suffering from dementia. Furthermore this study was also purposed to identify cognitive function in the elderly group of dementia before and after therapy using both methods.

**Material and Method of Research**

This study was a comparative study, conducted by comparing the conditions before and after treatment in two groups with characteristics that are more or less the same in one analysis (2). This study intended to assess the cognitive function of the elderly before and after treatment, then the results of two group were analyzed. The design of this study is as follows:

**Table 1: Comparative study design of the influence of brain gym and memory games therapy on improving cognitive function in the elderly**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Pretest</th>
<th>Treatment</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>B₀</td>
<td>IB</td>
<td>B₁</td>
</tr>
<tr>
<td>M</td>
<td>M₀</td>
<td>IM</td>
<td>M₁</td>
</tr>
</tbody>
</table>

**Description**

B: Brain gym treatment group  
M: Memory Games treatment group  
B₀: first observation (before Brain gym)  
B₁: second observation (after Brain gym)  
M₀: first observation (before Memory games)  
M₁: second observation (after Memory games)  
IB: Brain gym intervention  
IM: Memory games therapy intervention

**Sample and the population of the study:** The target population in this study were 16 elderly people with dementia disorders who were in the nursing home. The inclusion criterion for the elderly were aged 60-70 years, experienced a decline in cognitive function at a sufficient and insufficient score, at least have ever been experienced in elementary education

**Sampling Technique:** This study used a total sampling technique which means that the number of samples is the same as the population (9).

**Variable of the Study:** The independent variable in this study was Brain gym intervention and Memory Games therapy. While the dependent variable in this study was the cognitive function of the elderly.

**Research Instrument:** The instrument in this study, in the intervention variable, was using a comparison between Brain gym which consists of activities stimulating the right and left brain (Lateral Dimension), relaxes the front and rear brain parts (Focusing Dimension), stimulates the system associated with emotional or feeling, namely the brain middle and cerebrum (Centering Dimension) with memory games therapy consists of stages of orientation, intervention, and evaluation (10).
Whereas the dependent variable used the MMSE (Mini-Mental State Examination) form, which consists of an assessment of time and place orientation, registration, attention and calculation, recall, and language skills. Patients were assessed quantitatively on these functions, perfect values are 30 (2).

### Data Analysis

The initial analysis of the data was carried out, by editing, coding, scoring, and data entry. The data was processed and statistical analyzed using the Paired-Sample T-Test with a significance level of \( p < 0.05 \) (SPSS program) with the aim of comparing between the two sample groups. The scale of the data used is ordinal.

### Results

Table 1: Cognitive function in elderly with dementia before and after Brain Gym was implemented

<table>
<thead>
<tr>
<th>No.</th>
<th>Cognitive Function</th>
<th>Before Treatment</th>
<th>Before %</th>
<th>After Treatment</th>
<th>After %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Good (MMSE value ranged from 27-30)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.</td>
<td>Moderate (MMSE value ranged from 22-26)</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>3.</td>
<td>Poor (MMSE value &lt; 21)</td>
<td>8</td>
<td>100 %</td>
<td>6</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
<td><strong>100 %</strong></td>
<td><strong>8</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

Table 1 shows that there is a cognitive function improvement of the elderly in the treatment group. With the elderly interacting in an activity, cognitive abilities will be formed because of the influence of the environment in which the surrounding environment can facilitate orientation abilities, attention to be able to stimulate a person’s cognitive functions. Besides, social influence or social transmission can support the process of the cognitive ability of the elderly.

Table 2: Cognitive functions before and after Memory Games therapy was implemented

<table>
<thead>
<tr>
<th>No.</th>
<th>Cognitive Function</th>
<th>Before Treatment</th>
<th>Before %</th>
<th>After Treatment</th>
<th>After %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Good (MMSE value ranged from 27-30)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.</td>
<td>Moderate (MMSE value ranged from 22-26)</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>37.5 %</td>
</tr>
<tr>
<td>3.</td>
<td>Poor (MMSE value &lt; 21)</td>
<td>8</td>
<td>100 %</td>
<td>5</td>
<td>62.5 %</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
<td><strong>100 %</strong></td>
<td><strong>8</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

Based on the table above, the cognitive function in the group before being the treatment was considered as poor. While the post-treatment results showed an increase in the cognitive function abilities of respondents, however, did not show an increase in cognitive function abilities as expected by researchers. This is possible because respondents experienced dementia which was aggravated by the absence of activities that could improve the memory of the respondents while in the nursing home (1).

Table 3: Cognitive function of the elderly with dementia before and after Brain Gym and Memory Games were implemented

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Brain Gym</th>
<th>Terapi Memory Games</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>Before</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>%</td>
</tr>
<tr>
<td>Good (27-30)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Average (22-26)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Conted…

<table>
<thead>
<tr>
<th>Poor (&lt;21)</th>
<th>8</th>
<th>100</th>
<th>6</th>
<th>75</th>
<th>8</th>
<th>100</th>
<th>5</th>
<th>62.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>8</td>
<td>100</td>
<td>8</td>
<td>100</td>
<td>8</td>
<td>100</td>
<td>8</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4 shows that all groups have less cognitive function values before the intervention was implemented. After Brain Gym and Memory Games therapy was implemented, there was an increase in the value of the cognitive function in both groups.

**Table 4: Cognitive function value of elderly with dementia before and after Brain gym and Memory Games therapy was implemented**

<table>
<thead>
<tr>
<th>No.</th>
<th>Brain Gym</th>
<th>Memory games Therapy</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Differences</td>
</tr>
<tr>
<td>1.</td>
<td>18</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>20</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>18</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td>20</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>5.</td>
<td>20</td>
<td>21</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>17</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>7.</td>
<td>19</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>8.</td>
<td>19</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>Mean</td>
<td>18.875</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

P = 0.007 Paired-Samples T, Test (p ≤ 0.05)  
P = 0.001 Paired-Samples T, Test (p ≤ 0.05)  
P = 1.000 (p > 0.05) Independent T Test

The results of statistical analysis using the Independent T-Test showed that the hypothesis was rejected. That means there was no difference in the effectiveness of cognitive function improvement after being treated by Brain Gym and Memory Games therapy. Because both of Brain Gym and Memory Games therapy were improving the cognitive function of the elderly with dementia.

**Discussion**

Based on the results of the study, the data shows that there was no difference in cognitive function improvement effectiveness after being treated by Brain Gym and Memory Games therapy in the elderly with dementia because both Brain Gym and Memory Games therapy improved cognitive function in the elderly. From the results in the Brain Gym treatment group, half of the respondents experienced an increase in cognitive function. While in the Memory Games treatment group, the majority of respondents had their cognitive functions increased. This is caused by severe dementia experienced by respondents, and the lack of cognitive activity in the institution which causes a dull cognitive function of the elderly. According to the results of the study, Brain Gym can improve cognitive function in elderly people with dementia. In addition, brain exercise can significantly improve the cognitive function of the elderly (11). The positive impact of Brain Gym on the elderly, after 2 weeks of implementation there has been an increase in memory (cognitive) function, concentration, attention, and alertness to reduce senility or dementia. The method of Brain Gym can improve brain performance to better cognitive function in the elderly group of dementia before and after Memory Games therapy.

Brain Gym will stimulate brain function which consists of three dimensions which are interconnected as one unit, among others: stimulating (Dimensions of Laterality), alleviating (Dimension Focusing), and relaxing (Dimensions of Certering) (2). Brain Gym itself aims to maintain the optimal balance between the right and the left brain. Brain Gym provides a repair stimulus to the fibers in the corpus callosum that provide many
two-way neural connections between the cortical areas of both brain hemispheres. Including several brain structures including the hippocampus and amygdala. Brain gym movement reactivates the neural connections between the body and brain so as to facilitate the flow of electromagnetic energy throughout the body. These movements support electrical and chemical changes that take place on all mental and physical events (12).

Decreasing cognitive function in the elderly can be inhibited by implementing Brain Gym therapy. In the application of the Brain Gym method, there is a concentration dimension for the limbic (midbrain) and cerebral cortex systems (11). Inside the cerebral cortex, there is a functional area that divides the functions of each right and left hemisphere. The brain of the left hemisphere is largely tasked with regulating the right body which functions to think logically, rationally, analyze, the ability to write and read, speak, time-oriented, and things that are detailed, while the left brain is also the center of mathematics (13).

Memory Games therapy will be able to activate sensory functions both visual, auditory and touch receptors from the body surface and even provide psychomotor stimulation. The various sensory organs become thousands of information received by the nervous system and then integrated to determine an immediate body reaction and memories can be stored in the brain for minutes, weeks or years and they can help determine the body’s reaction in the future come. Information storage is a memory process and is a synapse function (14).

Memory Games therapy allows someone especially the elderly to be able to carry out activities in a group so that it stimulates sensory abilities that will support cognitive function for action. In addition, these activities will be able to motivate the elderly to communicate, socialize and be more creative who will support the next life process. But this is not supported by the employment history of the elderly and activities in his spare time (15).

Conclusion

This research shows that there was no significant difference in effectivity between Brain Gym and therapy of Memory Games. Because both of them also enhance the cognitive function of elders with dementia symptoms.

Ethical Clearance: The study process involved participants in the survey using a questionnaire that is consistent with the ethical research principle is based on the regulation of the research ethics committee. The present study principles were carried out in accordance with the research principles. This basic implementation study of the principle ethics of respect, beneficence, nonmaleficence, and justice.

Conflict of Interest: There is no conflict of interest in this study.

Source of Funding: This research was carried out by a team and funded independently.

REFERENCES


Effects of Intensity of Reading Short Stories Activities and Retelling the Story on Elderly Cognitive Impairment

Devi Ayu Kumalasari¹, Hanik Endang Nihayati¹, Elida Ulfiana¹, Rista Fauziningtyas¹
¹Department of Nursing, Faculty of Nursing, Universitas Airlangga, Jl. Airlangga No.4 - 6, Airlangga, Gubeng, Kota SBY, Jawa Timur

ABSTRACT

Introduction: Minimizing the risk of cognitive decline in the elderly can be done by developing the brain activity, one of them is by reading the story and retelling the story again, but little attention has been paid to the intensity of reading short stories and retelling the story against cognitive impairment in the elderly.

Objective: This study aimed to determine the effect of the intensity of reading short story activities and retelling the story on the elderly cognitive impairment

Method: This was a pre-experimental study with one group pre and post-test design. The sample was determined using the purposive sampling technique, with total sample was 14 respondents who met the inclusion and exclusion criteria. The independent variable was a reading short story and retelling the story, the dependent variable was the cognitive function. The data were collected using MMSE questionnaires and analyzed using the Wilcoxon test (α<0,005).

Results: The result indicated a therapeutic effect of reading short story activities and retelling the story on the increase of elderly cognitive function (p=0.001). Most respondent experienced an increase in cognitive function in the aspects of material recall which is equal to +1.15.

Conclusion: Reading short story and retelling the story activities can be used as an intervention to improve the cognitive function of elderly. Future research is needed to confirm this study and qualitatively assessed the benefits of this study.

Keyword: reading, retelling the story, cognitive function, elderly

Introduction

Impaired cognitive function is one of the health problems that can arise in adults where the majority are elderly ¹. Possible cognitive function disorders can be in the form of forgetfulness, which is the mildest form of cognitive impairment. In this phase a person can still function normally even though it is difficult to recall information that has been studied, this kind of impairment not rarely found in the elderly so that it affects the quality of life of the elderly where it can often make the elderly feel scared, embarrassed, and have a low self-esteem ²this qualitative, grounded-theory study investigated the experiences and consequences of becoming forgetful. In-depth interviews with 32 participants were conducted and analyzed. The findings show that forgetfulness became part of daily life through 3 strategies, conceptualized as doing forgetfulness: (1. One of the nursing intervention that can be applied to overcome the problem of decreasing cognitive function is using the memory enhancement techniques that can be done through the cognitive activity, so that the results of better functioning or quality of life of the elderly can be achieved³. In 2015, 47.5 million people worldwide suffered from dementia, 58% of these were residents of developing countries, including Indonesia, and there were

Correspondence Author:
Hanik Endang Nihayati
Department of Nursing, Faculty of Nursing, Universitas Airlangga
Jl. Airlangga No.4 - 6, Airlangga,
Gubeng, Kota SBY, Jawa Timur 60286
Email: hanikendangnihay@yahoo.com
7.7 million new cases each year \(^5\). Dementia patients certainly experience impaired cognitive function, the condition complained by 39% of the elderly aged 50-59 years, increased to more than 85% at the age of more than 80 years\(^6\). The number of 80-year-old populations will increase to approximately four times to 395 million between 2000 and 2050, and the majority of the elderly population are living in the developing countries\(^7,8\) including Indonesia.

Based on preliminary data obtained by the researchers through an interview with nurses at the UPTD Griya Werdha Surabaya, Indonesia, in April 2016, there were 76 elderly people treated. The most common health problems in the elderly at the institution are dementia and hypertension, 39% or 30 of the elderly who live in the institution experience the impaired cognitive function. Elderly who can read is about 50% of the total number of elderly people that live in the nursing home. The UPTD Griya Werdha has carried out several activities to improve or maintain cognitive levels in the elderly but some of the activities have not shown a significant increase.

Cognitive health promotion in the elderly is affected by age-related changes, namely the brain degeneration, decreased reaction time, negative functional consequences, which are a mild decrease in some cognitive functions, slower reception of information, and several risk factors, namely myths regarding cognitive aging, decreased vision and hearing, side effects of alcohol and drugs, and also disease (dementia, depression)\(^3\). If the decline in cognitive function in the elderly is not immediately addressed, it can lead to an increase in the number of people with dementia. Reading stories by the elderly can improve cognitive functions, such as memory, intellectual function, and attention to the elderly, because reading is one of the cognitive activities that can stimulate the brain to think \(^9\). Storytelling can build resilience \(^10\) and reduce stress \(^11\) in the elderly. Retelling the contents of the story will trigger thinking process, where it is one of the cognitive activities that affect cognitive function. Without effective prevention there will be an increase in the incidence of cognitive function disorders in the elderly that can cause inability to carry out daily activities and dependence on others to take care of themselves. Therefore, this study aimed to determine the effect of the intensity of reading and retelling the story on the elderly at the UPTD Griya Werdha Surabaya, Indonesia.

**Method**

Location for data collection was at UPTD Griya Werdha Surabaya, Indonesia. In this study used a Pre-Experimental design with a One-group pre-post test design. This study used one of the Non Probability Sampling techniques, namely purposive sampling. The populations were elderly in the Griya Werdha UPTD Surabaya, Indonesia with 76 elderly. The inclusion criteria for the study were: (1) Elderly with mini mental interpretation status examination (MMSE) score ≤ 24; (2) Elderly who is able to read. While the research exclusion criteria are: (1) Elderly people who experience impaired vision without assistive devices and hearing senses that have not been corrected; (2) Elderly people who experience verbal communication disorders; (3) Elderly people who experience severe psychological problems when the research is still ongoing so as to disturb the concentration level of the client; and (4) Elderly people involved in other research with the same dependent variable. The samples size after being classified according to the inclusion and exclusion criteria were as many as 14 people.

Data were gathered by demographic questionnaire including age, gender, last education, occupation. The independent variable in this study was the provision of treatment in the form of reading short stories (short stories) and retelling the contents of stories carried out by the elderly. While the dependent variable in this study was cognitive function. The instrument in this study used to measure the dependent variable is the mini mental symptom examination status sheet (MMSE) as a pre-test and post-test. Mini mental status examination (MMSE) there are various questions that are used to measure cognitive function in the elderly. This questionnaire contained 11 questions consisting of 5 material aspects, namely orientation, registration, attention and calculation, recall, and language. Each question in the questionnaire has a quantitative answer in the form of a score that is if the answer is correct, then it will be given a score of 1. The score will be summed with a maximum score of 30 and a minimum score of 0. The scores obtained by respondents are summed and categorized into 4 categories, namely 25-30 not experiencing cognitive or normal function disorders, the number of scores 18-24 had mild cognitive impairment, the number of scores 11-17 had moderate cognitive impairment, and the number of scores 0-10 experienced
severe cognitive impairment. The mini mental status examination (MMSE) was measured by the researcher, then the respondent was asked to answer questions in the order of the list of MMSE questionnaires.

Other instruments needed were short stories with fable themes with 4 different titles, namely Kancil and Crocodile, Ape Becomes King, Arrogant Rabbit and Turtles, Little Frogs and Small Snakes. The theme of folklore with 4 different titles, namely Keong Mas, the Miserable Poor, Lutung Kasarung, Timun Mas. Indonesian fairy-tale theme with 4 different titles namely Bearded Weasel, Princess Melati Wangi, Putri Warna Warni, Moon that Envy Hearts. The theme that consist of advice with 4 different titles is Jack the Slacker, the Sick and the Fire, the Farmer and his Children, a bundle of wood. The theme of legend stories with 4 different titles namely Tangkuban Perahu, Telaga Pasir, Origin of the Bali Strait, Lake Toba. International fairy-tale themes with 4 different titles, Gonbe and 100 Ducks, Star Stories, Princess Rings, Five Potatoes. The tabulated data was then processed using statistical tests by using Wilcoxon test with a significant level of \( p \leq 0.05 \).

Results

Demographic characteristics of respondents

Table 1: Demographic characteristics of respondents at UPTD Griya Werdha Surabaya, Indonesia

<table>
<thead>
<tr>
<th>Demographic Data</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elderly (60-74 years old)</td>
<td>10</td>
<td>71.4</td>
</tr>
<tr>
<td>Elderly (75-89 years old)</td>
<td>4</td>
<td>28.6</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>4</td>
<td>28.6</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>71.4</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on table 1 it shows the characteristics of 14 respondents in the Griya Werdha UPTD based on the age category, the majority of respondents aged 60-74 years, namely as many as 10 people (71.4%). Based on gender, most of them are female, that is as many as 10 people (71.4%). Based on the last education level most of them have elementary education, that is as many as 5 people (35.7%). Based on previous work, most of them previously worked as entrepreneurs, as many as 6 people (42.9%). Based on free time activities, most of them are prefer to watch TV to spent their free time as many as 6 people (42.9%).

Cognitive functions before and after an intervention was given in the form of reading short story and retell the story.

Table 2: Distribution of respondents based on the level of cognitive function at UPTD Griya Werdha Surabaya, Indonesia

<table>
<thead>
<tr>
<th>Level Category</th>
<th>PRETEST</th>
<th>%</th>
<th>POSTTEST</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Function</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Severe</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Moderate</td>
<td>8</td>
<td>57.14</td>
<td>4</td>
<td>28.57</td>
</tr>
</tbody>
</table>
Based on table 2, it can be seen that most cognitive functions before intervention are moderate as many as 8 elderly (57.14%). After being given an intervention to read short stories and retell the contents of the story, most of the respondent’s cognitive functions were improved to the mild category as many as 8 elderly (57.14%). Analysis with the Wilcoxon statistical test shows that \( p = 0.001 \) so that the value of \( p < 0.05 \), this value shows that the intervention given in this study was effective in improving cognitive function in the elderly.

**Table 3**: The results of pre-test and post-test on the elderly cognitive function at the Griya Werdha UPTD Surabaya, Indonesia, based on MMSE material

<table>
<thead>
<tr>
<th>Aspect Material</th>
<th>Orientation</th>
<th>Registration</th>
<th>Attention and Calculation</th>
<th>Memory Recall</th>
<th>Language and Understanding</th>
<th>( \Delta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Pre</td>
<td>70,00</td>
<td>23,00</td>
<td>60,00</td>
<td>10,00</td>
<td>72,00</td>
<td>234,00</td>
</tr>
<tr>
<td>Post</td>
<td>81,00</td>
<td>37,00</td>
<td>63,00</td>
<td>26,00</td>
<td>83,00</td>
<td>290,00</td>
</tr>
<tr>
<td>14 Resp.</td>
<td>5,00</td>
<td>1,64</td>
<td>4,29</td>
<td>0,71</td>
<td>5,14</td>
<td>16,71</td>
</tr>
<tr>
<td>MEAN Post</td>
<td>5,79</td>
<td>2,64</td>
<td>4,50</td>
<td>1,86</td>
<td>5,93</td>
<td>20,71</td>
</tr>
<tr>
<td>( \Delta ) Pre-Post</td>
<td>+0,79</td>
<td>+1</td>
<td>+0,21</td>
<td>+1,15</td>
<td>+0,79</td>
<td>+4</td>
</tr>
</tbody>
</table>

Based on table 3 shows that most of the respondents experienced an increase in cognitive function, especially in memory recall, which is equal to +1.15.

**Discussion**

Reading short stories and retelling the contents of the story had a significant influence to the improvement of cognitive function in elderly, this is evidenced by an increase in cognitive function after intervention in respondents. The result is in line with previous studies which showed that reading activities had an effect on cognitive function of the elderly.

A high cognitive function score will prevent the elderly from experiencing a decline in cognitive function which if it continues can lead to dementia. Dementia is not a natural thing, but it is a pathological condition caused by the death or damage of brain cells so that intellectual ability decreases. Decreasing cognitive function always involves memory, usually in the form of impairment of working memory (WM), abstract thinking disorder, focusing-execution, poor decision making, and mood disorder. Reading and retelling the story’s contents considered as an activity to train the brain that can improve memory or prevent dementia as well as stimulate the mental to increase brain capacity which can result in reorganization of neuro cognitive tissue, suppress the detrimental effects of stress hormones on the brain. Engaging in cognitive activities can improve brain compensation for pathology condition by increasing brain reserves so as to protect or slow the clinical onset of cognitive disorders and dementia.

Improved cognitive function shows a significant relationship to aspect of material recall, material aspect that included in the cognitive aspects of verbal memory. Memory is a storage of the knowledge that has been obtained and to be recalled. Memory enters the brain through synapse (information flow). The three basic processes of memory are encoding (entering information), storage (storage) and retrieval (generating returns).

Based on the theory of Carol A. Miller that focused on the role of nurses in slowing down the decline or improving cognitive function of the elderly by giving intervention in reading short stories and retelling the
contents of the story to improve the health status of the elderly. Observations at the time of the intervention showed that there were some respondents who showed lack of enthusiasm and were a little inferior to other respondents because the process of reading it was long, unable to tell the story completely. One of the tasks of author as nurses is to encourage the elderly and provide motivation to the elderly to continue to follow interventions with other respondents. The patient’s demographics also affect the scope of significance of reading and retelling the story’s content of the cognitive function of the elderly. The incidence of impaired cognitive function increases with age, every 5 years of age progression the risk will be increased 2 times than normal. Gender is considered to affect one’s memory even though there is no certainty between men and women. Women are thought to be more numerous and tend to be forgetful due to hormonal influences, namely a decrease of estrogen in menopausal women, thus increasing neuro degenerative disease, because estrogen is known to play an important role in maintaining brain function. In addition, the life expectancy of women is higher than the life expectancy of men, so that the population of older women is greater than men. Then, most of the respondents were only educated up to elementary level wherein education is a very important factor in preventing cognitive impairment. Based on the research that has been done, most of the respondents previously worked as entrepreneurs. Work that emphasizes thinking skills like an entrepreneur who has a major influence on the neuropathology of cognitive function disorders. Most of the respondents spend their free time by watching television. Watching television such as entertainment programs can stimulate the audience to think, it can actually slow down the cognitive function impairment than those who watch broadcasted news.

**Conclusion**

Based on the results of the study that conducted at Griya Werdha UPTD Surabaya, Indonesia, it can be concluded that there was an increase in cognitive function assessment scores in the elderly who experienced impaired cognitive function before and after the intervention by reading short stories and retelling the contents of stories. The intensity of the activity had an effect on reducing or slowing down a cognitive function impairment in the elderly and especially in the memory recall aspect.

**Ethical Clearance:** This study had obtained the ethical feasibility in the Health Research Ethics Committee of the Faculty of Nursing, Airlangga University, Surabaya, Indonesia with No. 131-KEPK.

**Conflict of Interest:** The author reports no conflict of interest of this work.

**Source of Funding:** This study is done with individual funding

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The Influence of Dhakonan Games to Impede Dementia in Elders

Mita Nur Lathifah\textsuperscript{1}, Joni Haryanto\textsuperscript{1}, Rista Fauziningtyas\textsuperscript{1}

\textsuperscript{1}Faculty of Nursing, Universitas Airlangga, Mulyorejo street, Surabaya (60115), Indonesia

ABSTRACT

\textbf{Background:} Dementia can interfere the elderly in their daily activities. One of therapy that suitable for people with dementia is memory therapy using a traditional game, known as dhakonan.

\textbf{Objective:} The purpose of this study was to explain the influence of traditional dhakonan games on the level of dementia severity in the elderly.

\textbf{Method:} The research uses quasi-experimental design. The total sample was 20 respondents who met the inclusion criteria, namely the elderly with symptoms of dementia. The sampling technique used simple random sampling. The independent variable was a traditional dhakonan game, the dependent variable was cognitive function, depression level, and dementia level. Data were collected using a Mini Mental State Examination (MMSE) design questionnaire, Geriatric Depression Scale (GDS) questionnaire, and Functional Assessment Staging Tool (FAST). Data analysis was carried out using the Wilcoxon Sign Rank Test and Mann Whitney Test with a significance level of $\alpha < 0.05$.

\textbf{Result:} Wilcoxon Sign Rank Test obtained $p$ value $< 0.05$ for cognitive function, depression level, and dementia level in the treatment group (cognitive function, $p = 0.005$; depression level, $p = 0.005$; dementia level, $p = 0.014$). There was the influence of traditional dhakonan games on the level of dementia in the elderly.

\textbf{Conclusion:} Traditional dhakonan games can significantly improve cognitive function, reduce depression, and prevent the progression of dementia.

\textbf{Keywords:} traditional dhakonan games, elderly, cognitive function, depression, dementia

Introduction

Dementia is a neurodegenerative syndrome that arises due to chronic abnormalities and a progressive degradation in intellectual ability which results in a decrease in cognitive function, causing disruption of social functioning, work, and daily activities \cite{1}. There is no disorder of consciousness but there are impaired cognitive functions accompanied by worsening emotional, behavioral and motivational control. Risk factors that can cause dementia include vascular disease in the brain, coronary artery disease and atherosclerosis \cite{2}. The more the number of elderly people, the more likely the incidence rate of dementia, because age is one of the factors causing dementia \cite{3}.

Dementia can be overcome with a variety of therapies, one of them is memory therapy with cognitive stimulation to improve cognitive function in patients \cite{3}. Cognitive stimulation can be in the form of activity therapy, one of which is the dhakonan game. The dhakonan game will stimulate motor, cognitive, and emotion simultaneously, so that it will train one’s intellectual intelligence and emotional intelligence. Problems faced by elderly people with dementia include changes in cognitive function, behavior, decreased physical activity, mental, social function and decreased quality of life \cite{4}.
Decreasing cognitive function in dementia causes the elderly to forget easily and is not even able to maintain the newly received information. Disturbed memory can lead to a decrease in the ability to remember time, recognize people, objects, and places. Not only that, dementia also causes behavioral disorders such as easily suspicious, stubbornness, anger, depression and crying for no apparent reason and also unable to carry out daily activities independently so that the quality of life of the elderly becomes decreased. If this happens then there is no one who meets the needs of the elderly, such as fulfillment of nutrition, personal hygiene, and others. This will have an impact on reducing the health of the elderly. Another impact is caused if dementia is not handled properly, including behavioral changes in the elderly, such as forgetting oneself, opposing people around, and often wandering at night so that it is easily lost.

Dementia can be overcome by pharmacological therapy using anxiolytic agents, antipsychotic drugs, acetylcholinesterase inhibitors such as rivastigmine, donepezil, galantamine, and memantin. However, pharmacological therapy is considered detrimental because the elderly consume a lot of drugs for their physical and psychological illnesses so that other therapies need to be developed, namely nonpharmacological therapy. One of the nonpharmacological therapies is reminiscence therapy. Memory therapy can also improve cognitive function and mood in someone with dementia.

Dhakonan game is one of memory therapy that causes pleasure and trains cognitive brain. The dhakonan game trains the brain to make strategies, improve intelligence, exercise patience and honesty. Based on the statements above, the purpose of this study was to identify the level of dementia that can be indicated by observing at cognitive function and the level of depression in the elderly, before and after being given traditional dhakonan games.

**Method**

This research was a quantitative study with quasi experimental design and using a pre post test to the groups. In this study involved two groups, namely the control group and the treatment group. The treatment group was given an intervention of the dhakonan game, while the control group was not given the dhakonan game intervention, so that it could compare the changes in dementia levels in both groups. In both groups the pretest was given before the intervention, then post-test was given after intervention.

**Population and Sample:** In this study the target population was elderly people with dementia in Wedoro Village, Waru District, Sidoarjo Regency. Respondents in this study were elderly who had dementia and met the inclusion criteria, namely the elderly aged 60-74 years who had premensia, mild dementia, moderate dementia and severe dementia. According to Chen & Lin in their research (2009), ages 60-74 years are classified in the elderly group. Elderly with Clock Test score <4 at screening. Elderly who has played dhakonan in young age, elderly who lives with family, and the elderly who is cooperative and wants to be respondents to the study.

**Sampling Technique:** In this study, a multistage sampling technique was used from the district level to the village level. The next step was to determine the sample using a simple random sampling technique. The number of respondents per group was 10 people. The next stage was added with a drop out criterion sample of 10%. This was used to anticipate if someone as a respondent drop out during research.

**Variable Identification:** In this study, the independent variable was the game of dhakonan. While the dependent variables in this study were cognitive function, depression level and dementia level.

**Research Instrument:** In this study, the instruments used to measure the independent variables were Mini Mental State Examination (MMSE) and Geriatric Depression Scale questionnaire 30 items as pre-test and post-test on respondents, and Functional Assessment Staging Tool (FAST) used by researchers to determine the level of dementia. On the MMSE there are several questions that are used to assess cognitive function and the level of depression in the elderly, before and after being given traditional dhakonan games.
**Data Analysis:** The data collected by the researcher was analyzed to measure the influence between the independent and dependent variables using the Wilcoxon Signed Rank Test statistical test significant level $\alpha \leq 0.05$. This test was used to determine changes in cognitive function, depression levels and dementia levels before and after dhakonan game intervention in the treatment and control groups. Data was analyzed using Mann Whitney Test with a significant level of $\alpha \leq 0.05$.

**Research Ethics:** Researchers was conducting this research through research ethical procedures. Researcher did not include the respondent’s name on the data collection sheet to maintain identity confidentiality, and the researcher treats all respondents fairly and well and gives the become the right of the respondent.

**Table 1:** Characteristics of respondents based on their coffee consumption habits

<table>
<thead>
<tr>
<th>Coffee consumption</th>
<th>Control group</th>
<th>Treatment group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f(x) (%)</td>
<td>f(x) (%)</td>
</tr>
<tr>
<td>Yes</td>
<td>6 (60)</td>
<td>5 (50)</td>
</tr>
<tr>
<td>No</td>
<td>4 (40)</td>
<td>5 (50)</td>
</tr>
<tr>
<td>Total</td>
<td>10 (100)</td>
<td>10 (100)</td>
</tr>
</tbody>
</table>

Based on table 1, it can be seen that most of the respondents in control group had coffee consumption habits of as much as 60% and in the treatment group by 50%.

**Table 2:** The results of the cognitive function of pre test and post test in the control and treatment groups

<table>
<thead>
<tr>
<th>Cognitive function</th>
<th>Control group</th>
<th>Treatment group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>f(x) %</td>
<td>f(x) %</td>
</tr>
<tr>
<td>Normal</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Mild cognitive disorders</td>
<td>7 (70)</td>
<td>4 (40)</td>
</tr>
<tr>
<td>Moderate cognitive Disorders</td>
<td>3 (30)</td>
<td>6 (60)</td>
</tr>
<tr>
<td>Severe cognitive Disorders</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Total</td>
<td>10 (100)</td>
<td>10 (100)</td>
</tr>
</tbody>
</table>

Wilcoxon Test $p = 0.183$  
Signed Rank Test $\alpha = 0.05$  
Mann Whitney Test $p = 0.005$  
Mann Whitney Test $\alpha = 0.05$

Table 2 shows that the results obtained $p = 0.005$, causing $p < 0.05$. This result shows that there were significant differences between the results of the pre test and post test. In the pre test control group and treatment the Mann Whitney Test results obtained $p = 0.704$, which means there was no difference between the two groups, while in the post test results obtained $p = 0.002$ which means there were significant differences between the control group and the treatment group. It can be concluded that there is an influence of traditional dhakonan games on cognitive function of the elderly.

**Table 3:** Results of the dementia level in the pre test and post test in the control and treatment groups

<table>
<thead>
<tr>
<th>Level of dementia</th>
<th>Control group</th>
<th>Treatment group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>f(x) %</td>
<td>f(x) %</td>
</tr>
<tr>
<td>Stadium1 (normal)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Stadium 2 (subjective cognitive impairment)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Stadium 3 (early cognitive impairment/mild dementia)</td>
<td>7 (70)</td>
<td>4 (40)</td>
</tr>
<tr>
<td>Stadium 4 (mild dementia)</td>
<td>2 (20)</td>
<td>4 (40)</td>
</tr>
<tr>
<td>Stadium 5 (moderate dementia)</td>
<td>1 (10)</td>
<td>2 (20)</td>
</tr>
</tbody>
</table>

Table 3 shows that there were significant differences between the results of the pre test and post test. In the pre test control group and treatment the Mann Whitney Test results obtained $p = 0.704$, which means there was no difference between the two groups, while in the post test results obtained $p = 0.002$ which means there were significant differences between the control group and the treatment group. It can be concluded that there is an influence of traditional dhakonan games on dementia level of the elderly.
Table 3 shows that the results in the control group obtained \( p = 0.157 \) which means there was no difference between the results of the pretest and posttest. In the pre-test control group and treatment the Mann Whitney Test results obtained \( p = 0.579 \), which means there were no differences between the two groups, while the post-test results showed \( p = 0.004 \) which means there was a significant difference between the control group and the treatment group. When posttest, the majority of respondents experienced stage 3 dementia or early dementia and 1 person experienced stage 2 or Subjective Cognitive Impairment (SCI).

### Discussion

Based on the results of the Mann Whitney test, there were significant differences in the two groups after being given a treatment of dhakonan game intervention. In the treatment group, it was found that there were significant differences before and after being given traditional dhakonan games. Most respondents who are depressed were respondents who have low cognitive function values \(^{(12)}\). Based on table 2, the data of cognitive function values in the two groups did not show differences. The results showed that the majority of the pre-test results in the control group experienced mild cognitive impairment and a small proportion experienced moderate cognitive impairment. Most of the respondents were unable to repeat words and imitate images correctly at the MMSE test. This includes disorders in the region of the language and visuospatial functions.

From the results of the study, it was obtained that the majority of the control group who had coffee consumption habits. While in the treatment group the respondents who consumed coffee and those who did not consume coffee had the same percentage. Caffeine in coffee can block adenosine receptors so that there is an increase in brain neurotransmitters, namely dopamine and norepinephrine, which will have a fresh effect and increase concentration \(^{(13)}\). Caffeine also functions to inhibit some of the negative effects of cholesterol which can make brain blood vessels break and inhibit the activity of the enzyme acetylcholinesterase which can break down neurotransmitters and acetylcholine \(^{(14)}\).

The lower a person’s education level, the higher the prevalence of dementia. The more often training and using the brain, it can slow cognitive decline. High intelligence will be able to compensate for intellectual deficits \(^{(15)}\). Intellectual stimulation, social involvement or adequate physical activity increases neural synaptogenesis which can reduce the risk of dementia \(^{(3)}\).

Memory therapy will give impulses to memory. Memory therapy also aims to provide opportunities for socialization, transfer, pleasure, communication, reducing depression and social isolation and increasing self-esteem and life satisfaction of the elderly based on self-assessment and achievements \(^{(6)}\). Memories therapy affects cognitive, psychological, social habits and the health level of the elderly \(^{(8)}\). Memories therapy will have a happy effect on a person, reduce the level of depression and improve cognitive abilities \(^{(2)}\).

Cognitive function is the ability to process information, apply knowledge, change tendencies, beliefs obtained from thought processes, and in the form of mental activities such as thinking, remembering, analyzing, understanding, learning, imagining, and speaking \(^{(15)}\). Cognitive function consists of several aspects including attention, memory, visuospatial, language, and executive abilities such as planning, assessing, monitoring, and evaluating \(^{(7)}\). Cognitive function is influenced by age, education level and one’s occupation. Most of the elderly who experience a cognitive increase in their depression rates will decline. Vice versa, the lower the cognitive function of the elderly, the more severe the depression rate will be \(^{(6)}\).
Dhakonan games can improve mood, besides being seen from the social aspect, this game makes the elderly establish interaction with fellow elderly people so that it can create a sense of comfort. If the stimulation of the dhakonan game is done repeatedly it will have an effect on the brain which will automatically deliver impulses through the same synapse so that memory can be easily remembered and will prevent the development of dementia levels and reduce the level of depression (4).

**Conclusion**

Based on the results of this study, the traditional dhakonan game intervention can improve the cognitive function of the elderly through analyzing exercises, thinking strategies, counting, and motoric training. The effects of traditional dhakonan games can maintain dementia levels or prevent the progression of dementia because in traditional dhakonan games, depression can be reduced to normal levels by having social interactions with playing partners and being able to recall a pleasant past.

**Ethical Clearance:** This research is in accordance with ethical clearance, has not been published before and is not being considered for publication elsewhere.

**Conflict of Interest:** The authors guarantee that there is no conflict of interest related with this study so far.

**Source of Funding:** This research was carried out by a team and funded independently.

**REFERENCES**


The Effect of Indomethacin and Ambon Banana Stem Extract (	extit{Musa paradisiaca var. sapientum}) on Ileum Histopathology of Indomethacin-induced Rats (Rattus norvegicus)

Dian Afikasari¹, Kadek Rachmawati¹, Romziah Sidik¹

¹Faculty of Veterinary Medicine, Universitas Airlangga, Mulyorejo Street, Surabaya, East Java, Indonesia

ABSTRACT

Background: Indomethacin belongs to Non-Steroidal Anti-Inflammatory Drug (NSAID), used for fever, rheumatoid arthritis, and post-surgical medicaments. Indomethacin is known to have an inflammatory side-effect on the ileum. The flavonoid in ethanol extract of Ambon banana stem (Musa paradisiaca var. sapientum) had the possibility to be used as a therapy.

Aim: This research was aimed to analyze the effect of combining indomethacin and banana stem extract Ambon in the improvement of histopathological imaging of the white rat ileum.

Method: A dose of 3.15 mg/kg indomethacin was given per oral. This experiment used male rats (Rattus norvegicus) aged 8-12 weeks, weighing 150 grams, that were divided into five experimental groups, those were control-rats, Indomethacin-induced rats, and a group of Ambon banana stem extract with a dose of P1=100 mg/kg, P2=300 mg/kg, P3=400 mg/kg. Each ileum specimen was processed and the histopathological changes were observed. A score of submucosal edema, PMN infiltration, the number of goblet cell, epithelial integrity as qualitative data were analyzed with Kruskal Wallis test continued by Mann Whitney test.

Result: The result of the study showed that ethanol extract of Ambon banana stem could repair the damage of ileum histopathology (p<0.05). The administration of indomethacin at 400mg/kg dose showed the best result of histopathological imaging of ileum improvement.

Conclusion: Ambon banana stem extract can repair damage due to indomethacin side-effect of the ileum. Ileum histopathological repair was marked by improvements in epithelial cells of the ileum.

Keywords: Inflammatory, Indomethacin, ambon banana stem (Musa paradisiaca var.sapientum), histopathology ileum.

Introduction

Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) is an active ingredient that has a pharmacological characteristic to work heterogeneously inhibiting prostaglandin production. This drug family is used for the treatment of acute and chronic pain, which has the ability to reduce pain, fever, and inflammation¹. One kind of NSAIDs drug is indomethacin. The long-term treatment of indomethacin may induce its side-effects on the digestive tract, namely damage and inflammation in the small intestine, including ileum².

Indomethacin belongs to NSAID drug that works by inhibiting Cyclooxygenase-1 (COX-1), an enzyme functioning in prostaglandin synthesis. The decrease of prostaglandin synthesis will reduce the amount of mucus production that protects the mucosa against pathogenic bacteria. This may lead to a weaken ileum immunity thus increasing the risk of inflammation due to the high level of Reactive Oxygen Species (ROS) that may trigger oxidative stress, characterized by the appearance of mucosal damage in ileum histopathology². To maintain the ileum functioning properly, the therapeutic alternatives are needed. Cases of inflammation of
the digestive tract usually treated with drugs derived from chemicals and have a side effect that aggravates inflammatory conditions\(^3\), so that anti-inflammatory therapy that based on natural is needed\(^4\).

Indonesia has many types of plants that have the potential as medicinal plants. Treatment with medicinal plants is one alternative to meet the basic needs of the community in the health sector, one of which is Ambon banana plant. The stem of Ambon banana is known to contain several types of phytochemicals, namely saponins, flavonoids, and tannins that function as antibiotics, rapidly growing new cells, stimulating fibroblast formation, inhibiting bacterial growth, and also antifungal\(^6\). Ambon stem banana extract is believed to be effective in reducing inflammatory pain in post-tooth extraction of the white rat. Against the foregoing background, this study is aiming to analyze the effect of indomethacin and extract of Ambon banana stems administration in improving the white rat ileum histopathological imaging.

**Material and Method**

This study was conducted in the Laboratory of Biochemistry, Veterinary Pathology laboratory, and Department of Veterinary Basic Medicine at the Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia. The experimental animals in this study were 20 Wistar male rats (Rattus norvegicus), aged 8-12 weeks with an average body weight of 150-200 grams. The therapeutic dose of indomethacin for white rats in this study was 3.15 mg/kg. The specimen taken from the experimental animals is part of the ileum by excision from ± 4 cm before the caecum, up to 2 cm before the caecum (length = 2 cm).

The study was divided into five treatment groups with one negative (-) control and one positive (+) control, namely: The negative control group was given a 2 ml suspension of CMC Na as much as 2ml per oral. The positive control group was given indomethacin at a dose of 3.15 mg/kg as much as 2 ml per oral. The first treatment group was given banana stem extract dose of 100 mg/kg per oral and followed by indomethacin at a dose of 3.15 mg/kg as much as 2 ml each substance. The second treatment group was given banana stem extract with a dose of 300 mg/kg per oral, followed by indomethacin at a dose of 3.15 mg/kg as much as 2 ml each substance. The third treatment group was given banana stem extract with a dose of 400 mg/kg per oral followed by indomethacin at a dose of 3.15 mg/kg per oral as much as 2 ml each substance. The treatments were administered regularly on each experimental animal for 5 days. On the 6th day, the rats were sacrificed by means of neck dislocation and were dissected to isolate the ileum. The organ was put into a pot containing 10% formalin solution, then prepared into histopathological preparations\(^7\).

The degree of ileum damage at this examination determined by scoring the ileum histopathological slides, including submucosal edema, infiltration of PMN in the lamina propria, number of goblet cells, and epithelial integrity\(^8\). The degree of damage from each sample was determined by Barthel methods\(^8\).

The data obtained then analyzed by nonparametric statistical tests, Kruskal-Wallis. If there were significant differences, then proceed with the Mann-Whitney test. The entire analysis process was carried out with the Statistical Product and Service Solution (SPSS) program for Windows.

**Results**

**Submucous edema**

![Figure 1: Differences in ileum mucosal histopathological. (H.E staining; 200x enlargement; Olympus microscope; Opti Lab).](image-url)
Figure 1 shows that edema in the K+ group is the worst, where almost all surface was submucosal edema (arrows). The results of the mean observation and scoring of submucosal edema are presented in Table 1.

Table 1: The average histopathological observation of ileum edema

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean Rank ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-</td>
<td>4.50 ± 0.38</td>
</tr>
<tr>
<td>K+</td>
<td>16.38 ± 0.09</td>
</tr>
<tr>
<td>P1</td>
<td>13.62 ± 0.25</td>
</tr>
<tr>
<td>P2</td>
<td>9.25 ± 0.27</td>
</tr>
<tr>
<td>P3</td>
<td>8.75 ± 0.35</td>
</tr>
</tbody>
</table>

The different a; b; c superscript in the same column shows a significant difference between treatments (p <0.05).

Based on the results with the Kruskal-Wallis test showed that there were significant results in each treatment group (p <0.05). The Mann-Whitney test found that K- was not significantly different from P2 and P3 (p> 0.05). However, K- was significantly different from K+ and P1 (p <0.05).

PMN Infiltration at Lamina Propia

Figure 2 shows that PMN infiltration in the K+ group is the worst (arrow), whereas in P3 there were fewer PMN inflammatory cells compared to P1 and P2 (arrows). The results of the average observation and scoring of PMN infiltration are presented in Table 2.

Table 2: The average histopathological observation of PMN infiltration in ileum

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean Rank ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-</td>
<td>5.50 ± 0.37</td>
</tr>
<tr>
<td>K+</td>
<td>16.88 ± 0.41</td>
</tr>
<tr>
<td>P1</td>
<td>13.50 ± 0.43</td>
</tr>
<tr>
<td>P2</td>
<td>9.50 ± 0.14</td>
</tr>
<tr>
<td>P3</td>
<td>7.12 ± 0.16</td>
</tr>
</tbody>
</table>

The different a; b; c superscript in the same column shows a significant difference between treatments (p <0.05).

Based on the results with the Kruskal-Wallis test showed that there were significant results in each treatment group (p <0.05). The Mann-Whitney test found that K- was not significantly different from P1, P2 and P3 (p <0.05). However, K- is significantly different from K+ (p > 0.05).

Number of Goblet Cells

Figure 3: Differences in histopathological features (H.E staining; 400x enlargement; Olympus microscope; Opti Lab)
Figure 3 shows that the number of goblet cells in the K+ group is the least (arrow), while in P2 the number increased especially in P3 which showed the highest number of goblet cells (arrow). The average results of observation and scoring of the number of goblet cells are presented as in Table 3.

Table 3: The average histopathological observation of the number of goblet cells in the ileum

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean Rank ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-</td>
<td>4.25b ± 0.30</td>
</tr>
<tr>
<td>K+</td>
<td>14.38a ± 0.31</td>
</tr>
<tr>
<td>P1</td>
<td>14.38a ± 0.30</td>
</tr>
<tr>
<td>P2</td>
<td>12.50b ± 0.57</td>
</tr>
<tr>
<td>P3</td>
<td>7.00b ± 0.14</td>
</tr>
</tbody>
</table>

The different a; b; c superscript in the same column shows a significant difference between treatments (p <0.05).

Based on the results with the Kruskal-Wallis test showed that there were significant results in each treatment group (p <0.05). The Mann-Whitney test found that K- was not significantly different from P2 and P3 (p> 0.05). However, K- was significantly different from K+, and P1 (p <0.05).

Epithelial Integrity

Figure 4 shows that villi integrity in the K+ group is the worst (arrow), whereas in the P3 group the epithelium had improved although there was still mild epithelial necrosis (arrow). The results of the average observation and scoring of Epithelial Integrity are presented in Table 4.

Table 4: Average histopathological observation of epithelial integrity of ileum

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean Rank ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-</td>
<td>4.62b ± 0.26</td>
</tr>
<tr>
<td>K+</td>
<td>14.88a ± 0.33</td>
</tr>
<tr>
<td>P1</td>
<td>14.12a ± 0.34</td>
</tr>
<tr>
<td>P2</td>
<td>13.25a ± 0.28</td>
</tr>
<tr>
<td>P3</td>
<td>5.62b ± 0.16</td>
</tr>
</tbody>
</table>

The different a; b; c superscript in the same column shows a significant difference between treatments (p <0.05).

Based on the results with the Kruskal-Wallis test showed that there were significant results in each treatment group (p <0.05). The Mann-Whitney test found that K- was not significantly different from P3 (p> 0.05). However, K- is significantly different from K+, P1, P2 (p<0.05).

Discussion

This study showed the negative control group (K-) had mild damage, this was due to uncontrolled external variables, initial intestinal conditions especially the ileum, poor ideal cage conditions, and stress factors during the study. This study revealed a significant difference between the K-group and K+. The daily administration of indomethacin at a dose of 3.15 mg/kg that was given to the K+ group resulted in submucosal edema in the histopathology of the ileum. Indomethacin works by inhibiting Cyclooxygenase-1 (COX-1) which plays a role in the formation of prostaglandins. Inhibition of COX-1 has an impact on decreasing prostaglandin synthesis in the ileum which results in decreased protection of the mucous barrier which facilitates the invasion of pathogenic bacteria.

There was a significant difference between the treatment group K- and P1. The daily dosage of Ambon banana stem extract 100 mg/kg has not been able to minimize edema in the ileum of white rats given indomethacin. In the other treatment, groups showed that
K- with P2 and P3 did not have a significant difference. The daily dose of Ambon banana stem extract 300 mg/kg and 400 mg/kg could minimize submucosal edema in white rat ileum histopathology. This shows that the protection of the ileum is getting better in accordance with increase the dosage of Ambon banana stem extract. The flavonoid content of Ambon banana stem extract functions as an anti-inflammatory and antioxidant.

**PMN Infiltration at Lamina Propria:** The results of statistical tests show that between K- and K+ have significant differences. This shows that indomethacin has side effects in the digestive tract, one of which is the ileum. In the treatment group the results showed that between K- with P1, P2, and P3, there were no significant differences. This shows that a dose of 100 mg/kg body weight/day, 300 mg/kg body weight/day and 400 mg/kg body weight/day can minimize infiltration of inflammatory PMN cells in the ileum lamina propria because the flavanoid effects in the form of quercetin which works by inhibiting T cell activation results in TNF-α inactivation which causes a decrease in the presence of neutrophils\(^{10,11,12}\).

**Number of Goblet Cells:** The results showed that between K- and K+ and P1 showed significant differences. This shows that the treatment group with a dose of 100 mg/kg/day has not been able to maintain the presence of goblet cells in the ileum epithelium. In this study, the optimum dose below 100 mg/kg/day has not been able to overcome inflammation in the ileum which is characterized by a continued reduction in the number of goblet cells in the ileum villous epithelium.

In group P3 the result was not significantly different from the K- group. This shows that in the treatment group at a dose of 400 mg/kg/day can maintain the presence of goblet cells in the ileum villous epithelium. The ileum histopathology in the P3 group showed that in the ileum villi there was no necrosis that led to erosion so that the number of goblet cells could be maintained properly. This happens because the ambon banana stem has an active content of flavonoids which it quercetin. This flavonoids can inhibit the activation of T cells (Th 1).

**Epithel Integrity:** The results showed that between K-, K+, P1, and P2, there were significant differences. The study in the K- group with the treatment groups P1 and P2 showed significant differences even though there had been a slight improvement in the ileum epithelium. This shows that the dose of Ambon banana extract given 100 mg/kg/day and 200 mg/kg/day has not worked optimally in the improvement of ileum epithelial damage, in the white ileum histopathology there were still necrosis and epithelial erosion. In the P3 treatment group, the results were not significantly different from the K-group. These results indicate that the dose of banana stem extract 300 mg/kg/day provides optimal improvement in ileum epithelial damage. This happens because in the extract of Ambon banana stem there are flavonoids which act as antioxidants and anti-inflammatory.

Flavonoid as an antioxidant in Ambon banana stem extract functions as an excess free radical scavenger in the ileum due to indomethacin administration. Free radicals that have been suppressed by flavonoids can also suppress the formation of NF-Kβ. NF-kβ cannot occupy an element response that should be able to trigger transcription and translation of pro-inflammatory cytokines (TNF-α). Pro-inflammatory cytokines that are not formed will reduce the activity of inflammatory cells\(^13\). This causes an improvement in the histopathological picture of the ileum which is characterized by the regeneration of epithelial cells so that the distance of the villi is seen to recur, necrosis and villous erosion decrease. Intestinal mucosal epithelial cells are known to have a rapid rate of regeneration, which is about 3 to 6 days\(^14\). Cells in the mucosa of the ileum include labile cells. Unstable cells are cells that have high regeneration ability, occur continuously and have a short G0 phase (resting phase). Damaged cells are stimuli for cells that in a resting phase to undergo the mitotic phase so that there is an improvement in ileum tissue damage.

**Conclusion**

The administration of indomethacin and Ambon banana stem extract at a dose of 400 mg/kg/day was the optimum dose in providing improvements to the histopathology of the ileum.

**Ethical Clearance:** The research process involves participants in the survey using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee.

**Conflict of Interest:** The author reports no conflict of interest of this work.

Source of Funding: This study is done with individual funding.
REFERENCES


Attenuation of *Eimeria tenella* with Immersion Various Concentration of Formaldehyde in Inducing Protective Immunity after Challenge Test by Featuring Macroscopic and Microscopic Caecum

Rizki Rohmah Armiani¹, Muchammad Yunus¹, Chairul Anwar Nidom¹

¹Faculty of Veterinary Medicine, Universitas Airlangga, Mulyorejo Street, Surabaya, Indonesia

ABSTRACT

**Background:** *Eimeria tenella* parasite is one of the most pathogenic coccidia that can infect chickens. The strategy for prevention and control of coccidiosis is done by administering anticoxidia drugs and live oocyst vaccines. However, anticoxidia can cause resistance to coccidiosis. So it is necessary to make vaccines (attenuation) using formalin or formaldehyde.

**Aim:** The purpose of this study was to determine whether the attenuation of the pathogenicity *E. tenella* with immersion various concentrations of formaldehyde can induce protective immunity and the concentration of formaldehyde that is most effective in inducing protective immunity for attenuation of *E. tenella* in featuring cecal macroscopic and microscopic (lesion score).

**Method:** Twenty-five chickens at three weeks old were divided randomly into five groups. Challenge test did after the first infection. The first infection was inoculated *tenella* by divided the first group (P0) is chicken group was inoculated with 0% formaldehyde soaked *E. tenella* at 1 x 10⁴ doses as control, the 2nd, 3rd and 4th groups (P1; P2, P3 and P4) were inoculated 0.15%, 0.3%, 0.6% and 1.2% of formaldehyde soaked *E. tenella* at the same doses, respectively. On challenge test performed two weeks after the first infection by inoculated 15x10³ infective oocysts of *E. tenella*.

**Result:** The results showed that the attenuation of *E. tenella* with immersion various concentrations of formaldehyde can induce protective immunity by featuring cecal macroscopic and microscopic (lesion score).

**Conclusion:** The most effective concentration of formaldehyde in inducing protective immunity of the attenuation pathogenicity *E. tenella* was 1.2%.

**Keywords:** attenuation, *E. tenella*, formaldehyde, protective immunity

Introduction

Poultry coccidiosis is an intestinal disease caused by Genus *Eimeria* parasitic protozoa¹. *Eimeria* multiplies in the digestive tract and causes damage to the intestinal mucous tissue². *Eimeria* causes damage to the intestine thereby reducing the efficiency of feed use, body weight, decreased endurance, and decreased egg production³. Coccidiosis in chickens is located in two places, namely the caecal (cecal coccidiosis) caused by *Eimeria tenella*⁴. *Eimeria tenella* parasites develop in cecum cells, which are two dead end sacs near the back end of the small intestine. *Eimeria tenella* parasite is one of the most pathogenic coccidia to infect chickens. Acute infections often occur in young chickens. Infection can be characterized by blood in the stool and with high morbidity and mortality⁴. In addition, the immune response for *Eimeria* involves many aspects of both the cellular and humoral immune mechanisms⁶⁻⁷.

Correspondence Author:
Muchammad Yunus
Faculty of Veterinary Medicine, Universitas Airlangga, Mulyorejo Street, Surabaya, Indonesia, 60115
Email: muchammadyunusfkhunair@yahoo.com

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So far, strategies to prevent and control coccidiosis are carried out by anticoxidia and live oocyst vaccine. However, anticoxidia can cause resistance to coccidiosis. The development of increasing anticoxidia drug resistance has stimulated the search for biological control methods by vaccination. Some vaccines have been tried in the form of whole attenuated oocysts. One potential explored vaccine material is a live vaccine from oocysts that can be developed, produced and applied in the field. The development of live vaccines using low virulence lines from *Eimeria* oocysts can be used as an alternative for more efficient and effective protection compared to other coccidiosis vaccines, such as vaccines containing switched off microorganisms and subunit vaccines. Vaccine making can be done by activating or weakening the organism (attenuation). A simple way of attenuation can expose the organism to active chemicals to the limits of sublethal concentrations such as the use of formaldehyde or formalin.

Giving vaccines can stimulate the body to form antibodies to the *Eimeria* antigen so that the chicken is able to deal with new infections (challenge tests). The use of separated *Eimeria* types in vaccines makes it easy for users to apply vaccines according to the prevention of the desired disease. Based on this, the purpose of this study was to determine whether the attenuation of the pathogenicity *E. tenella* with immersion various concentrations of formaldehyde can induce protective immunity and the concentration of formaldehyde that is most effective in inducing protective immunity for attenuation of *E. tenella* in featuring cecal macroscopic and microscopic (lesion score).

**Materials and Method**

This research was conducted at the Laboratory of Parasitology, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia, from August to September 2016. The experimental animals used in this study were 25 broiler chickens strain CP 707 produced by Charoen Pokphand. The chickens were two weeks old and breed in a battery cage in Besah Village, Kasiman District, Bojonegoro Regency, Indonesia. *Eimeria tenella* inoculation was performed on 3 weeks old chickens after being adapted for 1 week by ad libitum feeding and drinking. Feed which given, it does not contain koksidiostat.

**Calculation of Dosage:** Calculation of dosages of *E. tenella* oocysts was carried out using micro pipets measuring 1-10 μl and white chips. The suspension of *E. tenella* oocysts was diluted using distilled water then the diluted liquid was vortexed so that both materials are homogeneous. The oocyst calculation was carried out by dripping 1 mL oocyst into a glass object with 5 replications and then calculating the number of oocysts found in all replications with a 100x ratio and looking for an average. From the results of calculations in the average can be 15,000 oocysts/ml.

**Formula:** This research was an experimental laboratory research with the Completely Randomize Design (CRD). The chicken grouping is based on the treatment given, namely:

**Treatment 0:** As a control, oocysts were not soaked in formalin

**Treatment I:** *E. tenella* was soaked in formalin with a concentration of 0.15%

**Treatment II:** *E. tenella* was soaked in formalin with a concentration of 0.3%

**Treatment III:** *E. tenella* was soaked in formalin with a concentration of 0.6%

**Treatment IV:** *E. tenella* was soaked in formalin with a concentration of 1.2%

After *E. tenella* was soaked, then chicken were inoculated as many as 10,000 oocysts orally. After 14 days, a challenging test was carried out by re-inoculating *E. tenella* without immersing 15,000 formaldehyde as a formalin.

**Chicken and *Eimeria tenella* infections:** Twenty-five 21-day old chickens were inoculated with 10,000 *E. tenella* oocysts that were patented using formalin with various levels of concentration (0.15%, 0.3%, 0.6% and 1.2%) for 96 hours. Chickens were inoculated using *E. tenella* orally which had been washed using distilled water and centrifuged at a speed of 1500 rpm for 10 minutes at five times. After two weeks, twenty-five 34-day-old chickens were re-inoculated with 15,000 *E. tenella* oocysts without formaldehyde immersion. Chicken is inoculated with *E. tenella* orally.

**Cecum Lesion Scoring:** Scoring of cecal lesions was carried out on the fifth day after inoculation,
The cecal abnormalities were recorded and the degree of damage to the mucosal surface of the chicken cecum was calculated based on a score of 0-4.

**Histopathology observation:** Histopathology observation was carried out at the Pathology Laboratory of the Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia. Microscopic examination was carried out based on the histopathological changes that occurred in the cecum which had previously been made histopathological preparations, assessed by scoring seen based on the Goodwin method.

**Challenge Test:** The challenge test was carried out 14 days after the first *E. tenella* inoculation, *E. tenella* which was soaked with various formalin concentrations. The challenge test was carried out by re-inoculating *E. tenella* without immerse as much as 15,000 oocysts formally. The indicator that shows the success of protective immunity is the reduced scoring of cecum lesions observed macroscopically and microscopically.

**Data Analysis:** Data to be obtained was macroscopic lesion scoring and microscopic lesion scoring. Data were arranged in table form using Kruskal Wallis analysis, if there are differences data, then proceed with the Mann Whitney test.

### Results

**Macroscopic Scores of Chicken Fecal Lesions**

![Figure 1: Macroscopic score of Chicken Fecal Lesions](image)

The figure above is a comparison of the scores of chicken cecal lesions macroscopically after being challenged with *E. tenella* infective in each group of chickens with a dose of 15 x 10^3* oocyst *E. tenella*. Each shows mean ± SD (N = 5). NS, not significantly different; *, p < 0.05.

**Figure 2: Macroscopic description of chicken cecum**

The figure above is a macroscopic picture of chicken cecum which has been challenged by inoculating *E. tenella* infective in each group of chickens with a dose of 15 x 10^3 oocyst *E. tenella*. The intensity of petechiae is reduced by *E. tenella* infection which is soaked in formalin with higher concentration. A small circle shows bleeding in the cecal mucosa, the arrow shows thickening of the cecum wall.
Microscopic score of Chicken Fecal Lesions

Figure 3: Cecum lesion microscopically in chickens

Figure 3 is a comparison of the scores of chicken cecal lesions macroscopically after being challenged with *E. tenella* infective in each group of chickens with a dose of 15 x 10^3 oocyst *E. tenella*. Each shows mean ± SD (N = 5). NS, not significantly different; *, p <0.05.

Microscopic description of chicken serum

Microscopic description of chicken cecum which have been challenged by inoculating *E. tenella* infective in each group of chickens with a dose of 15 x 10^3 oocyst *E. tenella* with various magnifications (A (100x) and B (400x)). The small circle shows the *Eimeria* distribution in the cecum and the black line shows the cecum mucosa.

Discussion

Macroscopic description of chicken cecum: From the macroscopic observation of the cecum, data were obtained based on histopathological abnormalities assessed based on a score of 0-4. At P0 it shows a normal condition because there is no damage to the caecal lesions macroscopically and there is no thickening of the cecum wall. P1 shows the degree of damage to mild level cecal lesions, characterized by bleeding spots (petechie) that spread onto the surface of the mucosal mucosa with slight changes in the color of the wall or the contents of the digestive tract. P2 shows the degree of damage to moderate cecal lesions, characterized by more bleeding and lesions with a slight thickening of the cecum wall. P3 shows the degree of damage to mild cecal lesions, there are several bleeding spots that spread to the mucosal surface of the cecum with slight changes in the color of the wall or the contents of the digestive tract. P4 shows a normal condition because macroscopically there is no damage to cecum lesions and there is no thickening of the cecum wall. These changes are due to the administration of *E. tenella* infective oocysts when the challenge test has no effect on cecal damage macroscopically, which means that the administration of oocysts that have been soaked in formalin before the challenge test can induce protective immunity seen macroscopically from chicken cecum.

The results of the statistical analysis using the Kruskal Wallis test also did not show significant differences in each treatment. It can be explained that macroscopically, the challenging test by inoculating as many as 15,000 *E. tenella* infective oocysts did not affect the damage to the cecum which had been inoculated with *E. tenella* with soaking various formalin concentrations (0.3%, 0.6%, 0.9 %, 1.2%). So it can be concluded that immersion of *E. tenella* in various concentrations of formaldehyde can induce protective immunity seen from the results of scoring and the results of macroscopic examination statistics after the challenge test which shows the results are not significantly different. The optimal formalin
concentration in patenting *E. tenella* is 1.2% indicating a normal state because macroscopically there is no damage to cecum lesions and there is no thickening of the cecum wall14.

**Microscopic description of chicken cecum:**
Histopathological observations on cecum, data obtained based on histopathological abnormalities contained in the preparations were assessed by scores seen based on summations of A and B, where A represents the distribution of *E. tenella* development stages found throughout the caecum, while B represents the severity of damage caused by *E. tenella*15.

The results of statistical analysis using the Kruskal Wallis test showed no significant differences in microscopic examination. The results obtained by histopathological preparations showed no significant differences in each treatment with the average scale which tended to be the same, namely P0: 3.88, P1: 4.28, P2: 4.22, P3: 4.04 and P4: 3.88. There are three immunity to *E. tenella*, which are totally invulnerable to parasites and do not develop parasites, chicken is immune to a certain degree, where oocysts are able to complete the life cycle but no lesions occur in the intestine, and chickens show no clinical symptoms but lesions occur in intestine16.

The microscopic scoring value in figure P0 did not experience abnormalities in cecum histopathology. Microscopic observations showed normal intestinal cells, the intestinal epithelium looked compact and did not show any rupture in the cecum villi. The first infected chicken, Schizont will develop properly due to immunity to *E. tenella* infection is still in the process of initiation, causing damage to the cecum.

The results of the P1 scoring data indicate histopathological abnormalities with moderate degrees of damage to the mucosal cecum. The cecal epithelium is compact and there are several villous ruptures. When compared with P0, P1 has a higher cecum damage. This is because previously chickens were inoculated with *E. tenella* which was soaked in formaldehyde with low concentration so it was suspected that schizont could still damage the caecum. Tissue damage to the cecum is caused by the outbreak of the schizont stage which has three generations before entering the gamete stage. P2 shows histopathological abnormalities with mild degrees of damage to the mucosal cecum. The cecal epithelium appears compact and only a few villi rupture, when it compared with P0, P2 suffers more damage, it suspected that P2 has a low immune system that is lowered by its parent.

At P3 it showed almost no abnormalities in the histopathology of the cecum, the cecal epithelium appeared to be compact and rarely found in ruptured cecum villi. If vaccines are used to better control disease in an animal population and not individually, the concept of group immunity should be considered. If group immunity is carried out by reducing the likelihood of sensitive animals meeting the infected, there will be no spread of disease13. In P4 there is no abnormality in the histopathology of cecum. Microscopic observations showed normal intestinal cells, the intestinal epithelium appeared to be compact and did not show any rupture in the cecum villi and rarely found in the development of parasites.

**Conclusion**

Attenuation of *Eimeria tenella* through immersion in various concentrations of formalin (0.15%; 0.3%; 0.6%; 1.2%) can induce protective immunity in terms of macroscopic and microscopic images of the cecum. The most potential formalin concentration for patenting *Eimeria tenella* in induces protective immunity serum in terms of macroscopic and microscopic images of cecum is 1.2%. Macroscopically there is no damage to cecal lesions and no cecum wall thickening. Whereas microscopically shows the intestinal epithelium looks compact and there is no rupture in the cecum villi.

**Ethical Clearance:** The research process involves participants in the survey using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice.

**Conflict of Interest:** The author reports no conflict of interest of this work.

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The Potential of Immune Response Improvement through \textit{Brucella abortus} Outer Membrane Protein and Whole \textit{Brucella abortus} S19 Vaccinations on White Pulp Diameter of \textit{Lepus nigricollis}

Muhammad Ardiansyah\textsuperscript{1}, Chairul Anwar\textsuperscript{1}, Imam Mustofa\textsuperscript{1}

\textsuperscript{1}Faculty of Veterinary, Universitas Airlangga, Jl. Airlangga No.4-6, Airlangga, Gubeng, Kota SBY, Jawa Timur

ABSTRACT

\textbf{Background:} Brucellosis is a disease that is still commonly found in developing and developed countries. The disease can be transmitted from animals to humans through food products made from animals. One of the efforts to control Brucellosis is by \textit{Brucella abortus} S19 vaccine. However, the vaccine may still deliver the same reaction as natural \textit{Brucella} infection. Safer vaccine development is carried out by using Outer Membrane Protein (OMP) from the infecting bacteria.

\textbf{Objective:} The study was established to determine the potential of immune response enhancement after administering OMP \textit{B. abortus} and whole \textit{B. abortus} S19 vaccine that were observed through the white pulp diameter of \textit{Lepus nigricollis}.

\textbf{Method:} An enhancement in the immune response can be determined through measuring the white pulp diameter of \textit{L. nigricollis}. The measurement data of the white pulp diameter would be analyzed by conducting one way ANOVA and Duncan statistical tests.

\textbf{Results:} The results suggested that the measurements of white pulp diameter experienced a significant enhancement (p <0.01) in each treatment. The vaccine treatment by employing OMP \textit{B. abortus} indicated the highest diameter measurement results with an average value of 553.73 μm.

\textbf{Conclusion:} Vaccination by employing OMP \textit{B. abortus} had a good potential to improve the immune response since there was a significant enhancement in the white pulp diameter of \textit{L. nigricollis}.

\textbf{Keywords:} white pulp diameter, OMP \textit{B. abortus}, immune response, vaccine, whole \textit{B. abortus} S19

Introduction

\textit{Brucellosis} is one of the primary zoonotic diseases that can have a negative impact on public health and public economy\textsuperscript{1}. Brucellosis is classified in B list, as the disease transmission affects the socio-economic or public health in a country and influences the trade development, especially in animals or products made from animals\textsuperscript{3}. In the veterinary field, at least 37\% of cows are infected by Brucellosis and causes miscarriages annually. The prevalence varied from 1\% to 40\% in 2002\textsuperscript{3}.

The economic losses caused by Brucellosis include the occurrence of abortion, animal youngs born weak and dead, sterility due to reproductive disorders, drop of milk production, and drop of market access, both nationally and internationally\textsuperscript{4}. Some efforts to reduce these effects can be applied by conducting an early diagnosis by a combination of two methods, i.e., Rose Bengal Test or RBT and Complement Fixation Test or RBT\textsuperscript{5}. Another effort in reducing \textit{Brucella abortus} effects is by administering a vaccine extracted from \textit{B. abortus} S19\textsuperscript{6}. Each type of vaccine has its advantages and disadvantages. The disadvantages of \textit{B. abortus} S19...
vaccine is that it is an active vaccine which contains attenuated B. abortus. Thus, there are still side effects after injection. The injection of B. abortus S19 vaccine often causes a misdiagnosis which may be mistaken from B. abortus infection because there are difficulties to differentiate the immune system formed due to the vaccine injection and that by natural B. abortus infection. In addition, the injected vaccine can deliver broad reactions to the tissue. Based on some of the weaknesses of the B. abortus S19 vaccine, several efforts were established to produce other types of vaccines such as the Outer Membrane Protein (OMP), which is the first barrier exposed to the agent/host, causing the produced immune response tends to attack the outer membrane.

Vaccination is one of the solutions to deal with a specific disease so that specific antibodies or body defense will be formed. The immune response from vaccination will activate the formation of immunity in the body where lymphatic tissue also plays a role. The spleen is the largest lymphatic organ in the body that filters the blood and plays an important role as the immune response site towards antigens in the blood. The spleen consists of red pulp and white pulp. Microscopic lymphatic organs are indicated by the proliferation of lymphocytes and white pulp diameter enhancement in the spleen. Based on these reviews, the study was established to determine the immune response enhancement as indicated by white pulp diameter enhancement of the spleen of Lepus nigricollis after being vaccinated with whole B. abortus S19 and OMP B. abortus.

Materials and Method

The study was an experimental research utilizing a Completely Randomized Design method (CRD), and the data results were statistically tested. The research was carried out at the Laboratory of the Faculty of Medicine, Universitas Airlangga.

Instruments and Materials: The research instruments to use during the trial period included wooden experimental animal cage with wire mesh as the base, animal feeder, and 1ml syringes. The equipment for breeding bacteria consisted of petri dish, inoculating loop, Bunsen burner, and incubator. The equipment utilized for necropsy and producing histopathological preparation consisted of surgical scissors, scalpel, tweezers, object glass, cover glass, hot plate, small pot and lid as organ storage, Bunsen burner, oven, aluminum foil, microtome, staining jar, refrigerator, optical lab, and Olympus® CX-41 microscope.

The materials utilized in this study consisted of 1) the whole bacterium of B. abortus S19, heated at 80°C and then added with CFA; 2) the whole bacterium of B. abortus S19, heated at 80°C then added with IFA; 3) OMP B. abortus added with CFA; and 4) OMP B. abortus local strain added with IFA, which were cultured in Bacteriology and Microbiology Laboratory at the Faculty of Veterinary Medicine, Universitas Airlangga. Additional materials included ketamine, acetylpromazine, 10% formalin, alcohol and cotton, and PBS. The materials utilized to treat the experiment animals consisted of feed given in the form of BR II pellets, drinking water, and preparation staining by using Hematoxylin-Eosin (HE).

Research Procedure: The experimental animals employed in this study were male rabbits (Lepus nigricollis) with body weight of approximately 1-2 kilograms and approximately aged eight weeks. In this study, 18 samples were employed to be divided into three treatment groups. The first group was the control group (P0), administered with NaCl at a dose of 1 ml/rabbit. The second group was the treatment 1 group (P1), vaccinated with B. abortus S19 at a dose of 0.5 ml/rabbit, and a dose of 1.0 x 10^8 CFU, and Complete Freund Adjuvant (CFA). The third group was the treatment 2 group (P2), vaccinated with OMP B. abortus at a dose of 0.5 ml/rabbit and Complete Freund Adjuvant (CFA).

The adaptation process period of L. nigricollis towards the laboratory environment lasted for one week. The first injection was subcutaneously administered by using Complete Freund Adjuvant (CFA) in the second week. Two weeks later, after the first injection, the booster was implemented by using the Incomplete Freund Adjuvant (IFA). The booster was implemented for two times per 2 weeks of injection. Then, they were euthanized and necropsied to take the spleen for histopathological preparations.

The euthanasia and necropsy stages were carried out five weeks after the last booster administration. Premedication by administering acetyl promazine (1 mg/kgbw) was delivered subcutaneously or intramuscularly. Then, euthanasia was carried out by using acetyl promazine 100 mg/kgbw, injected intramuscularly. The necropsy in the spleen organ was carried out through
surgery, and the organ fixation was carried out by using formalin 10%. The histopathological preparations from the animal tissue was conducted by using Hematoxylin-Eosin staining.

The white pulp diameter observation was carried out by using an Olympus microscope and equipped with Optilab support facilities. The measurements were calibrated by using Image Raster software. The microscopic observation was carried out by using 100x magnification. The measurements were carried out by drawing a straight line from the white pulp’s tip to the other end by using Raster Image Application. The measurements were carried out in the entire visible white pulp on the visual field. Then, the values were averaged.

**Data Analysis:** The data obtained from the white pulp diameter in this study were analyzed by F test in ANOVA, then analyzed by using Duncan Alpha test to determine the differences among treatments.

**Result**

Based on the analysis attachment by using the one-way ANOVA method (F test), the test suggested that the group treatment for OMP *B. abortus* vaccination had significantly different results among the treatment groups (p <0.01). The comparison of the white pulp diameter of each treatment group can be observed in **Table 1**.

**Tabel 1: Comparisons among the spleen white pulp diameter of *L. nigricollis* vaccinated with the Outer Membrane Protein of *B. abortus* and whole *B. abortus* S19**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>White pulp diameter (µm) ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0</td>
<td>347.25 ± 56.4</td>
</tr>
<tr>
<td>P1</td>
<td>452.16 ± 33.9</td>
</tr>
<tr>
<td>P2</td>
<td>553.73 ± 132.5</td>
</tr>
</tbody>
</table>

**Notes:** P0 = control group with physiological NaCl, P1 = treatment 1 with *B. abortus* S19 vaccine, P2 = treatment 2 with OMP *B. abortus*. The letter notation indicated a significant difference (p <0.01) among each treatment. The same-letter notation means that the results were not significantly different. The different-letter notations mean that the results were significantly different.

Based on **Table 1**, the average white pulp diameter had different values in each treatment group. The diameter enhancement in the control group reached 347.25 µm; the treatment 1 group reached 452.16 µm; and the treatment 2 group amounting to 553.73 µm. The treatment 2 group, vaccinated with OMP *B. abortus*, indicated significant different results (p <0.01) from the control group. Meanwhile, treatment 1 group, vaccinated with *B. abortus* S19, indicated relatively insignificant increase from the control group. The spleen histopathology in each treatment is indicated in **Figure 1** as follows.

**Figure 1:** White pulp diameter in *L. nigricollis* spleen in each treatment, 100x magnification. A = control group (P0) administered with physiological NaCl, B = treatment 1 (P1) administered with whole *B. abortus* S19, C = treatment 2 (P2) administered with the Outer Membrane Protein *B. abortus*
Based on Figure 1, it can be observed that the white pulp diameter of *L. nigricollis* spleen in the control group (P0) had the smallest diameter. The white pulp diameter at P0 was approximately 240.9 µm. The white pulp in treatment 1 group (P1) indicated a larger diameter size than that in the control group of approximately 536.7 µm. The white pulp diameter in treatment 2 group (P2) indicated the largest diameter compared to treatment 1 and control groups, reaching approximately 790.6 µm. Based on these results, the OMP *B. abortus* treatment group had better immune enhancement compared to treatment utilizing whole *B. abortus* S19.

**Discussion**

The treatment group injected with OMP *B. abortus* vaccine had a significant different enhancement in the immune response (p < 0.01) compared to the control group. The treatment group injected with whole *B. abortus* S19 did not have much different immune response compared to the control group. There was an enhancement in the treatment groups because an antigen was injected so that it was capable of forming antibodies. Antigens will be recognized earlier by macrophages and presented in the form of fragments that will stimulate B and T lymphocytes to carry out proliferation that produces antibodies. The proliferations of both lymphocytes are mostly found in the white pulp of the spleen, causing mutual pressure on the lymphocytes due to its fission, causing the white pulp diameter became broader.

*B. abortus* bacterial structure is quite unique. It is unlike other negative gram bacteria. The outer surface of this bacterium does not have pili, and is not encapsulated. It has an outer membrane to protect bacterial cells from molecules diffusion, hydrolytic enzymes, and helps the conjugation process in controlling DNA replication. The outer membrane is composed of two components that have been identified as potential virulence factors, i.e., Outer Membrane Protein (OMP) and Lipopolysaccharide (LPS) proteins. These outer membranes are hydrophobic, causing them to be more resistant and potential as virulence factors. OMP in negative gram bacteria is a potential immunogen that can directly induce humoral specific immune responses, namely B lymphocyte cells so that it accelerates the antibodies formation faster. *Brucella* has a lipid component called lipoprotein. Unmodified lipids can enhance *Brucella* pathogenicity. Lipoproteins induce cytokines associated with nonspecific immunological reactions. The cytokines production in the immunological system is closely related to the inflammatory reaction.

Other studies have discovered that purified lipoproteins from OMP *B. abortus* such as L-OMP16 and L-OMP19 can stimulate cytokine production from innate immune response cells. Such stimulation occurs due to the interaction of OMP16, OMP19 or other *B. abortus* lipoproteins and cells, such as macrophages, which causes cytokine production, proliferation and the fusion of other inflammatory cells, resulting in tissue inflammation.

The immune response towards Brucellosis involves the humoral and cellular immune systems. The humoral response system is formed by antibodies produced by B lymphocytes that are located in peripheral lymphoid tissue. Antigens will be bounded by B lymphocyte immunoglobulin, which will stimulate proliferation of B cells into plasma cells and form antibodies to fight *Brucella* infection and neutralize the toxin.

*B. abortus* is an intracellular pathogen that can survive on macrophages in a hostile environment. Previous research has been carried out on mice and monkeys. It results in an important response to this infection, i.e. the presence of IL-2 and IFN-γ secretions, involving APC and Th1 cells. *B. abortus* has the capability of producing antibody response in the forms of independent T helper cells and independent CD4 + T cells. Peptides or proteins can be conjugated to *B. abortus* where the conjugates are used to obtain strong antibody and CTL responses, even without the presence of CD4 + T cells.

The development of Brucellosis vaccine is carried out by looking at IgG levels in vaccine administration of all bacteria *B. abortus* S19 and OMP *B. abortus*. The results of this study suggested significant differences among treatments, in which, OMP *B. abortus* vaccine resulted the highest IgG level. IgG is the antibody result by plasma cells in the blood where plasma cells are the mature forms of lymphocyt B. Before plasma cells are formed in the spleen’s white pulp, proliferation of lymphocytes is stimulated and ripens into plasma cells in the bloodm then producing antibodies. Therefore, it can be correlated with high IgG levels in vaccination of OMP *B. abortus* and lymphocyte cell proliferation in the spleen’s white pulp. The highest average spleen’s pulp white diameter of the OMP *B. abortus* treatment indicated the highest IgG level. The two results of the study suggested that the administration OMP *B. abortus* vaccination is capable of providing good antibody formation.
Conclusion

This study concludes that the diameter measuring experienced different results. The vaccination by using OMP B. abortus has the potential to improve immune response by having an enhancement in the L. nigricollis white pulp diameter. It is suggested for future research that there is a requirement to measure the formed antibody levels resulted from whole B. abortus and OMP B. abortus vaccinations.

Ethical Clearance: The research process was using experimental method that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice for animal.

Conflict of Interest: The author reports no conflict of interest of this work.

Source of Funding: This study is done with individual funding.

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The Effect of Adding Moringa Leave (*Moringa oleifera*) to Male Broiler Feed

Mien Qurrati A’yuni Muis¹, Kadek Rachmawati¹, Mohammad Anam Al Arif⁰

¹Department of Veterinary Education, Faculty of Veterinary, Universitas Airlangga, Jl. Mulyorejo, Surabaya, East Java

ABSTRACT

**Background:** Broiler chickens are popular in the community due to their inexpensive price and thick meat. Nevertheless, its high-fat content worries consumers.

**Objective:** This research aims to investigate the effect of Moringa leave powder added in commercial diets on increasing the protein level and decreasing the fat content in broiler chickens.

**Method:** This research employed 20 male Day-Old Chicks (DOC) of CP 707 strain, aged 21-35 days. This research applied CRD (Complete Randomized Design) with four treatments and five replications. The protein and fat of broiler meat were measured as the parameter in this study. After that, the data were analyzed using Analysis of Variance (ANOVA) and continued by using the Duncan test.

**Result:** Moringa leaves powder as a substituent in commercial diets had a significant effect (p <0.05) on the increase in meat protein. It was identified that P1 gained meat protein by 20.02%; P2 by 19.87%, and last P3 by 19.99% from the P0 group with 19.37% protein increase. There was also a significant influence (p <0.05) on meat fat decrease where P1 decreased fat by 1.23%; P2 by 1.30%, P3 by 1.13% from P0 with 1.50% fat content.

**Conclusion:** Moringa leaves powder supplemented to chicken diets impacts on increasing protein level and decreasing fat content of broiler chickens.

**Keywords:** Broiler, Meat protein, Meat fat, Moringa oleifera

Introduction

Broiler chickens are the type of chicken specifically raised for meat production with rapid growth as its economic characteristic. A fast harvest time, soft fibrous meat, thicker meat, and high nutrient make broiler chickens favorable. In addition, broilers are popular among the community due to their affordable price. However, the high fat contained in broiler chickens causes some people to worry. The high-fat content brings negative impacts on health and positively correlate with metabolic diseases such as atherosclerosis, hypertension, and coronary heart disease. Therefore, meat companies should provide chicken meat with low fat and high protein content to increase consumer interest in chicken meat.

Amino acids are vital substances required in protein synthesis. Amino acids, nonetheless, are not produced by the body. Hence, it must be imported in a completed form. One of the amino acid sources that can be obtained is Moringa leaves. Some active compounds contained in Moringa leaves include saponins, leucine, and methionine which have benefits for the body. Fresh Moringa leaves contain 492 mg of leucine, which is essential for the synthesis of muscle protein and normal cell function. Meanwhile, saponins is a compound which is capable of reducing cholesterol level in broilers due to its essential function in cholesterol metabolism and fat accumulation decrease. In addition, saponins are also capable of lowering lipid and blood cholesterol levels by inhibiting cholesterol absorption.
The supplement of Moringa leaves powder in the chickens’ diet positively affects the yellow color increase of the eggs. Furthermore, green vegetables on chickens’ diet are considered to contain useful substances such as vitamins and minerals that are essential for livestock. Green vegetables serve as vitamins and minerals source and are regarded as more efficient than factory-produced vitamins. Green vegetables are considered better because of their lower price, natural ingredient, and relatively perfect food substances such as protein, fat, and water. These factors can improve the quality of the food consumed. Based on the potential content of Moringa leaves, this research needs to be taken into account to examine the effect of Moringa leave powder addition in commercial diets toward meat protein and fat levels in male broilers.

**Method**

This research was conducted at the Faculty of Veterinary, Universitas Airlangga. The experimental animals employed were 20 male broiler chickens of CP 707 strains and aged between 21 to 35 days old. This research applied four treatments with a minimum of five replications for each treatment.

The treatment groups were arranged as follows:
- P0 (control): 100% commercial diets
- P1: 95% commercial diets + 5% Moringa leave powder
- P2: 90% commercial diets + 10% Moringa leave powder
- P3: 85% commercial diets + 15% Moringa leave powder

The treatments above were carried out for two weeks, preceded by an adaptation period of 7 days.

Powdered moringa leaves were utilized as the ingredient of supplementary diets. In this study, the broiler chickens were fed with commercial diets (PT. Charoen Pokphand, Thailand). Moreover, the cages were disinfected with Lysol. In addition, the chickens were administered an ND (Newcastle Disease) vaccine to prevent Newcastle disease. The ND vaccine consisted of 2 strains, namely Hichner B1 strain and Lasota strain. The drinking water provided to the chickens was mixed with anti-stress vitamins. Cipro antibiotics were also given adequately to unhealthy chickens. After that, the data obtained were analyzed using the ANOVA (Analysis of Variance). In addition, Duncan’s Multiple Distance Test was performed to discover the best treatment.

**Results**

**The Protein Level of the Broiler Chicken Meat:** The addition of Moringa leaves powder in the male broiler chickens’ diets suggested a significant difference (p <0.05) of meat protein increase.

Table 1: Average protein levels of the broiler chicken meat supplemented with Moringa leave powder

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Meat Protein Level (%) (X ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0 (100% commercial diet)</td>
<td>19.37132 ± 0.36708</td>
</tr>
<tr>
<td>P1 (95% commercial diet+5% Moringa leave powder)</td>
<td>20.02166 ± 0.51725</td>
</tr>
<tr>
<td>P2 (90% commercial diet+10% Moringa leave powder)</td>
<td>19.87110 ± 0.19768</td>
</tr>
<tr>
<td>P3 (85% commercial diet+15% Moringa leave powder)</td>
<td>19.99622 ± 0.30299</td>
</tr>
</tbody>
</table>

The data analysis result using ANOVA on the meat protein level detected that P0 (control group) was significantly different from P1, P2, and P3 (p<0.05). Meanwhile, P1 was not considerably different from P2 and P3 (p>0.05). The data analysis results illustrated that the addition of Moringa leaves powder affected the protein level increase of the male broiler meat.

**The Fat Level of the Broiler Chicken Meat:** The analysis results of the ANOVA test described that the Moringa leaves powder added in the broiler chickens’ diets had a significant effect (p <0.05) on the fat level of the male broiler chicken meat.

Table 2: Average of the fat level of the broiler chicken added with Moringa leaves powder

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Meat Fat Level (%) (X ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0 (100% commercial diet)</td>
<td>1.50284 ± 0.34660</td>
</tr>
<tr>
<td>P1 (95% commercial diet+ 5% Moringa leave powder)</td>
<td>1.23532 ± 0.21376</td>
</tr>
<tr>
<td>P2 (90% commercial diet+10% Moringa leave powder)</td>
<td>1.30756 ± 0.10908</td>
</tr>
<tr>
<td>P3 (85% commercial diet+15% Moringa leave powder)</td>
<td>1.13550 ± 0.14861</td>
</tr>
</tbody>
</table>
The average fat level of P0 (control group) differed significantly (p < 0.05) from P3, but not significantly different (p > 0.05) from P1 and P2. In contrast, P3 illustrated a different result from P1 and P2. The highest fat level was identified in P0 (control), and the lowest level was in P3. The results of this data analysis described that the addition of Moringa leaves powder in the ration could reduce the fat level of the male broiler meat.

**Discussion**

Based on the data analysis results using the ANOVA test which was then followed by Duncan’s multiple distance test, the addition of *Moringa oleifera* leaves powder in the ration significantly influenced (p < 0.05) meat protein level increase. The lowest protein content of meat was produced by in the control group (P0), reaching only 19.37%. The highest protein content of meat was generated from the addition of 5% Moringa leave powder in treatment group 1 (P1), amounting to 20.02%. Meanwhile, the protein content of meat produced with the addition of 10% Moringa leave powder (P2) reached 19.87%. This figure was not significantly distinctive from the addition of 5% Moringa leave powder (P1) reaching 20.02%, and the addition of 15% *Moringa* leaves powder (P3), amounting to 19.99%.

The meat protein level in the treatment group experienced an increase, compared to the control group, despite within the normal range. The energy contained in the feed nutrient composition from P0 to P3 decreased, namely 3,040.06 kcal/kg to 2,962.93 kcal/kg. The decrease in the energy contained in the ration composition caused an increase in ration consumption. It leads to more protein intake from ratio due to high ration consumption. The feed with higher energy is less consumed. On the other hand, the feed with lower energy will be consumed more and more to meet their needs. The ration consumption in large amount will be followed by high protein intake. The consumption of high protein will also affect meat protein intake. Moreover, amino acids intake will be sufficient; hence, cell metabolism in the body occurs normally. It causes the meat protein level to increase.

Moringa contains essential amino acids that are not produced by the body. Hence, it must be supplied into the body in a completed form. This amino acid is highly vital in protein synthesis. Protein is essential for the growth of chickens’ body parts and for replacing damaged body tissue. One of the active compounds contained in fresh Moringa leaves is 492 mg of leucine, which plays a role in muscle protein synthesis and normal cell function. The results of previous studies on the benefits of Moringa leaves as a broiler chicken feed has proven that *Moringa oleifera* leaves could be added up to 5% in feed to substitute fish powder and soybean.

The highest protein content of the broiler chickens fed with Moringa leaves powder added in their diet was found out in P1 with 5% Moringa powder level, resulting in 20.02% protein increase. This result was significantly different from P0, which only reached 19.37% protein increase. The addition of 10% and 15% Moringa powder, P2, and P3 treatment groups, produced lower protein content than P1, i.e., 19.87%, and 19.99% respectively. Nevertheless, it was still higher than P0. Moreover, the protein content in the nutritional composition of feed P1, P2, and P3 was not significantly different. Thus, the mean and standard deviations of the meat protein level were not significantly different as well. The results of this data analysis identified that the addition of Moringa leaves powder on the chicken feed influenced the protein level increase of male broiler meat.

The average fat content of the broiler chickens after being treated with the addition of Moringa leaves powder, from each treatment group was 1.50% fat addition in P0 (control), 1.23% fat addition in P1, 1.30% fat addition in P2, and last 1.13% fat addition in P3. The highest fat content resulted in P0 (control), and the lowest was in P3. The statistical analysis results with ANOVA test, followed by Duncan’s Multiple Distance test identified that the addition of Moringa leaves powder on commercial diets had a significant effect on decreasing the fat content of the male broiler chickens meat. The fat content in P0 (control) was significantly different from P3, which was 1.50% and 1.13% respectively. Meanwhile, P1 and P2 were not considerably different, namely 1.23% and 1.30% respectively.

In order to maintain the quality of the broiler chickens, the ration standard for the finisher phase requires crude fiber content, amounting no more than 6.0%. It is found out that the crude fiber content in the nutrient composition of P3 feed reached 6.94%, and it increased from P0. The high crude fiber content in the ration appeared to reduce the cholesterol and fat level in the chickens’ body. Moreover, the average...
and standard deviation of the meat fat level illustrated that P0 (control) was significantly different from P3. The fat distribution in the body decreased, along with the increase of crude fiber content in the diet, and the presence of probiotic addition in the body 16.

Diet is one of the factors that play a role in various chemical and physiological activities, converting feed nutrients into animal body substances 17. Some active substances in Moringa include saponins, tannins, methionine, flavonoids, and essential oils 18. The active substances such as saponins, vitamin C, flavonoids, and tannins are also capable of reducing fat accumulation 19. This component can be utilized to inhibit the accumulation of fat and cholesterol in the body of livestock to improve carcass quality and reduce carcass cholesterol in the broiler chickens. The addition of alfalfa saponins is capable of lowering cholesterol and fat level in chicken’s breast meat 20.

Based on these reasons, the results of this study are better since the fat content percentage of the broiler chickens was still in a low range. The results of this data analysis identified that the addition of Moringa leaves powder affected the fat content decrease in the male broiler meat.

Conclusion

*Moringa oleifera* leave powder addition on the commercial diet can increase the protein content of male broiler meat up to 15% powder addition and reduce the fat content of the male broiler meat up to 15% powder addition.

Ethical Clearance: This research is in accordance with ethical clearance, has not been published before and is not being considered for publication elsewhere.

Conflict of Interest: There is no conflict of interest in this study.

Source of Funding: This research was carried out by a team and funded independently.

REFERENCES


The Effect of Vitamin on Wistar Rats’ Testicles Exposed to Lethal Insecticide

Gabriella Ayu Pitaloka¹, Kusnoto¹, Thomas Valentinus Widiyatno¹
¹Department of Veterinary Education, Faculty of Veterinary, Universitas Airlangga, Jl. Mulyorejo, Surabaya, East Java

ABSTRACT

Background: Agricultural products exposed to endosulfan insecticides potentially lead to organ dysfunction in living organisms that can cause morphological changes in the reproductive system such as a decrease in the number of sperm cells, an inhibition on the testosterone production by the Leydig cells, and a decline in the ascorbic acid levels in the testicles.

Purpose: This study aimed to determine the effect of vitamin C on testicle weight and the number of Leydig cells in adult male Wistar rats exposed to endosulfan.

Method: This study used 20 male Wistar rats with an average weight of 25 grams as samples, where the rats were equally divided into four groups, i.e., P-, P+, P1, and P2. The testicles of all Wistar rats were harvested on day 19 and then prepared for a microscopic examination with routine H & E staining. The results analyzed by using ANOVA and the Waller-Duncan T-test.

Results: The testicle weight of the Wistar rats administered with endosulfan suggested a significant difference (p <0.05) and had the lowest value compared to the other treatments. The Wistar rats administered with endosulfan and then followed by vitamin C administration did not indicate a significant difference (p <0.05). Vitamin C administration to Wistar rats caused an increase in testicle weight. Conversely, administering endosulfan to the Wistar rats caused a decrease in testicle weight.

Conclusion: Administering vitamin C to Wistar rats exposed to endosulfan could potentially lead to an increase in the testicle weight and the Leydig cells.

Keywords: endosulfan, vitamin C, Wistar rats, testicle weight, Leydig cells

Introduction

Some chemicals in recent years still need to be evaluated and examined as they potentially lead to toxicity in the reproductive system ¹. One of the widely used chemicals is endosulfan. This insecticide can enter the body through various intermediaries such as food, air, or skin contact can inflict several toxic effects on the body ². The endosulfan contained in agricultural products will enter the body of living organisms and lead to organ dysfunction if ingested. Endosulfan is a type of insecticide classified as highly toxic and potentially cause damages to the reproductive organs, especially the testicles ³. The endosulfan toxicity can lead to morphological and functional changes in the reproductive system such as a decrease in the number of sperm cells and inhibition on the testosterone production by the Leydig cells ⁴. The endosulfan distribution is carried out through agricultural lands and the surrounding aquatic environment ⁵. In mammals, endosulfan disrupts the central nervous system and the metabolic system so that it inhibits the nervous system transmission in the brain ⁶, activates cholinergic, dopaminergic ⁷, and serotonergic systems in the body mechanism ⁸, and causes very high gonad toxicity ⁹. At a more severe level, it also causes lethal and sublethal effects, which result in a high percentage of death and disability effects on animal larvae ¹⁰.
Vitamin C is the main chain-breaking antioxidant that neutralizes hydroxyl, superoxide, and hydrogen peroxide radicals and prevents sperm agglutination. The amount of vitamin C found in infertile men is quite low. At a dose of 200-1,000 mg/day, this vitamin can increase the sperm amount of infertile men in vivo. Administering vitamin C can forestall cell lipid peroxidation, as evidenced by the diminishing occurrence of cell damage. Vitamin C has positive effects on the reproductive organ weight and sperm parameters such as motility, development, feasibility, number, and anomaly. Besides, vitamin C can also increase testosterone levels in the blood.

Based on the background above, this study aimed to determine whether administering endosulfan followed by vitamin C administration affected the testicle weight and the number of Leydig cells of the male Wistar rats. This study hypothesized that vitamin C could improve the testicle morphology and increase the number of Leydig cells of the Wistar rats exposed to endosulfan.

**Method**

This study used Federer’s formula to determine the number of samples for experimental research. The number of sample groups divided into 4 treatment groups. The total number of samples in this study were 20 adult Wistar rats aged 2-3 months with an average weight of 25 grams. Its placed in closed plastic cages with a bed of husk in a ventilated room that is indirectly illuminated to adapt to the research site for seven days and consisted of five Wistar rats. The amount of endosulfan orally administered to the Wistar rats was 3.2 mg/kg BW, while the amount of vitamin C administered was 25 mg/kg BW and 50 mg/kg BW.

There were four treatment groups of the Wistar rats placed in cages for seven days to adapt to the research site, namely:

- **P-**: administered with 0.5 ml aquadest for ten days starting on the 8th day to the 18th day
- **P+**: with 0.5 ml endosulfan at a dose of 3.2 mg/kg for ten days beginning on the 8th to the 18th day
- **P1**: administered with 0.5 ml endosulfan at a dose of 3.2 mg/kg BW for ten days beginning on the 8th day to the 18th day, and then followed by vitamin C administration at a dose of 25 mg/kg for seven days beginning on the 11th to the 18th day
- **P2**: administered with 0.5 ml endosulfan at a dose of 3.2 mg/kg BW for ten days beginning on the 8th day to the 18th day, followed by vitamin C administration at a dose of 50 mg/kg for seven days beginning on the 11th day to the 18th day

The dissection of the Wistar rats was carried out on the 19th day. The Wistar rats were euthanized by using chloroform PA and then dissected by using dissecting kits. After the scrotum was opened, the testicle organs of the Wistar rats were taken and then weighed using a 0.1 analytical scale to determine the testicle weight. After the weighing process, the testicles were washed with a physiological solution and put into a pot containing 10% formalin solution for subsequent histopathological preparation. The changes in the testicle weight and the number of Leydig cells in histopathological preparations were analyzed and examined by using SPSS program using the One-Way ANOVA method then followed with Duncan’s Multiple Distance Test.

**Results**

The right and left testicles of the Wistar rats were weighed with an analytical scale of 0.1 and then examined using the ANOVA test. The average results of testicle weight in the P-, P +, P1, and P2 treatment groups were 0.056 grams, 0.024 grams, 0.064 grams, and 0.098 grams, respectively. The ANOVA test results on the testicle weight indicated a significant difference in the existing treatments (p <0.05).
significantly different (p <0.05) compared to the other treatment groups. It indicated that administering vitamin C at a dose of 50 mg/kg BW to Wistar rats caused testicle weight to increase. The lowest testicle weight occurred in the P+ group and was significantly different compared to the other treatment groups. This finding denoted that the endosulfan administration at a dose of 3.2 mg/kg BW to Wistar rats caused testicle weight to decrease. On the other hand, the testicle weight in the P- and P1 groups did not differ significantly (p <0.05).

The observation of Leydig cells in histopathological preparations of the Wistar rats’ testicles using a microscope with 400x magnification in ten visual fields were between three to four seminiferous tubules.

The results of the 5% Duncan test indicated that the highest number of Leydig cells occurred in the P- group, reaching 296 cells, and differed significantly from the other treatment groups. The lowest number of Leydig cells in the P+ group, which only reached 169 cells and differed significantly (p <0.05) from the other treatment groups. It indicates that administering endosulfan at a dose of 3.2 mg/kg BW in Wistar rats caused the number of Leydig cells to decrease. The number of Leydig cells in P1 and P2 groups that reached the amount of 210 and 269, respectively, were not significantly different (p> 0.05). It proved that vitamin C administration to Wistar rats could improve the number of Leydig cells in each treatment, but the most optimized Leydig cell recovery was at a dose of 50 mg/kg BW.

**Discussion**

Vitamin C as an antioxidant has been proven to improve the testicle morphology and weight, increase the number of Leydig cells, and prevent cell damage of the Wistar rats exposed to endosulfan. Endosulfan acts as a gamma amino butyric antagonist, which is an inhibitory neurotransmitter in the central nervous system. Acute symptoms of the endosulfan effects include motion incoordination, gagging, vomiting, diarrhea, anxiety, convulsion, and loss of consciousness. Moreover, endosulfan also inflicts the kidney, liver, reproductive organ, respiratory organ, and immune system disorders in mammals.

The results of the statistical analysis using ANOVA presented that the testicle weight of the Wistar rats in the P+ treatment group differed significantly from the other treatments. In the P+ treatment, the Wistar rats were given endosulfan at a dose of 3.2 mg/kg BW for ten days. The testicle weight in the P+ treatment had the lowest number compared to the other treatments, which was only 0.024 cells. It indicated that the peroral administration of 0.5 ml endosulfan at a dose of 3.2 mg/kg BW for ten days to the Wistar rats caused the testicle weight to decrease. In P1 treatment, where the Wistar rats were administered with 0.5 ml endosulfan at a dose of 3.2 mg/kg BW for ten days followed by 0.5 ml vitamin C administration at a dose of 25 mg/kg BW for seven days, indicated a value of 0.064. Both treatments did not have a significant difference (p <0.05). It implied that vitamin C administration could not protect spermatogenic cells from free radicals inflicted by endosulfan, disrupting the spermatogenic cell formation in the seminiferous tubules in the testicles.

The heaviest testicle weight among all treatments was in P2 where the Wistar rats were administered with 0.5 ml endosulfan at a dose of 3.2 mg/kg BW for ten days, followed by a 0.5 ml vitamin C administration at a dose of 50 mg/kg BW for seven days, reaching an amount of 0.980. It showed that administering vitamin C could increase the number of spermatogenic cells formed so that there would be an increase in the epithelial thickness of the seminiferous tubules, affecting the testicle weight. The spermatogenic cells formed in the testicles were closely associated with an increase in the epithelial thickness of the seminiferous tubules. The abundance of spermatogenic cells in the seminiferous tubules in the testicles could determine the increase in the testicle weight itself. Administering vitamin C at a dose of 50 mg/kg BW affected the number of spermatogenic cells in Wistar rats exposed to endosulfan, causing the testicle weight to increase. The results of the ANOVA test on the number of Leydig cells implied that the
endosulfan and vitamin C administration in Wistar rats had a significant difference in the number of Leydig cells. The highest number of Leydig cells occurred in the P- treatment group as a control group, reaching an amount of 296 cells and was significantly different from the P+ group with only 169 cells. It indicated that drug solvent administration did not lead to central nervous system disruption to secrete gonadotropin-releasing hormone which stimulates the luteinizing hormone and follicle-stimulating hormone secretion from the anterior pituitary gland.

Luteinizing hormone increased the activity of the desmolase cholesterol enzyme, stimulating the testosterone secretion. On the other hand, follicle-stimulating hormone increased the Leydig cell responses to luteinizing hormone so that the spermatogenesis process ran normally. In the P+ group, the endosulfan administration to the Wistar rats at a dose of 3.2 mg/kg BW for ten days disrupted the hypothalamus by inhibiting the gonadotropin-releasing hormone performance so that the follicle-stimulating hormone and luteinizing hormone formation became inhibited. If the levels of follicle-stimulating hormone and luteinizing hormone were inhibited, the proliferation of Leydig cell development in the testicles decreased. The results in P- group did not differ significantly from P2 with 269 cells indicated that the drug solvent and vitamin C administration at a dose of 50 mg/kg BW had the same function in maintaining the number of Leydig cells. At a dose of 50 mg/kg, vitamin C increased the luteinizing hormone secretion, which led to an increase in the number of Leydig cells produced. Testosterone produced Androgen Binding Protein used in the spermatogenesis cycle to increase the number of spermatozoa.

The P1 and P2 treatment groups did not show a significant difference (p> 0.05). Whereas in P1, the Wistar rats were administered with endosulfan at a dose of 3.2 mg/kg BW, followed by vitamin C administration at a dose of 25 mg/kg BW, and reached a total of 210 cells. In P2 group, the Wistar rats were administered with endosulfan at a dose of 3.2 mg/kg BW, followed by vitamin C administration at a dose of 50 mg/kg, and reached a total of 269 cells. These findings implied that vitamin C administration at a dose of both 25 mg/kg BW and 50 mg/kg could improve and maintain the number of Leydig cells, but the latter dose was proven to be more maximal. Vitamin C provides spontaneous and rapid stimulation to the hypothalamus, arising signals to increase the follicle-stimulating hormone and luteinizing hormone secretion by protecting the brain and brain fluids. Therefore, the chain reaction of free radicals would stop, the central nervous system would be safely protected from damage, and the pituitary gland would typically produce hormones like follicle-stimulating hormone and luteinizing hormone. If the follicle-stimulating hormone and luteinizing hormone levels became normal, the proliferation of Leydig cell development would normally run in the testicles.

**Conclusion**

The administration of specific doses of vitamin C could increase the testicle weight and the number of Leydig cells in Wistar rats exposed to endosulfan.

**Ethical Clearance:** This research is in accordance with ethical clearance, has not been published before and is not being considered for publication elsewhere.

**Conflict of Interest:** There is no conflict of interest in this study.

**Source of Funding:** This research was carried out by a team and funded independently.

**REFERENCES**


The Potency of Formalin in Atenuation of Pathogenicity in *Eimeria Tenella* at the Caecum of Broiler Chicken

Enik Setywati¹, Muchammad Yunus², Dadik Rahardjo¹

¹Faculty of Veterinary, Airlangga University, ²Department of Parasitology Veterinary, Faculty of Veterinary, Airlangga University, Kampus C, Mulyorejo, Kec. Mulyorejo, Kota Surabaya, Jawa Timur

ABSTRACT

**Background:** Coccidiosis is a parasitic disease that disrupts digestive tract, especially in caecum. It causes a lot of harm to chicken farms. Formalin, can be a new invention as an alternative for *Eimeria tenella* protozoa attenuation in vaccines.

**Aim:** To determine formalin effect and optimum concentration for formalin attenuation of pathogenicity to cecum lesions inoculated score in boiler chickens.

**Method:** This study was an experimental study using completely randomized design (CRD) with five treatments. Treatment variation is formaldehyde with a concentration of 0%, 0.15%, 0.3%, 0.6%, 1.2%

**Results:** Results of the study showed that formalin with different concentrations resulted in a significant decrease. Decreasing microscopic cecum lesions inoculated score in boiler chickens in each treatment 0%, 0.15%, 0.3%, 0.6% and 1.2% were 10.32; 9.86; 7.00; 5.14; 4.98 respectively. The largest decrease in lesion score was at 1.2%.

**Conclusion:** Formalin with 1.2% concentration could reduce cecum lesions inoculated score in boiler chickens

**Keywords:** Formalin, *E. tenella*, Caecum of boiler chicken, Attenuation

Introduction

Chicken could get diseases caused by protozoa with high morbidity and mortality. Coccidiosis is one parasitic that cause disease especially in caecum of digestive tract, resulting almost 80-90% morbidity and mortality. In addition, this disease could also cause decreasing egg production, body weight and increasing in medical expenses. Economic losses due to coccidiosis in United States between 450 million dollars to 1.5 billion US dollars. Coccidiosis is one among all diseases always occurs in every period of chicken maintenance.

Various ways to control coccidiosis have been carried out, but not yet fully successful. Maintenance with good sanitation can break *Eimeria* development cycle, but this method is still not fully able to prevent occurrence of coccidiosis. It is caused by the small size of the oocyst can contaminate water, feed, and cage equipment. Residue in meat also could endanger consumers. One effective action is using a vaccine that induce immunity. Live vaccine is giving immunity in a certain range of time and protecting against infection with pathogenic agents. In coccidiosis, the best type of vaccine to use is an active vaccine, where vaccine functions got protection in live vaccines form.

Formalin is a 37% formaldehyde gas solution and contains methanol as a stabilizer. Coccidiosis vaccine development needs to be explored to prevent infection through various immersion concentrations of *E. tenella* with formalin as a live vaccine in chickens. Exploration of optimum immersion time to produce attenuation could induce the most effective protective immunity in chickens. This study aim was to determine formalin
effect and its attenuation optimum concentration on pathogenicity against cecum lesion scores inoculated in boiler chickens.

**Method**

This study was located in experimental cages, parasitology laboratories and pathology laboratories at the Faculty of Veterinary, Universitas Airlangga, Surabaya. Method used in this study as follow (i) Animals subject used in this study were 25 broiler strains of CP 707 produced by Chaeron Pokphand and aged 21 days. Two-week-old chickens were kept in a battery-powered coop, fed ad libitum and did not contain coccidiostat. Saturated sugar solution, chlorine, distilled water, formalin with concentrations of 0.15%, 0.3%, 0.6% and 1.2%. (iii) Research tools used were battery-powered chicken coop, feed-drink containers, microscope, object glass, cover glass, lab optics, surgical scissors, tweezers, scalpel, centrifuge tube, centrifuge, tray, pot ointment, paper label, tissue paper, stapler, and pipette, micropipette and white chip

Study was an experimental study using complete randomized design (CRD), consist of four treatments. The treatment given is:

- **Treatment 0**: As a control, oocysts was not soaked in formalin and inoculated with 10,000 oocysts.
- **Treatment 1**: *E. tenella* was soaked in formalin with a concentration of 0.15% for 96 hours, then oral inoculated with 10,000 oocysts.
- **Treatment II**: *E. tenella* was soaked in formalin with a concentration of 0.3% for 96 hours, then oral inoculated with 10,000 oocysts orally.
- **Treatment III**: *E. tenella* was soaked in formalin with a concentration of 0.6% for 96 hours, then oral inoculated with 10,000 oocysts.
- **Treatment IV**: *E. tenella* was soaked in formalin with a concentration of 1.2% for 96 hours, then oral inoculated with 10,000 oocysts.

Macroscopic and microscopic scoring was performed on 5th day after inoculation with scoring done macroscopically, cecal abnormalities were noted and degree of damage to mucosal surface of chicken cecum was calculated based on a score of 0-4:

### Table 1: The Degree of cecal damage in chicken that infected with *E. tenella*

<table>
<thead>
<tr>
<th>Lession Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal conditions do not indicate a presence of lesion.</td>
</tr>
<tr>
<td>+1</td>
<td>Mild lesions, there is a presence of blood patch (ptechie) which spreads slightly on the mucosal surface accompanied by cecum discoloration or the contents of the digestive tract.</td>
</tr>
<tr>
<td>+2</td>
<td>Medium level lesions, more bleeding and lesions with a slight thickening of the cecum wall.</td>
</tr>
<tr>
<td>+3</td>
<td>Severe lesions, characterized by severe bleeding and blood clots.</td>
</tr>
<tr>
<td>+4</td>
<td>Very severe lesions, characterized by very intense and widespread bleeding, the presence of bluish red clot in the cecum that indicates the presence of blood clots.</td>
</tr>
</tbody>
</table>

Histopathological observations were based on total values A and B, where A represents the distribution of *E. tenella* presences found in the cecum mucosa in the histopathological preparation as described below:

### Table 2: The Distribution of *E. tenella* presence found in the cecum mucosa in histopathological preparations

<table>
<thead>
<tr>
<th>Lession Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>There are no parasites in the sub epithelial part.</td>
</tr>
<tr>
<td>+1</td>
<td>If in 10 visual fields in the sub-epithelium there are 1 parasite.</td>
</tr>
<tr>
<td>+2</td>
<td>If in 10 visual fields in the sub-epithelium there are 2 parasites.</td>
</tr>
<tr>
<td>+3</td>
<td>If in 10 fields of view in the sub-epithelium there are 3 parasites.</td>
</tr>
<tr>
<td>+4</td>
<td>If in 10 fields of view in the sub epithelium there are 4 parasites.</td>
</tr>
</tbody>
</table>

While B represents cecal damage severity caused by *E. tenella* as described below:
Table 3: The Severity damaged villi in caecum caused by *E. tenella*

<table>
<thead>
<tr>
<th>Lesion Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>If the severity due to parasitic infection in the villi is 0% at 10 fields of view.</td>
</tr>
<tr>
<td>+1</td>
<td>If the severity due to parasite infection in the villi is &lt;25% at 10 fields of view.</td>
</tr>
<tr>
<td>+2</td>
<td>If the severity due to parasitic infection in the villi is 25-50% at 10 fields of view.</td>
</tr>
<tr>
<td>+3</td>
<td>If the severity due to parasitic infection in the villi is 51-75% at 10 fields of view.</td>
</tr>
<tr>
<td>+4</td>
<td>If the severity of infection of the villi parasites is &gt;75% at 10 fields of view.</td>
</tr>
</tbody>
</table>

Quantitative analysis was used in this study from scores and statistically analyzed using Spearman correlation test.

**Result**

Based on macroscopic and microscopic observations, score data of cecal damage in *E. tenella* inoculation were different between treatment groups. Calculation score lesion on boiler chicken cecum, based on average results of macroscopic and microscopic scoring on each treatment.

Table 4: Scores of chicken cecum lesions that inoculated with *E.tenella* and were soaked using several formalin concentrations and infected with each group of chicken with a dose of 1 x 10⁴ oocyst of *E. tenella*

<table>
<thead>
<tr>
<th>Treatment group</th>
<th>Cecum score based on Macroscopic observation X ± SD</th>
<th>Cecum Lession score based on Macroscopic observation X ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>P₀</td>
<td>1.8ᵃ ± 0.447</td>
<td>10.32ᵃ ± 0.487</td>
</tr>
<tr>
<td>P₁</td>
<td>1.8ᵇ ± 0.447</td>
<td>9.86ᵇ ± 0.182</td>
</tr>
<tr>
<td>P₂</td>
<td>1ᶜ ± 0</td>
<td>7.00ᶜ ± 0.339</td>
</tr>
<tr>
<td>P₃</td>
<td>0.6ᵈ ± 0.547</td>
<td>5.14ᵈ ± 0.207</td>
</tr>
<tr>
<td>P₄</td>
<td>0.6ᵈ ± 0.547</td>
<td>4.98ᵈ ± 0.239</td>
</tr>
</tbody>
</table>

**Description:** Different letter transcripts show significant differences

Macroscopic and microscopic mean value of boiler chicken cecum lesions score showed a significant difference. In macroscopic scoring, cecum lesion score decreased with increasing formalin concentration. However, treatment concentration of 0.6% and 1.2% did not show a significant result of 0.547. The biggest decrease in the lesion score was in treatment group of 0.6% and 1.2% with value of 0.6.

Microscopic observation scoring showed a significant decreasing in lesion scores between treatments on boiler chicken cecum along with increasing in formalin concentration. Decreasing in lesion scores in treatment concentration of 0%, 0.15%, 0.3%, 0.6% and 1.2% were 10.32; 9.86; 7.00; 5.14; 4.98 respectively. The biggest decrease in lesion score was in the addition treatment concentration of 1.2%

Results of chicken cecum obtained from image observation macroscopically. Picture showed degree damage of each treatment due to *E.tenella* inoculation can be seen in Figure 1.

![Macroscopic image of chicken cecum inoculated with E. tenella soaked using several formalin concentrations](image-url)
Intensity of pteciae was reduced by immersion in formalin with higher concentrations. Circle showed bleeding in the mucosa and arrows for thickening of the mucous cecum. Picture was taken using an iPhone 5s camera.

Histopathological picture showed degree damage of each treatment due to *E. tenella* inoculation can be seen in Figure 2.

![Histopathological picture showing damage due to *E. tenella* inoculation](image)

**Figure 2: Histopathological description of chicken cecum inoculated with *E. tenella* and soaked using several formalin concentrations [0% (P0); 0.15% (P1); 0.3% (P2); 0.6% (P3); 1.2% (P4)]**

**Description:**  
- Arrow showing ruptured cecum villi, arrow showing bleeding, arrow showing *E. tenella* oocyst; (0.1 - 4.1, 100x magnification; 0.2 - 4.2, 400x magnification).

**Discussion**

Chemicals for *E. tenella* attenuation in vaccines usually using chemicals that can cause antigen changing responsible for stimulating protective immunity. Formalin reacts with amino and amide groups in proteins. Amino bonds are bound to non-water substances with basic ingredients of purine nucleic acids and pyrimidines forming cross-bonds and provide structural rigidity in the organism. Structural rigidity of organism will result in cell death, could reduce virulence of the organism. Organism could lives but not potent enough to cause disease and has large influence to improve antibodies.

Formalin will react chemically with almost all substances in cell thereby suppressing cell function and causing cell death. Formalin is also a source of reactive oxygen compounds (ROS) and oxygen free radicals. Safe threshold of formalin in chicken bodies according to International Program on Chemical Safety (IPCS) in liquid form is 1 mg/l.

*E. tenella* infection phase in the cecum is at sporozoite stage penetrates epithelial cells in cecum villi and crypta. After in cecal epithelium, parasite develops asexually and sexually. This development results in damage to cecal epithelial cells due to schizont ruptured which liberated merozoites. Larger size and increasing amount of *E. tenella* that infects cecum could increase cecal epithelial erosion, and vice versa. In previous study, it was resulting a decrease in number and precocious lines. It caused a decrease in the cecal epithelial erosion score in each treatment group. Formalin could denaturate protein enzymes, and causing enzyme structures changing. It inhibits enzyme activity and unable to catalyze metabolic processes in cells, causing microorganisms weaken and inhibit schizont process. Inhibition of schizont process results in decreased opportunities for reproduction and lesions will decrease. Formalin is able to react with *E. tenella* oocysts because its outer layer wall consists of protein and inner layer consists of fat, related to protein. Formalin could easily binds to protein, able to make organism cell dehydrated and resulting in structural rigidity.

Macroscopic observation of the cecum at P0 showed a moderate damage, characterized by more bleeding and lesions with a slight thickening of cecum wall. This was supported by clinical symptoms as chickens look limp, tangled chicken feathers, decreased appetite. P1 showed moderate level cecal lesions, characterized by more bleeding and lesions with a slight thickening of the cecum.
wall. P2 showed mild cecal lesions, some bleeding that spreads to mucosal surface of cecum with slight changes in wall color or digestive tract content. P3 showed mild cecal lesion, some bleeding that spreads to mucosal surface of cecum with slight changes in wall color or contents of digestive tract. P4 showed mild cecal lesions, some bleeding spreads to mucosal surface of cecum with slight changes in wall color or contents of digestive tract. 12. Conclusion of above discussion shows that optimal formalin concentration for attenuating *E. tenella* in terms of macroscopic aspect was 1.2%. It showed a mild degree damage to cecum mucosa. Inoculation at doses of 1000-3000 Oocysts of *E. tenella* could cause bleeding and other characteristics caused by infection 24. *E. tenella* infection causes lesions in cecum that cause bleeding and diarrhea 25. Inoculation at treatment with 1.2% formalin, there were several bleeding spreads to mucosal surface of cecum with slight discoloration wall or contents of the digestive tract 12.

Histopathological observations in microscope on the cecum, based on P0 image, there was a lot of damage to the cecum mucosa and development of parasites, cecal epithelium was not compact, and many ruptured cecum villi were found. P1 showed histopathological abnormalities with mucosal damage and discovery of clear parasites development in several parts. Cecal epithelium did not appear to be compact, and cecum villi that rupture was found in several parts. P2 values indicate histopathological abnormalities with mild degrees damage to mucosal cecum. Cecal epithelium appeared to be compact, rupture of cecum villi was rarely found and development of parasites also minimum. Value of the microscopic scoring on P3 showed almost no abnormalities in the histopathology of cecum. Cecal epithelium appeared to be compact and ruptured cecum villi was rarely found. P4 shows cecum cell tend to be normal, cecal epithelium appeared patchy and almost did not show any villi rupture 14. Other studies have obtained results on microscopic examination of chicken cecum infected with 5000 oocysts that shows cell necrosis, degeneration, thickening of the muscularis layer, inflammatory cell infiltration, presence of parasites surrounded by inflammatory cells and bleeding 26.

**Conclusion**

Based this result study, we can conclude that formalin can attenuate *E. tenella* in cecum of broiler chicken. There was a difference in the attenuation degree of *E. tenella* in each formalin concentration. The optimal formalin concentration for attenuate *E. tenella* in terms of macroscopic and microscopic features of broiler chickens was 1.2%.

**Ethical Clearance:** This study procedure used test animals were approved with the principles of ethical research based on research ethics committee rules. This study applied the basic principles of replacement, reduction and refinement.

**Conflict of Interest:** The author reports no conflict of interest of this work.

**Source of Funding:** This study is done with individual funding.

**REFERENCES**

Fasciolosis Prevalence on Several Cattle Breeds

Kurnia Winda Pratiwi¹, Setiawan Koesdarto¹, Nenny Harijani¹
¹Faculty of Veterinary Medicine, Universitas Airlangga, Jl Mulyorejo Kampus C Universitas Airlangga, Surabaya, Indonesia

ABSTRACT

Background: Parasitic fluke infection diseases which affect livestock remain issues for big economic loss in Indonesia and other parts of the world. Fasciola fluke infection is zoonotic. Hence it could infect animals and human. Furthermore, fluke infection is hazardous and could result in big economic loss for farmers.

Purpose: This study aimed at determining the fasciolosis prevalence in cattle at an abattoir.

Method: The study applied a quantitative method with non-experimental design without any preceding treatment. The independent variables included liver organs and cattle breeds, while the dependent variable was fasciolosis prevalence. Cow livers and feces samples each were 100 samples examined in this study through post-mortem and fecal examinations.

Result: From the examination, 17% of liver samples and 12% of feces samples were positively infected with *Fasciola sp*. In aggregate, the total prevalence of *Fasciola sp.* infected cattle amounted to 27%. Viewed from each cattle breeds, Simmental, Limousin, and Ongole cattle were positively infected with *Fasciola sp.* with a prevalence of 12%, 12%, and 3%, respectively.

Conclusion: In this study, the prevalence of *Fasciola sp.* fluke infection was low. There was no correlation between cattle breeds and *Fasciola sp.* prevalence.

Keywords: *Fasciola sp.*, cattle, prevalence, abattoir

Introduction

Cattle produce approximately 50% of the global needs of meat, 95% of milk and 85% of skin needs for industry ¹. Nonetheless, many diseases infect cattle, including fluke infection. Fluke infections on livestock, cause huge global economic loss indirectly. Many of them are zoonotic and have become major community diseases ²⁻⁴. *Fasciola sp.* or liver flukes are among the fluke parasites that infect cattle. It is a trematode from *Fasciola* genus. *F. hepatica* and *F. gigantica* are two species commonly reported to have the greatest impacts ⁵. *Fasciola hepatica* is an endemic parasite in Europe countries, Africa, Asia, the United States, and Oceania.

On the other hand, *Fasciola gigantica* is only found in Africa and Asia and is rarely found in the northern part of Europe. According to a study, *Fasciola hepatica* originated from Europe and used Galba tuncatula as its intermediate host ⁶. Several countries, namely North America, South Africa, Republic of Iran, and West Europe, are majorly affected ⁷. In several provinces in Indonesia, Fasciolosis prevalence by *Fasciola hepatica* reaches between 30-90% ⁸,⁹.

*Fasciola sp.* has a flat shape; similar to a leaf, with the anterior body wider than its posterior. Adult *Fasciola sp.* has a greyish brown color, measuring 30 mm long and 13 mm wide. *Fasciola sp.* infects ruminants as its definitive hosts that then survives and matures in the liver and gall bladder. Several ruminants, namely bulls, cattle, goats, and sheep, are commonly infected after swallowing *F. gigantica* metacercariae ⁸,¹⁰⁻¹².

The cattle livers infected with *Fasciola sp.* are damaged and partly or completely rejected with chronic disease and other comorbidities causing decreased
livestock meat, milk, and skin production. Infected cattle can exhibit decreased body weight and production. Furthermore, even though the cattle are free from the adult flukes, performance disturbance remains present prior to the slaughter process. Other symptoms caused by Fasciola sp. infection include poor nutrition, slow growth, as well as liver and bile inflammation. Moreover, the prolonged mild infection may cause cattle unable to reach optimal body weight, exhibit weak body condition, decrease food appetite, inflammations on a mandibular lymph node, hunger edema, and death. This study aimed at determining fasciolosis prevalence in cattle at the abattoir.

Method

This study applied a quantitative approach with non-experimental research design without any preceding treatment. The field survey was conducted using random sampling. The independent variables included liver organs and cattle breeds. The liver organ variable was defined by the measurement of infection severity and sickness duration of the cattle breeds. The infection indicators included any occurrence of inflammation, blockage of the bile ducts, and hardening tissues as the result of cirrhosis and atrophy. The cattle breeds included Simmental cattle, Limousin cattle, and Ongole cattle. Meanwhile, the dependent variable was fasciolosis prevalence. The data were analyzed with Chi-Square by using SPSS program for Windows (SPSS, Chicago, IL, USA).

Instruments: The instruments in this study included a camera, plastic pots, 10% formalin, scalpel, tweezers, gloves, filters, plastic cups, centrifuge tubes, centrifuge tubes rack, stirring rod, object glass, cover glass, label papers, pipets, optilab, and microscope. 3.6

Feces samples examination: The fecal samples were examined with native and sedimentation method to identify any existence of fluke eggs, along with its genus and species that infected the cattle. The sample was stated positively infected if there are any Fasciola sp. fluke eggs found.

Result

The post-mortem and fecal examination results of liver and feces samples from cattle breeds in the abattoir are presented in Table 1 as follows.

<table>
<thead>
<tr>
<th>Cattle breeds</th>
<th>Liver</th>
<th>Feces</th>
<th>Infected total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simmental</td>
<td>7</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Limousin</td>
<td>8</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Ongole</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>12</td>
<td>27</td>
</tr>
</tbody>
</table>

Result of post-mortem and fecal examinations in cattle breeds: The samples collected were cow livers and feces, each of the samples amounted to 100 items. The result indicated that there were 17% liver samples collected through post-mortem examination and 12% feces samples collected through fecal examination that were positively infected with Fasciola sp. In aggregate, the total percentage of infection amounted to 27%.

Differences of Prevalence Numbers between Cattle Breeds: The post-mortem and fecal examinations were conducted to identify the prevalence and susceptibility numbers of Fasciola sp. fluke infection among several cattle breeds. The indicator was if one of the examinations indicated the occurrence of fluke or Fasciola sp. eggs, the animal was assumed to be infected with Fasciola sp. flukes.

According to Table 1, twelve samples of Simmental cattle, 12 samples of Limousin cattle, and 3 samples of Ongole cattle were positively infected with Fasciola sp. Meanwhile, 22 samples of Simmental cattle, 43 samples of Limousin cattle, and 8 samples of Ongole cattle were negatively infected.

Discussion

Fasciolosis is a global health issue, causing a huge economic loss for farm animals. Despite the significant importance to economic conditions and veterinarian field, fasciolosis has spread globally and shown its emergency state as zoonotic parasites, which also infect humans. The result of this study indicated lower infection prevalence than previous studies.

Fasciolosis in ruminants refers to the agents’ life cycle which causes the infection. Adult Fasciola sp. flukes are capable of surviving in ruminants’ livers for 1-3 years. The eggs were then discharged from the ruminant body along with feces, and they are capable of surviving for about 2-3 months in a humid environment.

Several aspects that influence Fasciola sp. development include climate and temperature conditions.
Other conditions include land altitude, rainfall, food system management, and parasite distribution, as well as the intermediate host. Those aspects may have different roles in *Fasciola sp.* development. One of the most significant aspects in *fasciolosis* in certain areas is the suitable snail habitat. In addition, the cattle conditions of having poor nutrition are also susceptible to fluke infections.

The standard temperature that *Fasciola sp.* needs for its development in a snail body ranges from 10°C to 16°C. The optimum humidity for the development of snail and larva stage development inside the snail occurs when heavy rainfall takes place which increases the saturation and humidity. Furthermore, studies found that the highest *Fasciola sp.* prevalence occurs as the result of increased rainfall during winter and autumn, along with the higher infection prevalence in snails during the wet season than in other months.

Besides climate and temperature conditions, other contributing factors in *Fasciola sp.* infection include poor housing management, food and nutrition, grazing, sanitation, and farmers’ lack of knowledge about infection control. The increase of *Fasciola sp.* prevalence number is caused by the existence of swamps and well-irrigated grass which are suitable for the intermediate hosts’ reproduction. Since green grass is the habitat for flukes of metacercariae infective stage, farmers should not provide fresh grass to cattle. These external factors result in no difference in *Fasciola sp.* infection among cattle breeds.

In acute disease condition, the life cycle of flukes is not completed, and the eggs are not produced, resulting in the absence of *Fasciola sp.* eggs in the fecal examination. After 16 weeks, young flukes grow mature and live inside the bile ducts. Then, mature flukes produce *Fasciola sp.* eggs. This stage resulted in the absence of *Fasciola sp.* flukes in post-mortem examination because the fluke migration never reached the liver.

If observed through bare eyes, the appearance of the infected liver organ in cattle is visible on the organ enlargement as the result of inflammation in liver parenchyma and gall bladder fibrosis, which contained mature flukes. In acute condition, the liver organ is swollen or enlarged with the dull-formed liver edge, has pale-colored compared to the normal state with several bleeding marks spread at the organ surface with sizes variations from small to big.

There was no correlation between post-mortem and fecal examinations. *Fasciola sp.* flukes cannot be inspected through only one examination. Therefore, two examinations were conducted. Fecal examinations were conducted to detect the *fasciolosis* occurrence in cattle, to prevent further occurrences and avoid economic loss. This is the only examination that can detect safely without having to kill animals. Meanwhile, post-mortem examinations, in addition to detecting fasciolosis, also serves to prove the feasibility of food in terms of veterinary public health.

According to the descriptions above, fasciolosis is a widespread global occurrence and causes huge loss for farmers and consumers in the form of liver failure, low-quality meat, as well as growth and productivity rate decrease. It has been mentioned that the high prevalence number is associated with poor management practices and farmers’ lack of knowledge about infection control. This situation can be prevented by conducting control toward intermediate hosts, therapeutic strategies, and being supported by adequate grazing management to control fasciolosis.

**Conclusion**

The result of this study indicated that the *Fasciola sp.* prevalence in infected cattle breeds was lower compared to previous studies from other areas in Indonesia. There was no correlation between cattle breeds and *Fasciola sp.* infection prevalence. Nonetheless, the fluke infection can be prevented by proper grazing management, intermediate host controlling, and therapeutic strategies.

**Ethical Clearance:** The research process involves participants in the survey using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice.

**Conflict of Interest:** The authors report no conflict of interest in this work.

**Source of Funding:** This study is done with individual funding.
REFERENCES


BPJS Kesehatan Patients Satisfaction on Pharmaceutical Services in Community Health Center (PUSKESMAS)—South Surabaya Area

Assyifa Ilmi Auliya\textsuperscript{1}, I Nyoman Wijaya\textsuperscript{1}, Catur Dian Setiawan\textsuperscript{1}, Gesnita Nugraheni\textsuperscript{1}

\textsuperscript{1}Pharmacy Department, Faculty of Pharmacy, Airlangga University, Indonesia, Jl. Airlangga No 4-6, Airlangga, Gubeng, Surabaya city, Jawa Timur

ABSTRACT

Background: The implementation of health care efforts in the Puskesmas, as primary health care facility, needs to be supported by proper pharmaceutical services through patient perceptions. The measurement of patient satisfaction is based on five dimensions of service quality, namely reliability, responsiveness, assurance, empathy and tangibles.

Objective: The purpose of this study was to determine satisfactory of the patient using Social Health Security Agency (BPJS Kesehatan) Health Insurance on pharmaceutical services in the Puskesmas

Method: This was a descriptive cross-sectional study which including 120 respondents who had pharmacy services at that time in the puskesmas. Questionnaire with a Likert scale were used in this study, which was previously tested for validity and reliability. Data analysis was done by comparing the patient’s perception of performance and expectations using the servqual and customer window methods.

Results: It shown that there were 18/25 items of negative statements which meant that the patients were not satisfied. The results using the customer window method shown an illustration in 4 quadrants. Quadrant A (indicators that are the top priority to be improved), quadrant B (indicators that need to be maintained), quadrant C (indicators that are in low priority) and quadrant D (indicators that are perceived as excessive by patients).

Conclusion: In general, patients were still not satisfied with the pharmacy services in the Puskesmas. This patient’s perception was influenced by the quality of services as well as the experience they have

Keywords: Satisfaction, expectation, service performance, servqual method, customer window

Introduction

The Social Health Security Agency (BPJS Kesehatan) is a legal entity established to administer national health insurance program in Indonesia\textsuperscript{1}. Health insurance is a health protection in which participants receive proper health care and protection in meeting basic health needs given to everyone who has paid contributions or fees paid by the government\textsuperscript{1}.

The World Health Organization (WHO) also explained that one of health problems are related to health services\textsuperscript{2}. Health services in this case the health center that should provide services include promotion, prevention, curing\textsuperscript{3} and rehabilitation services including medicines and consumable medical materials in accordance with the medical needs. The intended health services include all primary-level health facilities and advanced health facilities, other health facilities determined by the Minister in collaboration with BPJS Health including supporting health facilities consisting of laboratories, hospital pharmacy installations, pharmacies, blood

Correspondence Author:
I Nyoman Wijaya
Pharmacy Department, Faculty of Pharmacy, Airlangga University, Indonesia
Jl. Airlangga No 4-6, Airlangga, Gubeng, Surabaya city, Jawa Timur 60115
Email: iwijayanyoman@gmail.com

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transfusion units/Red Cross Indonesia, optics, service provider for Consumable Ambulatory Peritonial Dialysis (CAPD) and midwife/nurse practice or equivalent.  

The implementation of health services which are a shared responsibility of the government and the community is mostly carried out in health centers. The responsibility of the government is to provide quality health services in accordance with health service quality standards. Patients/communities assess quality services as services that can meet the expectations and needs, they feel. The quality of health services related to patient satisfaction can affect the degree of health and community well-being, because patients who are satisfied will comply with the treatment and want to come back for treatment.

Satisfaction is the feeling of being happy or disappointed someone who appears after comparing between impressions of the performance or results of a product and its expectations. By knowing satisfaction with the services provided, it can be known the needs, desires, and expectations of patients so that service quality improvement can be carried out in accordance with patient expectations. To find out satisfaction with service quality can use the SERVQUAL (service quality) concept that measures patient expectations and is associated with what should be done to produce high-quality services. The indicators used to measure satisfaction in this study are tangible, reliability, responsiveness, assurance, and empathy. In organizing pharmacy staff pharmacy services use the Service Standards guidelines that cover standard management of drugs and medical consumables material and standard clinical pharmacy services. This study aimed to determine the patient satisfactions who were the user of the BPJS Kesehatan health insurance on pharmaceutical services in the puskesmas.

**Method**

This was a descriptive study, namely research that describes important events. The study was conducted using cross-sectional data retrieval with data sources form of primary data and secondary data. Measurements can be made on subjects that are observed only once but do not have to be at one time.

Data sampling in this study using non-random sampling or accidental sampling method. In accordance with the inclusion and exclusion criteria, the minimum number of respondent taken on each puskesmas was as many as 7 patients. The instrument used in this study is a questionnaire with a Likert scale that has been tested for validity and reliability. Likert scale was used in this study because there were a few aspects such as attitudes, opinions and perceptions of a person or group of people about social phenomena that about to be measured.

The data validity test was carried out in this study by using visual validity, content validity, and construct validity. The visual validity test was done by comparing between two types of instruments that have different paper sizes. In addition to validity testing, this study also carried out a reliability test. The reliability of the questionnaire in this study was tested by the Alpha Cronbach technique.

Data analysis is performed using a customer window derived from the concept of SERVQUAL (service quality) by measuring patient expectation (customer expectation) associated with the performance should be done to produce high-quality services. The SERVQUAL method is used to measure the quality of pharmaceutical services for each indicator, which is satisfied or dissatisfied. In analyzing customer window, the average value of total performance and expectations is used, which are described by two variables, namely X and Y.

**Results**

The results of this first study are in the form of demographic data. Demographic data in this study were not counted as patient satisfaction factors but were only used to find out visitors’ data on the health center at the time the study was conducted.

**Table 1: Demographic data of respondents**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Treatment</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency distribution of respondents in each puskesmas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sawahan</td>
<td></td>
<td>8</td>
<td>6,6</td>
</tr>
<tr>
<td>Putat Jaya</td>
<td></td>
<td>8</td>
<td>6,6</td>
</tr>
<tr>
<td>Banyu Urip</td>
<td></td>
<td>8</td>
<td>6,6</td>
</tr>
<tr>
<td>Jagir</td>
<td></td>
<td>8</td>
<td>6,6</td>
</tr>
<tr>
<td>Wonokromo</td>
<td></td>
<td>8</td>
<td>6,6</td>
</tr>
</tbody>
</table>
SERVQUAL Analysis: The calculation results with the SERVQUAL method, 18 items of statements obtained are negative which means the patient is not satisfied and 7 statement items are positive which means the patient is satisfied. The first dimension is tangibles, three statements of patients feel dissatisfied and three more statements are quite satisfied. For the statement ‘Comfort of the waiting room’ the score produced is negative (not satisfied). Then in the statement “There are posters/brochures/health magazines or the like for drug information or counseling efforts” the resulting score is also negative (not satisfied). But in the administration of drugs in good condition and packaging and clear use of letters, patients have been quite satisfied as evidenced by positive results.

Almost all statements in the reliability dimension did not meet the patient expectation. For statements “Pharmacy officers give information directly or in writing about the usage of drugs” the score produced is negative (not satisfied). The biggest dissatisfaction in this dimension is in the statement “Pharmacy officers give explanations if patients forget to take medicine”. Only one statement “The officer gives information directly or in writing about the rules for taking drugs and when taking medication” which is positive (satisfied).

The majority of the patients were not satisfied in the statements on assurance and responsiveness dimensions. The biggest dissatisfaction result lies in the statement “The pharmacy officers asks the patient to repeat the explanation” then the second in the statement “The clerk asks the patient’s medication history” and third in the statement “The pharmacy officers asks the patient’s allergy history” the score is below -0.50.

Performance–Expectation Quadrant (Customer Window): One way to observe the overall service quality is to use the Customer Window. To obtain each coordinate of each indicator is by multiplying the frequency of each score, then calculate the average score for each statement. X value is obtained from the average performance score and Y value obtained from the average score of expectation. Then, to obtain the intersection of X and Y, the average performance score is divided by the number of statements on the questionnaire for intersections on line X and the average expectations score divided by the number of item statements on the questionnaire for intersections on line Y.

The minimum respondent number for each puskesmas is seven patients. However, to avoid the lack of respondents, 8 patients in each health care will be given a questionnaire to get the results of 120 respondents in one area of South Surabaya. More than 50% of respondents were female. The age of the respondents in this study varied from 17 years to 69 years old.

<table>
<thead>
<tr>
<th>Puskesmas</th>
<th>Age Group</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ngagel Rejo</td>
<td>17-24 years</td>
<td>7</td>
<td>5.8</td>
</tr>
<tr>
<td>Kedurus</td>
<td>25-44 years</td>
<td>70</td>
<td>58.3</td>
</tr>
<tr>
<td>Dukuh Kupang</td>
<td>45-64 years</td>
<td>41</td>
<td>34.2</td>
</tr>
<tr>
<td>Wiyung</td>
<td>&gt;65 years</td>
<td>2</td>
<td>1.7</td>
</tr>
<tr>
<td>Gayungan</td>
<td></td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>Jemursari</td>
<td></td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>48</td>
<td>40</td>
</tr>
<tr>
<td>Female</td>
<td>72</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Occupation</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Employees/Soldier/Police</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Entrepreneur/Private</td>
<td>56</td>
<td>46.7</td>
</tr>
<tr>
<td>Housewife/Not Working</td>
<td>45</td>
<td>37.5</td>
</tr>
<tr>
<td>Retired</td>
<td>5</td>
<td>4.2</td>
</tr>
<tr>
<td>College student</td>
<td>2</td>
<td>1.7</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary/equivalent</td>
<td>5</td>
<td>4.2</td>
</tr>
<tr>
<td>Middle/equivalent</td>
<td>28</td>
<td>23.3</td>
</tr>
<tr>
<td>High school/equivalent</td>
<td>59</td>
<td>49.2</td>
</tr>
<tr>
<td>College/equivalent</td>
<td>28</td>
<td>23.3</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>
The greatest value of dissatisfaction is in the drug use monitoring by the health workers indicators, for example via telephone or when the patient comes back (value -1.07) which means that the patient’s expectation on these indicators is very high but the performance of pharmacy service officers is very low. This shows that patients understand the importance medication use monitoring. On the other hand, patients with the smallest dissatisfaction value were found in the using easy-to-understand language indicators (value 0.42) which means that the service performance have met patient expectations. This shows that the patient is satisfied with the performance of pharmacy service officers on the indicator.

Discussion

One of the most important dimensions of quality and the main indicator of health care success is patient satisfaction\textsuperscript{14}. Patients will feel satisfied if the performance of health services have met or exceed their expectations, otherwise patient disappointment will arise if the performance of health services obtained is not in line with their expectations\textsuperscript{6}. Patient satisfaction is a valid indicator of the quality of services\textsuperscript{15}. Service quality and satisfaction are subjective for each patient.

Using the SERVQUAL method we can reveal the difference between patient preferences and experience\textsuperscript{14}. There are 7 positive statements and 18 negative statements. The first dimension is tangible evidence. This dimension is important to grow the image of service providers or in this case, The Puskesmas, for patients\textsuperscript{16}. One of the patient dissatisfaction is the uncomfortable waiting room at the puskesmas. This patient dissatisfaction also occurs because patients do not understand the purpose of giving such media/posters/brochures/magazines.

The second dimension is reliability. This dimension importance is that customer satisfaction will decrease if the service provided is not in accordance with what was promised (on time)\textsuperscript{16}. Based on observations in the field, there are officers who always provide information directly about the medicinal uses. Patient dissatisfaction can occur because the patient has repeatedly obtained the drug and feels that he already knows the information about the drug that been given so that when the officer provides information related to the drug, the patient does not pay too much attention. Officers also often do not explain this to patients because officers shorten the information given to patients at the time of delivering...
medicines so that all patients can be served. But this should be explained, for example, in patients who get antibiotics. This can increase the incidence of resistance due to the wrong method of using antibiotic drugs.

The third dimension is assurance. The importance of this dimension is due to the knowledge and behavior of service providers to build trust and confidence in consumers to use their services. Observations in the field, officers only call the names on the recipe but do not make sure who take the drugs. By identifying the owner properly, swapped drugs between patients who have the same name can be prevented. Patients have realized the importance of this, thus there must be an improvement in delivering prescribed drugs by pharmacy services in the puskesmas.

The fourth dimension is responsiveness. The importance of this dimension is to provide service quickly and responsively. Responsiveness can foster a positive perception of the services. This dimension emphasizes the attention and speed of the officers involved in responding to patients’ requests, questions and complaints. The time needed by the officer to do the service is not too long, but the patient’s dissatisfaction can be due to the psychological state of the patient who feels unwell and wants to return home quickly so that the service is felt relatively long. Another factor that can cause long service time is because the queue piles up at one period of time.

The fifth dimension is concern (empathy). The importance of this dimension is to give attention to customers by placing themselves in the customer’s situation. Overall for this dimension the patient feels dissatisfied. Most patients consider drug use monitoring via telephone is an important thing but it was never been done by pharmacy officers at the puskesmas. This proves that the patient knows that drug use needs to be monitored by pharmacy officers to see the progress of treatment, especially for chronic diseases.

Measurement of the gap between performance and expectations is needed to determine patient satisfaction for each item statement of pharmaceutical services. The purpose of knowing patient satisfaction on each statement is to know the lack of services available in the puskesmas so that it can be used as a recommendation to improve the performance of pharmacy services in the puskesmas.

Conclusion

In general, the patients were not satisfied with pharmacy services in the Puskesmas based on the SERVQUAL method. Patient satisfaction was carried out based on five dimensions of service quality, namely care (empathy), physical evidence (tangibles), responsiveness, assurance, and reliability. Several pharmacy-services indicators have not yet fulfilled patient expectation, therefore its improvement has to be prioritized. Other pharmacy-services indicators that have met patient expectation must be maintained so their satisfaction will generally improve.

Ethical Clearance: The research process involves participants in the survey using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, nonmaleficence, and justice.

Conflict of Interest: None declared

Source of Funding: This study is done with individual funding.

REFERENCES


5. KEMENKES RI KKRI. Undang-Undang Republik Indonesia Nomor 36 Tahun 2009 tentang Kesehatan. Indonesia; 2009.


The Effect of Lower Extremity Massage with Lavender Essential Oil on Decreasing Blood Pressure in Elderly with Hypertension in UPTD Griya Werdha Surabaya

Fatih Haris Maulana1, Joni Haryanto1, Elida Ulfiana1
1Community and Mental Health Department, Faculty of Nursing, Airlangga University, Jl. Mulyorejo, Surabaya City, Jawa Timur

ABSTRACT

Introduction: Hypertension is one of the degenerative diseases that occur in almost all the elderly in the world. The high rate of hypertension may lead to mild or severe strokes even to death. The purpose of this study was to determine the effectiveness of lower extremity massage with lavender essential oil in the elderly with hypertension.

Method: This study used a pre-experimental design with one group research pre-test and post-test design. The sample in this study was 13 elderly who had hypertension who were selected according to the specified inclusion and exclusion criteria. Thirteen respondents in this study were in accordance with inclusion and exclusion criteria. The variables studied were administration of lower extremity massage with lavender essential oil on elderly blood pressure. Furthermore, the data obtained were analyzed by the Shapiro Wilk normality test.

Results: Elderly blood pressure were measured before lower extremity massage with lavender essential oil and reaches a value of 180/100 mmHg. After being given therapy, systolic pressure has a maximum value of 160 mmHg and for diastolic values has a maximum value of 90 mmHg. There was a significant effect of lower extremity massage with lavender essential oil on decreasing blood pressure in hypertensive elderly people (p≤0.05).

Conclusion: The lower extremity massage with lavender essential oil was effective in reducing blood pressure in elderly hypertension. This therapy can be used as one of the complementary treatments in the form of lower extremity massage with lavender essential oil.

Keywords: Hypertension in the elderly, massage, lavender essential oil

Introduction

Along with the progression of age, the physiological changes will occur in the elderly accompanied by various health problems that cause high degenerative diseases. One degenerative disease that causes high mortality rates is hypertension1,2.

Hypertension is a persistent blood pressure with systolic pressure above 140 mmHg and diastolic pressure above 90 mmHg. About 20% of the elderly population has hypertension. In 2008 there were about 40% of people over the age of 25 in the world suffering from hypertension and that number will continue to increase in Amerika terjadi lebih dari 65 juta orang usia dewasa keatas mengalami hipertensi dan berpotensi terjadinya infark miokard, stroke hingga gagal jantung. In Indonesia, this case increases continuously every year and becomes the main cause of outpatient clinics in the 45-64 age group and over 65 years of age. In East Java, the number of elderly people with hypertension in 2011 was 174,041 people. Preliminary study in Griya Werdha...
UPTD in Surabaya, East Java, Indonesia. Elderly people usually feel dizzy and after their blood pressure is checked or their blood pressure increases.

Hypertension that mostly found in the elderly is isolated systolic hypertension. The high rate of systolic pressure can cause the possibility of fatal or mild strokes\textsuperscript{10,11}. In addition to strokes, isolated systolic hypertension can also cause the arteries to become rigid, this is what will cause morbidity and mortality in the elderly\textsuperscript{12,13}.

Massaging with lavender essential oil therapy as one of the non-pharmacologic therapies that not giving side effects. A number of studies have shown that regular massage therapy can reduce systolic and diastolic blood pressure, reduce stress and cortisol levels, reduce anxiety so that blood pressure will decrease and body functions improve\textsuperscript{14}. Intervention using massage to the patients can overcome various symptoms of hypertension such as anxiety, depression, headache, neck pain, vertigo and provide calm and relaxed conditions\textsuperscript{15}. So that this study was conducted which aims to determine the effectiveness of the massage therapy with lavender essential oil in the lower extremities on elderly people with hypertension.

**Method**

This study was a pre-experimental study desing, consisting pre-test and post-test. This study was conducted to determine the effect of lower extremity massage with lavender essential oil on the reduction of blood pressure in elderly people with hypertension at Griya Werda UPT Social Services in Surabaya City. This study only used one group sample, without any control group. This study was conducted by giving the initial test (pre-test) and giving as many as seven treatments, then the final test (post-test) will be carried out\textsuperscript{16}.

**Population, Sample, Sampling:** The general population in this study were all elderly who had hypertension in the whole world. Then the target population of the study was all elderly in Griya Werda who had hypertension with a population that consisting 17 people\textsuperscript{16}. From the entire population, the participant will be selected according to the inclusion and exclusion criteria that had been determined, and as a result, 13 participants were obtained.

**Variables and Instruments:** The independent variable in this study was the treatment of lower extremity massage with lavender essential oil. The dependent variable was blood pressure in the elderly with hypertension after and before the massage. The research instrument used was the SOP (Standard Operating Procedure) that was determined and the observational sheet containing the respondent’s data as well as the results of blood pressure that had been measured with sphygmomanometer and stethoscope.

**The Process of Collecting Data and Statistical Analysis:** The ethical clearance of this study was with ethics certificate number 232/EC/KEPK/FKUA/2016 along with the location permits for the research from various related parties. The respondent was asked to lay in a comfortable position on the bed and given a lower extremity massage with lavender essential oil by a physiotherapist as an intervention provider. The author as observers of the interventions that were carried out 7 times a week, every day for each the respondent and duration of each intervention was 10 minutes. The data were analyzed using the Shapiro Wilk normality test.

**Results**

The number of respondents in this study was 13 people representing the total population of elderly who had hypertension. The characteristics of respondents were presented in full in the table below:

**Table 1: Characteristics of elderly participants with hypertension (n = 13)**

<table>
<thead>
<tr>
<th>Sample Characteristics</th>
<th>Elderly, N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>45 – 59 years</td>
<td>0 (0)</td>
</tr>
<tr>
<td>60 – 74 years</td>
<td>6 (46)</td>
</tr>
<tr>
<td>&gt; 90 years</td>
<td>1 (8)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>7 (54)</td>
</tr>
<tr>
<td>Male</td>
<td>6 (46)</td>
</tr>
<tr>
<td><strong>Smoking History</strong></td>
<td></td>
</tr>
<tr>
<td>Never smoke</td>
<td>10 (76.9)</td>
</tr>
<tr>
<td>Ever Been, but already stopped 0-5 years</td>
<td>1 (7.69)</td>
</tr>
<tr>
<td>Ever Been, but already stopped &gt; 5 years</td>
<td>2 (15.41)</td>
</tr>
<tr>
<td>Still smoking</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>
1. The respondent’s blood pressure before intervention (massage) was given

<table>
<thead>
<tr>
<th>Variable</th>
<th>Median</th>
<th>SD</th>
<th>Min-Max</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic pressure, before intervention</td>
<td>160.00</td>
<td>11.658</td>
<td>140 – 180</td>
<td>150.65-164.74</td>
</tr>
<tr>
<td>Diastolic pressure, before intervention</td>
<td>80.00</td>
<td>11.26601</td>
<td>70 - 100</td>
<td>77.8074 - 91.4324</td>
</tr>
</tbody>
</table>

Blood pressure examination before being intervention was conducted. The respondents had a minimum value for a systolic pressure of 140 mmHg and for diastolic pressure had a minimum value of 70 mmHg. The results of the interval estimation of the study concluded that 95% were considered to be an average of diastolic blood pressure of the respondents 150.65 - 164.74 mmHg and diastolic pressure 77.8075 - 91.4234 mmHg.

2. The respondent’s blood pressure after the intervention was given

<table>
<thead>
<tr>
<th>Variable</th>
<th>Median</th>
<th>SD</th>
<th>Min-Max</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic before massage</td>
<td>130.00</td>
<td>15.484</td>
<td>140 – 180</td>
<td>150.65-164.74</td>
</tr>
<tr>
<td>Diastolic before massage</td>
<td>80.00</td>
<td>11.26601</td>
<td>70 - 100</td>
<td>77.8074 – 91.4324</td>
</tr>
</tbody>
</table>

Based on table 3, it is known that after being given intervention, the respondent’s blood pressure, that is systolic pressure had a value of at least 110 mmHg and for diastolic pressure had a value of at least 60 mmHg. Systolic pressure after the intervention was given, it had a maximum value of 160 mmHg and for diastolic pressure, it had a maximum value of 90 mmHg. The results of the interval estimation study concluded that 95% considered that the average blood pressure in respondents for diastolic pressure was 123.72 - 142.43 mmHg and for diastolic pressure was 69.8456 - 82.462 mmHg.

3. Differences in blood pressure before and after the lower extremity massage with lavender essential oils were given

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean value before the intervention</th>
<th>Mean value after the intervention</th>
<th>Difference</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic</td>
<td>157.69</td>
<td>133.08</td>
<td>24.61</td>
<td>0.000</td>
</tr>
<tr>
<td>Diastolic</td>
<td>86.6154</td>
<td>76.1538</td>
<td>8.4616</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Based on the Shapiro Wilk normality test, the significant value of systolic and diastolic blood pressure before and after treatment ≥ 0.05 so that it can be concluded that the data are normally distributed, then the data is analyzed using paired t-test with a confidence level of 95% (α = 0.05). From the results of analysis data
showed that there was an influence of lower extremity massage with lavender essential oil on decreasing blood pressure in elderly people with hypertension.

**Discussion**

The classification of blood pressure chosen is in the range of grade 1 with systolic blood pressure starting from 140 mmHg and up to 200 mmHg. Blood pressure in the respondent, the highest systolic pressure was 180 mmHg and the highest diastolic was 100 mmHg. The lowest systolic blood pressure is 140 mmHg and the lowest diastolic is 70 mmHg.

Prevalence of blood pressure increased by 24.6% in women over 30 years old and increased every year\(^{17}\) nonsynchronized design to investigate the effect on home blood pressure (BP). Women usually have higher blood pressure after menopause\(^{18}\). At the pre-menopause stage, women begin to lose estrogen gradually which has been protecting blood vessels from damage\(^{19,20}\). Menopause is one of the factors in cardiovascular disease, because of changes in the distribution of body fat from a gynoid to android patterns, reduced glucose tolerance, abnormal plasma lipids, increased blood pressure, increased sympathetic tone, endothelial dysfunction and vascular inflammation\(^{20}\). These factors make older women have a greater risk of hypertension.

The anti-hypertensive therapy given to respondents in this study was the Calcium Channel Blocker (amlodipine) group. In this study, the majority of respondents consumed one type of antihypertensive drug, namely the Calcium Channel Blocker. Amlodipine works to inhibit the entry of calcium ions through slow canals in the secular muscle tissue and causes relaxation of deep arterioles. Calcium channel blockers work on all degrees of hypertension\(^{21,22}\).

The elderly's blood pressure after the intervention was given: The frequency distribution of respondents showed that the lowest systolic pressure was 110 mmHg and diastolic pressure with a minimum value of 60 mmHg. The systolic pressure has a maximum value of 160 mmHg and the diastolic pressure has a maximum value of 100 mmHg.

This study showed that the respondents experienced a decrease in systolic blood pressure and a decrease in diastolic blood pressure. This study is in line with the previous one that the aroma massage combination of lavender, marjoram, ylang-ylang and neroli and mixed with almond oil and jojoba oil can reduce blood pressure in women aged 49 to 50 years\(^{17}\) nonsynchronized design to investigate the effect on home blood pressure (BP).

Massage is one of the healing arts in China that can suppress symptoms of hypertension, depression, headaches, and vertigo. This therapy is very effective as a non-pharmacological treatment for essential hypertension (EH)\(^{15}\). Pain is also quite effective to overcome with massage therapy.

The use of massage therapy has been used for a long time to provide comfort in all conditions\(^{14}\). High blood pressure due to anxiety and stress, depression and catecholamines\(^{23}\). Massage therapy works effectively by overcoming anxiety so that blood pressure decreases, besides that massage therapy can also overcome depression during childbirth, pain due to multiple sclerosis, arthritis, fibromyalgia, asthma, some immune disorders such as breast cancer, and aging problems such as Parkinson’s and demential\(^{14,24}\).

Some studies also proved that essential oils as effective therapies reduce cortisol concentration and control blood pressure\(^{25,26}\). So that clients who get lavender aromas feel comfortable so that the blood flow in the heart becomes smooth and hypertension decreases\(^{25}\). Non-pharmacological therapy in the lower extremities massage with lavender oil can be used as an option in hypertensive patients.

**Conclusion**

The lower extremity massage with lavender essential oil gave an effect on decreasing blood pressure in elderly hypertension. This massage therapy can be used as one of the complementary treatments with lavender essential oil. So that given this therapy the elderly not only reduce blood pressure but also get comfort and relaxation.

**Ethical Clearance:** The research process involves participants in the survey using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, nonmaleficence, and justice.
Conflict of Interest: None declared

Source of Funding: This study is done with individual funding.

REFERENCE


ABSTRACT

Introduction: Fine motor and cognitive delays are the things that occur in children with autism. The fine motor activity becomes a component which supports emotional, social and cognitive development. Good motor skill development will optimally trigger the maturity of cognitive ability.

Aims: This study analyzes the effect of finger painting on fine motor skill and cognitive changes in children with autism.

Method: This study applies a pre-experimental one-group design. There are six children with autism without comorbidities selected as respondents by using purposive sampling technique. The sample must be able to receive orders while still getting ABA and BIT therapies. The independent variable of the study was finger painting activity while the dependent variable is a fine motor and cognitive status in children with autism. The observation format from Dr. Rudy Sutadi, SpA, MARS was applied for motor and cognitive skill assessment. The research media used was paper and paint which were safe for children and the Wilcoxon sign rank test was used as the result analysis of the study with a significance level p 0.05.

Result: The results of the study indicated that improvement in cognitive skill (p=0.023) and fine motor skill (p=0.024) in children with autism after treated with finger painting intervention.

Conclusion: Finger painting is potential to be an alternative to develop cognitive and fine motor skills in children with autism. It stimulates motoric and cognitive aspects in the process of recalling the color mix which relates to fingers’ fine muscles.

Keywords: finger painting, autism, cognitive, fine motor.

Introduction

Autistic disorder is often interpreted as a developmental disorder such as social communication, as well as limited interest and repetitive behaviour versus behaviors that are on the borderline of being atypical or rarely occur in only one context. For example, while toe walking may be an example of criterion B, it may not be sufficient by itself to assign the criterion if there is a physical explanation for the behavior (and thus not clearly atypical. Fine motor and cognitive delays are common in children with autism. On the other side, good motor skill is considered necessary in physical, social, and psychologic development in children. Physical activity has a positive impact on the process of cognitive and motor development in children.

Fine motor skill and cognitive developments are the results of the nervous system and brain development relation, also adapting experience of the environment. Less optimal function of brain nerve is a factor that affects fine motor and cognitive perspective as well as physical damage detected. One indicator that children can move their smooth muscle and have the ability in developing their logic is using finger painting.

Finger painting is a direct painting technique using fingers and palms. This activity is expected to develop...
children with autism skill to recognize color, classify, follow the direction, also draw a pattern using fingers. Finger painting assessment is not about the creative aspect but the ability to coordinate their finger movement and motor muscle.

Early intervention with appropriate management is required to get the optimal development of children with autism. The application of finger painting training is all about drawing. It is also a global motor movement where it involves the entire body movement and exercises cognitive function. Finger painting is considered as a method to increase focus and attention in children. Finger painting is also capable of improving the skill of social interaction process in children with autism. The previous study indicates that finger painting has a good impact on fine motor development of pre-school children. Therefore, this study aimed to determine the impact of finger painting intervention on fine motor and cognitive changes in children with autism.

**Method**

**Research Sampling:** This study applied a pre-experimental design (one-group pre-post test design) by adjusting Constructivism theory held in Yayasan Anak Autis in Surabaya, Indonesia on May 12 to June 25, 2015, with a population of 18 people. The samples were selected using a purposive sampling method. This technique determines the sample among the age population by specific criteria. Children with autism who had mental retardation, ADHD (Attention Deficit Hyperactivity Disorder) and other comorbidity were discarded from the sample selection. Children with autism involved must be capable of receiving the order and sufficiently independent while still given ABA (Applied Behaviour Analysis) dan BIT (Biomedical Intervention Therapy) therapies for a year or more. The result of the sampling found six children who fit in the criteria as research respondents.

**Research Variables:** Meanwhile, the dependent variables were fine motor and cognitive skills. The assessment of the dependent variables was measured using Dr. Rudy Sutadi, SpA, MARS’s observation format. The observation format was adjusted to finger painting intervention. Children cognitive skills were assessed in their ability to recognize primary and secondary colors, designate the colors they want to use, distinguish simple patterns, and recall the techniques taught in the intervention. In addition, fine motor assessment consisted of the ability to mix and stir paint mixture, imitate patterns, apply creations on paper, and capable of mimicking 1-10 finger painting techniques.

**Data Collection Mechanism:** After filling out the informed consent sheet, the respondents worked on the pre-test before treated with the intervention. The study was conducted nine times within two meetings in one week. Each respondent was observed for ± 10 minutes in one meeting. The first lesson was to introduce primary colors and to teach the basic techniques of 1 spiral finger and point as well as one straight finger technic. Next, the respondents were asked to dip their fingers into the paint that had been provided to color the paper.

At the second meeting, the respondents were taught the basic techniques of 1 finger swivel, two-finger swivel, and three-finger swivel. On the third meeting, the respondents were taught one-finger diagonal painting, two-finger diagonal painting, the one-finger curve at the fourth meeting.

The respondents began to mix, stir, and recognize primary colors into secondary colors (orange, green, purple) in the fifth meeting. They were guided to imitate patterns previously made by the researchers at the fifth and sixth meeting.

The respondents were guided to apply their creativity to the drawing paper provided at the seventh meeting. The paper was not required to be full of color. Furthermore, at the eighth and ninth meeting, they were capable of freely coloring the paper using three primary colors and it must be colorful by applying three basic techniques which had been taught. The post-tests were performed after the intervention was given in full.

**Data Analysis:** Fine motor and cognitive skills assessments in the respondents were categorized as A (achieved) if they could do the given instructions; P (prompt) if they performed the instructions with assistance; and C if they were unable to do instructions. The research analysis applied for SPSS Windows program with Wilcoxon sign rank test with the significance or p level of lower or same as 0.05. This study had passed the ethical test at the Faculty of Nursing Universitas Airlangga number 273-KEPK.
Result

Respondents' Demography: All respondents had taken ABA therapy (Applied Behavior Analysis) for more than a year. More than half of the respondents (66.67%) were diagnosed with early autism at the age of 2-3 years, and others (33.33%) were diagnosed at the age of more than three years. Most of the respondents (66.67%) were born when the gestational age was mature (see Table I).

Table I: Respondent's Demographic Data

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Amount</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>4</td>
<td>66.67</td>
</tr>
<tr>
<td>Female</td>
<td>2</td>
<td>33.33</td>
</tr>
<tr>
<td>Age at Birth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premature</td>
<td>2</td>
<td>33.33</td>
</tr>
<tr>
<td>Mature</td>
<td>4</td>
<td>66.67</td>
</tr>
<tr>
<td>Age at First Diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-3 y.o.</td>
<td>4</td>
<td>66.67</td>
</tr>
<tr>
<td>&gt;3 y.o.</td>
<td>2</td>
<td>33.33</td>
</tr>
<tr>
<td>Therapy Duration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 y.o.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>&gt;1 y.o.</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>Type of Therapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABA + BIT</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ABA</td>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>

During pregnancy, 66.67% of mothers did not experience complications in pregnancy. However, 33.33% of the mothers had a disease history such as hyperthyroidism and herpes during pregnancy. 50% of the respondents’ parents had their last education at Senior High School level (see Table II). The occupation of the respondents’ parents, especially mothers, were housewives (66.67%).

During pregnancy, 66.67% of mothers did not experience complications in pregnancy. However, 33.33% of the mothers had a disease history such as hyperthyroidism and herpes during pregnancy. 50% of the respondents’ parents had their last education at Senior High School level (see Table II). The occupation of the respondents’ parents, especially mothers, were housewives (66.67%).

Table II: Parent's Respondent Demographic Data

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Father</th>
<th></th>
<th>Mother</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHS</td>
<td>1</td>
<td>16.7</td>
<td>1</td>
<td>16.7</td>
<td></td>
</tr>
<tr>
<td>JHS</td>
<td>3</td>
<td>50</td>
<td>3</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>2</td>
<td>33.3</td>
<td>2</td>
<td>33.3</td>
<td></td>
</tr>
<tr>
<td>Parent’s Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil Servant</td>
<td>3</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Private Employee</td>
<td>1</td>
<td>16.6</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Enterpreneur</td>
<td>1</td>
<td>16.6</td>
<td>2</td>
<td>33.3</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>16.6</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

The Effect of Finger Painting on Fine Motor and Cognitive Skills: The observation results indicated a cognitive skill increase in children with autism by giving finger painting stimulation. Before the intervention, there were no children with decent cognitive skills. Respondents with less cognitive skills category, amounting to 66.67%, and the rests were included to adequate category by 33.33%. The finger painting intervention was capable of increasing the cognitive status of the respondents into a good category (100%) (see Table III). The statistical test found a significant cognitive difference (p = 0.023) in children with autism after being treated with the intervention.

The improvement also occurred in fine motor skills since there were no children with good motor status found at the beginning of the study. Fifty percent of children were categorized into less category, and the other half were categorized into the adequate category. After the finger painting intervention was given, all respondents were categorized into the good category (100%) (see Table III). The statistical test utilizing the Wilcoxon Signed Rank Test indicated p-value of 0.024, meaning that the finger painting intervention caused significant differences in the fine motor skills of the respondents.

Table III: The Effect of Finger Painting on Fine Motor and Cognitive Skills

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Pre</th>
<th></th>
<th></th>
<th>Post</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>%</td>
<td>Amount</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>4</td>
<td>66.67</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Enough</td>
<td>2</td>
<td>33.33</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Not so good</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Wilcoxon Signed Rank Test</td>
<td>P = 0.023</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine Motor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>3</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Enough</td>
<td>3</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Not so good</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Wilcoxon Signed Rank Test</td>
<td>P = 0.023</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Discussion

Stimulation is an essential part of consistently honing children’s skills to produce a memory enhancement\textsuperscript{17}. This study found the effect of finger painting intervention on fine motor and cognitive skill improvement in children with autism. Learning finger painting can also develop emotional expressions of the children\textsuperscript{18}.

The result of cognitive observations of children with autism after nine times of finger painting intervention indicated an increase with the final result of $\geq 80\%$. The respondents were introduced to primary colors (red, yellow and blue). Next, the respondents mixed the primary colors to produce secondary colors. The respondents learned to recognize the colors in this activity\textsuperscript{18}. Most respondents experienced a significant increase ($p = 0.023$) based on the post-test results where they were included in the good cognitive skills category (66.67\%). As previously mentioned all of the respondents (100\%) were categorized in the less cognitive skill category. However, the respondents still required help in recalling the nine finger painting techniques.

One of the improving parameters was knowledge about color mixing. In the first lesson, respondents were still confused when they were asked about color mixing. The respondents began to be capable of mentioning new colors produced after continuous and repeated interventions. This situation can develop cognitive skills and pave the way for the respondents to utilize all their potentials. Such a cognitive development means that the children can hone the skills on perception, attention, memory, thinking, concentration, focus on understanding symbols, problem-solving, and reasoning\textsuperscript{19}.

Through finger painting, children can freely move/rotate their fingertips to make a variety of images according to their imagination. This intervention triggered the respondents to have the courage to develop imagination both from the situations they can reach or those they cannot\textsuperscript{20}. The respondents’ cognitive improvement was significantly supported by ABA therapy lasting for more than a year because it was proven to cause persistent cognitive improvement\textsuperscript{21}.

The environmental factors indeed play a significant role in children’s growth and development as the level of intelligence is determined by the experience and knowledge gained from the environment\textsuperscript{22}. These factors can be affected by parents, peer groups, and social influences. Parents’ educational backgrounds are often also associated with development problems. Education and socio-economic levels of parents are highly influential in providing stimulation for children. The lack of knowledge in delivering positive stimuli can be one of the causes of problems or obstacles in children development since stimulation is necessary to improve the cognitive skills of children with autism. Besides, the role of parents is vital to guide children in practicing cognitive skills in various kinds of stimulation such as visual, verbal, tactile (drawing), and so forth, which will help the children develop. However, the parameter of the environment effect on children growth and development depends on the children’s situation themselves as well as their physical and spiritual conditions.

The pre-test results indicated that all respondents’ fine motor skills (100\%) were in the less developed category where the children had not been able to color paper independently. Fine motor improvement occurred after the finger painting intervention was conducted where 50\% of the respondents developed into the good category and the other half improved to the moderate category. One of the indicators were that the children could rub their hands independently. Motor skills do not develop because of the maturity of the organ but because of the need for the learning process\textsuperscript{23}. Gross and fine motor movements are closely related to the development of motoric center in the brain. Through proper training, gross and smooth movements can be improved in terms of flexibility and precision; thus, a child will become gradually more skilled\textsuperscript{6}.

The Wilcoxon Signed Rank Test results indicated that $p=0.024$ which proved that there were effects of finger painting intervention on the fine motor development in the respondents. The muscles of the hands, fingers, and eyes of the respondents became trained. There was coordination of fine motor muscles when doing finger painting and increasing courage of the children to find new things, especially new drawing media\textsuperscript{20}. When children are free to express themselves, it does not necessarily mean they do not know the rules. Every child is expected to be able to use paper optimally so that they can practice eye and hand functions to paint something proportional.

Through learning finger painting, children can freely move or rotate their fingertips to make variations according to their wishes. Therefore, children can increase
the strength of their fingers. The next phase was how the children mix the colors by using hands to stir the paint. The activity trains physical or touching senses, logical thinking, as well as a broader focus and attention\textsuperscript{13}.

This study has limitations. The number of samples was too little because of the limited number of children with autism included in criteria. Also, the lack of active interaction with the respondents’ parents caused less maximized information collection of information related to the respondents.

**Conclusion**

Finger painting interventions can improve fine motor and cognitive status in children with autism. This is because finger painting learning is one of the cognitive development stimulations to train memory from mixing primary colors and the basic techniques. In addition, fine motor development is triggered by the involvement of the muscles of the hands, fingers, and eyes in the process of finger painting.

**Acknowledgment**

High gratitude to Dr. Rudy Sutadi, SpA, MARS who given permission to the authors to use the observation format. The authors would also thank the head of Yayasan Anak Autis in Surabaya and all of the respondent of this study.

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**REFERENCE**


The Effectiveness of Afternoon Sunbath in Improving Elderly Sleep Quality

Zaenal Abidin¹, Harmayetty¹, Deni Yasmara¹

¹Faculty of Nursery, Universitas Airlangga, 60115, Surabaya, Jawa Timur

ABSTRACT

Background: A decrease in sleep quality has been an issue lately which occurs in geriatric patient, including early elderly group. One way to improve sleep quality in elderly is by afternoon sunbath.

Purpose: To explain the effectiveness of afternoon sunbath in improving sleep quality in elderly.

Method: This was a quasi experimental study with pre and post intervention. The respondents were divided into two groups (control & intervention). Data was collected using the PSQI (Pittsburgh Sleep Quality Index) questionnaire and analyzed using the Wilcoxon Sign Rank Test and Mann Whitney test with a significant level of α ≤ 0.05.

Results: The results showed that afternoon sunbath significantly improve sleep quality in elderly where p value = 0.000

Conclusion: The afternoon sunbath treatment increases serotonin and endorphin hormones, which improved the sleep quality in the elderly.

Keywords: Elderly sleep disorders, afternoon sunbath, Pittsburgh Sleep Quality Index

Introduction

Aging is a physiological process that starts from birth. The physiological process cannot be separated from health, social, cultural and economic dimensions. The proportion of people over the age of 60 has drastically risen lately, compared to other groups of age, as a result of longer life expectancies and decreased fertility rates. The impact of the aging process includes a decrease in organ system functions and physical changes. These changes result in variety of problems, including disruption of sleep quality. Elderly only use 58% of their time to sleep from the total time spent in bed, with an average sleep duration around 4-5 hours at night while the sleep needs for elderly is 5-6 hours per day. It will affect their concentration and memory, higher risk of falling, drowsiness during the day, feeling powerless, and mood changes. As many as 54% of elderly who experience sleep disorders consumed sleeping pills in order to overcome their sleep problems.

Risksdas 2013 (Indonesian Basic Health Research 2013) reported that 57% or 13.7 million elderly was experiencing some type of sleep disorders, including difficulty in starting or maintaining sleep (43%), waking up at night (30%), insomnia (29%), napping (25%), difficulty sleeping (19%), waking up too early (19%), and not feeling refreshed after waking up (13%) with an average sleep duration between 4-5 hours per day. This is in line with an epidemiological survey conducted in Japan, reported the insomnia prevalence in elderly was 21.4%. Insomnia was defined as experiencing at least one episode of difficulty in starting sleep (8.3%), difficulty in maintaining sleep (15.0%), or getting up too early (8.0%). Sleep disorders were experienced by 50% of elderly who lived at home and 65% of elderly who were staying in long-term care facilities. This condition has an impact on decreased concentration, physical weakness, lack of enthusiasm, and drowsiness during the day.

Changes in sleep patterns occured in the elderly due to changes in circadian rhythms, where the biological
clock becomes shorter and the sleep phase becomes earlier. Circadian rhythm changes are related to the degeneration of supra chiasmatic nucleus (SCN) cells in the hypothalamus(5). Degenerative changes occur in both central and peripheral nervous system, slowing down nerve transmission and decreasing the rate of cortisol and melatonin secretion by 25% which results in disturbance in stages III and IV of sleep (NREM) which causes frequent wakefulness and reduced REM sleep(8).

Improving sleep quality can be done by doing exercise or gymnastics, relaxation techniques, stimulus control, sleep hygiene, light therapy, dietary supplements, massage therapy and aromatherapy use(5). Research in Russian Vladyslav showed bright light therapy can improve sleep quality in people with depression(9).

The intensity of sunlight received by the retina depends on the presence or absence of barriers or obstacles from both physical and environmental aspects. Sunlight exposure at around 3.30 pm to 4 pm has 2500 lux intensity which can be used as a therapy to improve sleep quality. In addition, the sun has UV rays which can stimulate the formation of endorphins. Endorphin triggers calmness and relaxation so that easy to induce sleep and make sleep more comfortable(10). Therefore, this study aimed to see the effectiveness of afternoon sun in improving sleep quality in elderly, especially those who lived in Indonesia since this is a tropical country that receives sunlight most of the year.

**Method**

This study used a quasi-experimental research design (Quasy-experiment). The population of this study was the elderly who lived in Griya Santo Yosef Surabaya, consisting of 120 men and women, but only 33 elderly met the criteria for this study. The independent variable in this study was an evening sunbath and the dependent variable was sleep quality in elderly. This research was conducted from January 13th to 27th 2016.

**Research Instrument:** The research instrument used were a PSQI (Pittsburgh Sleep Quality Index) and SPMSQ (Short Portable Mental Status Questionnaire) sheets to measure the independent and dependent variable which includes seven components, namely subjective sleep quality, sleep latency (difficulty starting to sleep), nighttime sleep, sleep efficiency, sleep deprivation, using drugs to sleep, and disruption of activity during the day.

**Data Collections:** Elderly who were prospective respondents and willing to be respondents are divided into two groups. The intervention group was treated with an afternoon sunbath for 20 minutes starting from 3.30-3.50 pm on the next day after measuring respondent sleep quality. Sunbathing was conducted once every 2 days in 14 days. There were no intervention given to the control group. After 14 days, the sleep quality was remeasured using PSQI with the help of 10 sitters who accompanied the both groups.

**Data Analysis:** The SPMSQ was used to assess the cognitive aspects of respondents, consist of 10 true or false questions. 0-2 (intact intellectual function), 3-4 errors (intellectual functions with minor damage), 5-7 errors (intellectual functions moderate damage), and 8 or more errors (severe intellectual function).

The PSQI questionnaire sheet with seven parameters measured the sleep quality. The data scale used was ordinal. If the number of scores 0 means the fulfillment of his sleep needs is very good, 1-7 is good, 8-14 is lacking, 15-21 is very lacking.

Pre and post intervention in both groups were analyzed using Wilcoxon signed rank test to find out the difference of sleep quality between the control and the intervention group that had given a evening sunbath therapy. The degree of significance used in this study was $\alpha \leq 0.05$.

**Results**

The characteristics of respondents including gender, age group based on the Ministry of Health classification, length of stay in the nursing home, habits before going to bed, length of nap, and daytime activities. Most of the respondents are female (54.5%), dominated by those in 66-70 group of age (39.4%), with the most frequent length of stay in the nursing home around 7-13 months (51.5%). The activities done before going to bed and during the daytime were mostly watching TV (57.6% and 42.4%, respectively). All of the respondents had length of napping time 60-90 minutes per day.
Table 1: Specific data on the characteristics of respondents between each group

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Indicator</th>
<th>Intervention Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>f(x)</td>
<td>%</td>
<td>f(x)</td>
</tr>
<tr>
<td>Length of night time sleep</td>
<td>&lt; 4 hours</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>4-6 hours</td>
<td>17</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>&gt;6 hours</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Frequency if waking up at night</td>
<td>&lt;3 times</td>
<td>5</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>3-4 times</td>
<td>9</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>&gt;4 times</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Feeling refreshed after waking up</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>17</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 1 showed the distribution of respondents in pre and post interventions in each groups. The length of night time sleep duration were increased in the intervention group and there were 2 respondents on each group who experienced sleep more than 6 hours. The frequency of waking up at night in the both groups did not change. In the intervention group there were still 2 respondents who were not feeling refreshed after waking up while there were 15 respondents the control group who still had the same experience.

There is the change in sleep quality score. After the intervention, most of respondents’ sleep quality scores were 4, which had sleep quality score improvement compared to their pre intervention score. Meanwhile, there were statistically constant sleep quality score in the control group, based on pre and post intervention questionnaire. In the intervention group, the sleep quality of most respondents had been improved and categorized into good sleep quality criteria. In the control group, there were 2 respondents experienced a decrease in PSQI scores and 2 respondents experienced an increase in PSQI scores.

Table 2: Respondents’ sleep quality categories before and after intervention

<table>
<thead>
<tr>
<th>Score PSQI of sleep quality</th>
<th>Intervention Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Intervention</td>
<td>Post-Intervention</td>
</tr>
<tr>
<td></td>
<td>f(x)</td>
<td>%</td>
</tr>
<tr>
<td>1 Very good</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2 Good</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3 Poor</td>
<td>16</td>
<td>94%</td>
</tr>
<tr>
<td>4 Very poor</td>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>17</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on Table 2, 17 respondents in intervention group showed drastic changes in sleep quality from poor to good quality of sleep. Statistical analysis using the Wilcoxon Sign Rank Test found an increase in sleep quality in the intervention group after sunbathing with p value = 0.000, which means afternoon sunbath effectively improve the sleep quality in elderly.

Mann Whitney statistical test showed p=0.000, which means that there are very significant differences between the intervention group and the control group. It can be concluded that afternoon sunbath is effective in improving sleep quality in elderly.
Discussion

This study showed that afternoon sunbath can improved sleep quality in the elderly. In addition to light, the afternoon sunray also produced UV rays that able to stimulate endorphins and serotonin formation, which take part in sleep quality improvement.

The sleep quality before giving afternoon sunbath treatment

All respondents were experiencing sleep disorders with a poor to very poor sleep quality. Most respondents described the disorders as lack of sleep quality, difficulty in starting and maintaining sleep, recurrent urge in urinating during the night, daytime drowsiness, and not feel refreshed after waking up.

Decreased capacity of the bladder (urinary vesica) and weakened bladder muscles causes many elderly experiencing recurrent wake up at night due to the frequent urgency to urinate(11). 29 out of 33 respondents were having poor sleep quality in the beginning of the study, where 17 of them were female. During the day, almost all elderly in this study spent more time indoor, and were taking a nap with 30-90 minutes duration. A person’s daily routine affects sleep patterns(11).

According to data, 17 respondents who had lived for 7-13 months stated that their sleep quality was poor, while respondents who had lived for more than 13 months had better sleep quality. The risk of sleep disorders often increased in patient during the first night of treatment, in both hospital and long-term care places such as nursing homes(11). The difficulty of sleep in elderly is closely related to the ability to adapt to their new environment.

The sleep quality after being given afternoon sunbath treatment

The elderly sleep quality were positive after being treated with afternoon sunbath for 14 days. In the beginning, the respondents in intervention group were having poor and a very poor sleep quality. By the end of the study, all respondents in the intervention group experienced a good sleep quality after being treated with afternoon sunbath.

The improvement in sleep quality happened in both qualitative and quantitative ways, showed by longer duration of sleep, less difficulty in starting sleep and not waking up too early. Most of them able to maintain their sleep until 5 a.m. and the habit of going to the toilet during night time were reduced. In addition, 5 out of 17 respondents in the intervention group were able to maintain sleep duration for more than 6 hours.

There are many factors that influence sleep quality. For example, respondents 31 and 41 stated that they were not feel refreshed when they woke up even after the intervention. They stated that the nursing home environment were not as comfortable as their previous home. This condition frustrate them and resulting in not feeling refreshed after they woke up in the morning. However, their sleep quality were improved from poor to good sleep quality, based on PSQI score before and after intervention. The situation above oftenly occured during the adaptation stage of environmental changes. Another factor influencing sleep quality was the daily schedule of each individuals. For example, the earlier bath turn they got, the earlier they had to wake up, even though they stay up late the night before.

The PSQI questionnaire components that did not change too much before and after the afternoon sunbath intervention were components 6 and 7, namely the use of drugs and the disruption of daytime activities.

Comparative analysis in sleep quality before and after giving afternoon sunbath treatment

After the afternoon sunbath treatment respondents felt the positive effects of intervention gradually in term of sleep patterns and quality. The difficulty to start sleeping more than 30 minutes decreased to be faster or can immediately start sleeping after being treated, with the length of sleep increased to 5 to 6 hours and even can reach 7 hours, sleep efficiency got better, night sleep disturbances subsided, no medicines used to treat their sleep problems and being able to do daytime activities better.

The main concept was that sunlight is naturally easy to obtain. Light stimulation has an effect in increasing serotonin and endorphins production(12). Light that comes naturally from the sun will be received by the skin and retina. Light stimulation that enter through the retina can produce serotonin, GABA, and norepinephrine(13). The high amount of serotonin during the day will be converted into melatonin at night to induce sleep. Exposure of the afternoon sun played role in intrinsic photosensitive retinal ganglion cells (ipRGC) which are carried forward to a system of SCN oscillation.
in the hypothalamus through a special nerve, the Retinohypothalamic Tract (RHT). The smooth delivery through RHT will release a neurotransmitter in the form of glutamate and Pituitary Adenylate Cyclase Activating Polypeptide (PACAP). The release of glutamate and PACAP stimulates the receptors and is expressed in SCN which then releases humoral factors that cause cell modulation in the pineal gland. The combination of inhibitors and stimulators in the SCN will produce output in the form of multisynaptic control in serotonin synthesis. When darkness comes, the pineal begins to convert serotonin to melatonin\(^\text{(14)}\). Theoretically, this hormone play an important role in the body including acting as a regulator of the metabolic processes occur in the body, suppressing brain wave activity and preparing for sleep, reducing the possibility of blood clots forming which in turn protects us from strokes and heart attacks, as antibodies and antioxidants\(^\text{(15)}\).

UVC lights that reach the stratum corneum will increase the synthesis of POMC propeptide which then processed to produce beta-endorphins and other biologically active peptides. The increase in continuous beta-endorphin in plasma is able to increase signals on opioid receptors on the periphery and or the central nervous system to produce endogenous dependent opioids. Opioid receptor signals can alter midbrain nerve activity to produce high dopamine. Increased beta-endorphins can provide a sense of calm and relaxation, making it easier for someone to fall asleep\(^\text{(16)}\).

**Conclusion**

In conclusion, there is a significant effect on afternoon sunbath in improving elderly sleep quality. This can be used as a modification in nursing intervention to treat sleep disorders in elderly. Afternoon sunbath stimulates the formation of serotonin and endorphins which triggered calmness and relaxation, thus improving sleep quality (sleep latency).

**Ethical Clearance:** The current study was carried out in correspondence with the research principles. It is implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice. The research process entangles participants in the survey using a compatible questionnaire that was in accordance with the ethical research principle based on the research ethics committee’s regulation.

**Conflict of Interest:** The author reports no conflict of interest of this work.

**Source of Funding:** This study is completed with individual funding.

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Family Burden and Coping in Family Caregivers of Patients with Schizophrenia

Winda Kusumawardani1, Ah.Yusuf1, Lailatun Ni’mah1
1Faculty of Nursing, Universitas Airlangga, 60115, Surabaya, Jawa Timur

ABSTRACT

Background: Schizophrenia is a mental disorder that is still being a stigma and causes a conflict in the family due to maladaptive behavior. Coping strategies are needed by the family members to dealing burden, so that they can care patients well.

Purpose: This study aimed to determine the relationship between family burden and coping with the family ability of caring for patients with schizophrenia.

Method: This study used a cross sectional approach. The population was a family of patients with schizophrenic in the Wijaya Kusuma room at Menur mental hospital. The number of samples was 21 respondents. The independent variable was family burden and coping. The dependent variable was the family ability of caring. Data were collected by questionnaires of demographic, family ability, family burden, and family coping. Data analysis used Spearman Rho correlation test with a significance level of α = 0.05.

Results: The statistical results showed that family burden has a correlation with family ability (r = 0.656), while family coping has a very strong correlation with family ability (r = 0.868) with family integrity better than psychological status and communication.

Conclusion: Family with a low burden did not necessarily have a good ability in caring for patient, but family with good coping will be able to provide good care for patient. Therefore, nurses are expected to develop methods to improve family coping in family caregivers of patient with schizophrenia.

Keywords: Schizophrenia, family burden, family coping, family ability of caring

Introduction

Schizophrenia is a mental disorder that have stigma in society. The stigma in society is that schizophrenia is about craziness or mental illness that needs to be shunned so that causes fear, misunderstanding, and punishment. Schizophrenia is included in the severe schizophrenia group. In the world, schizophrenia affects 21 million people and 1 of 2 people with schizophrenia do not get a treatment (1).

The arised problems in patients are lossing of ability to be independent and a negative symptoms which will affect work and family financial conditions (3). This can be a family burden that can be grouped into objective and subjective burdens. Objective burdens are limited social relations and work activities, financial difficulties, disrupting the physical health of family members. While the subjective burdens are feeling of loss, sadness, anxiety, shame, stress, family can blame each other and hostility between family members. The burden causes high level of stress in families (4–7).

Effective coping is needed by families with schizophrenia. The inability of families to create effective coping exacerbates the needs of schizophrenic patients at home. Treatment failure that causes recurrence in patients who have just returned from a mental hospital but various studies cannot explain the relationship between family and family difficulties in treating patients with schizophrenia(7,8).

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Schizophrenia which is not handled well will worsen the patient’s condition, cause an impact in the community and family, and can be a family burden so that family coping become ineffective. This burden will be increased when there is no internal support from family members. This burden easily triggers high emotional expression in caregivers (9).

In this case, the family has an important role in treating patients with schizophrenic. Therefore, the family needs to have effective coping abilities as a right way to overcome the perceived burden. Effective coping ability can be achieved if the family has a sufficient knowledge and information in accordance with Ajzen’s theory. (10,11). This study aimed to determine the relationship between family burden and coping with the family ability of caring for patients with schizophrenia

Method

This research was a descriptive correlation study with a cross sectional approach. This descriptive study aimed to make a general description of a situation objectively. While the cross sectional approach is one type of study that emphasizes the observation time of independent and dependent variable data simultaneously (12). This research was conducted at Menur Mental Hospital Surabaya.

Sample: Determining representativeness is based on the inclusion criteria. The inclusion criteria is a family who takes care of patients with a diagnosis of mental disorders of at least 1 year. Selecting diagnosis criteria was based on PPDGJIII include groups F20-F29 (Schizophrenia, Schizotipal, and wedge disorders).

Sampling: The sampling technique in this study was the nonprobability sampling type of consecutive sampling. The chosen study object is the family of patients with schizophrenic who met the inclusion criteria.

Variable: The independent variable in this study was the family burden and coping in treating patients with schizophrenia mental disorders, while the dependent variable in this study was the family’s ability of caring patients with schizophrenic mental disorders.

Research Instrument: Data was obtained by a demographic questionnaire consists of demographics of patients and families. Second questionnaire was the family ability questionnaire consisting of five aspects and was presented in a closed form. Third questionnaire was family burden questionnaire. Finally, the family coping questionnaire was measured using a modification of the 2001 McCubbin coping questionnaire which developed a self-evaluation instrument in the form of a check list: copying health inventory for parents (CHIP) about specific behaviors in dealing with chronic stress experienced by families (8). Third questionnaire consists of 17 questions about three types of family coping patterns that are (1) six questions about maintaining family integrity, cooperation, looking at everything with positive things (2); six question about maintaining social support, self-esteem and psychological stability (3); and five question about understanding the medical situation, communication and consultation with health workers. The structure of coping health inventory for parents (CHIP) questionnaire is based on the important behavior of the family in responding to stress (14).

Data Analysis: This research analyzed using descriptive and statistical analysis used Spearman Rho correlation test. It is processed and analyzed with Statistical Package for the Social Science (SPSS) software (15).

Results

Respondents were patients with schizophrenia for at least 1 and their family caregivers. Data of respondent were obtained from the medical record of Menur mental hospital in Surabaya. Data collection used questionnaires and structured interview on 21 respondents. Frequency distribution of respondents of schizophrenia patient families based on demographic data in Wijaya Kusuma Hospital, Menur mental hospital in June 2016 shows that the respondents who were siblings with patient with schizophrenia are 13 people (62%), 6 people (29%) aged 20-30 years, 17 people (81%) are from the Javanese. There was no patient’s family who do not go to school, almost half the number of families worked as employees (48%), had income between 500,000-1,000,000 (38%), used JKN-KIS (62%), were not discipline in giving drugs to schizophrenia patients (81%) and were discipline in re-checking schizophrenia patients (67%).

The frequency distribution of schizophrenia patients based on demographic data in Wijaya Kusuma Room, Menur mental hospital in June 2016 shows that 14 schizophrenia patients was treated at Menur mental hospital (67%), 7 people (33%) with educational background of junior high school, 8 people (38%) in the age ranged of 21-30 years, patients with status single was 13 people (38%), 14 people (67%) had experienced mental disorders for 1-10 years, more than half of the patients had been referred to the mental hospital for the first time, 13
people (62%) were not doing treatment routinely, 7 people (33%) had experienced rejection and only 4 people (19%) had families with a history of mental disorders.

The table below is the result of a test of the relationship between family burden and family ability of caring for patient schizophrenia.

**Table 1: Relationship between family burden and family ability to care for schizophrenia patients in Wijaya Kusuma Room, Menur mental hospital in June 2016**

<table>
<thead>
<tr>
<th>Family Burden</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>%</td>
<td>Total</td>
</tr>
<tr>
<td>Low</td>
<td>8</td>
<td>38</td>
<td>1</td>
</tr>
<tr>
<td>Medium</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>High</td>
<td>1</td>
<td>4.8</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>42.8</td>
<td>10</td>
</tr>
</tbody>
</table>

Spearman’s Rho p = 0.008

Table 1 shows the results of the Spearman correlation test between family burden and family ability of caring for patients with schizophrenia which shows a significance value of p = 0.008 or H1 was accepted which means that there was a relationship between family burden and family ability to treat schizophrenia patients. Correlation coefficient interval value (r) = 0.561 which means having a moderate relationship.

The table below is the result of a test of the relationship between family coping and family ability to care for schizophrenic patients.

**Table 2: Family coping relationships with the ability of the family to care for schizophrenia patients in Wijaya Kusuma Room, Menur mental hospital in June 2016**

<table>
<thead>
<tr>
<th>Family Coping</th>
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<th>Fair</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>%</td>
<td>Total</td>
</tr>
<tr>
<td>Poor</td>
<td>7</td>
<td>33.3</td>
<td>0</td>
</tr>
<tr>
<td>Fair</td>
<td>2</td>
<td>9.5</td>
<td>10</td>
</tr>
<tr>
<td>Good</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>42.8</td>
<td>10</td>
</tr>
</tbody>
</table>

Spearman’s Rho p = 0.000

Table 2 shows the correlation spearman statistical test of relationship between family coping with the family ability of caring for patient with schizophrenia which shows a significant value of p = 0.000 or H1 was accepted which means that there was a relationship between family coping and family ability of caring for patient with schizophrenic. Interval value of the correlation coefficient (r) is 0.868, which means having a very strong relationship.

**Discussion**

This research showed that family who have better coping strategies will take care of patient with schizophrenia well and full of affection. However, family with less burden do not always have the ability of caring for patient with schizophrenia properly.

The results of descriptive data showed that family burden is still relatively low. Subjective burden that most families feel is feeling stressed, confused, anxious and only 2 of 21 respondents felt embarrassed when taking care patients with schizophrenia. The objective burden that most families feel is reduced income, and only 2 of 21 respondents felt a rejection from the community when they are taking care patient with schizophrenia patients.

Families who have a high burden of taking care patient with schizophrenia in this study work as
employees with low income so it is difficult to take medication and visit the doctor regularly. It also makes the families often leave the office earlier and result in getting reduced income. In contrast to families that have health insurance facilities that are very supportive to caregivers’ finances, which will reduce the burden. Most respondents have and use health insurance facilities such as JKN-KIS and ASKES.

Contributing factors to the low family burden are the length of time the patient suffers from mental disorders, history of hospitalizing in mental hospital, and history of persecution. Data showed that most patients had suffered mental disorders for 11-20 years. Most of patients had a hospitalized history in mental hospital once and there was no history of persecution. It caused their family do not need to waste long time to take care for and manage patient who need continuous care, patients were less independent and had many needs that must be fulfilled as family burden get low.

Descriptive data showed that family coping were quite good. The component of family integrity which consists of perceptions of schizophrenia, daily behavior to patients, collaboration with patients, and the ability to think positively of situation occupy the highest proportion in family coping rather than components of psychological stability and communication skills. The most common component of family integrity is the ability to provide care and affection to patients and few respondents are able to provide good medical services to patients. Families with high coping also have a better integrity rather than psychological stability and communication skills.

Taking care a patient with schizophrenia can cause stress for the family. It makes family need coping strategies. Coping is a process for dealing with stressors by assessing how heavy the burden and the impact that might occur from the stressor experienced (16–18). Family education background influences whether family’s coping abilities are good or not. This is proven by the higher family education, the higher their knowledge level and awareness in caring for patient with schizophrenia.

Descriptive data showed that family ability of caring for patient with schizophrenia was quite good. The duty of caring a patient is one of the five components of family duties in care that are best implemented, followed by utilizing the health services, then environmental modification, making decisions for the right actions and the most rarely is the task of recognizing health problems. Family have a role in maintaining health, namely recognizing family problems, making decisions to determining the right actions, caring for sick family members, modifying a healthy family environment, and utilizing health service facilities around the environment (19). Family efforts in carrying out maintenance duties are certainly influenced by several factors.

As already stated above, knowledge has an important role in influencing family’s efforts in caring for schizophrenic patients. Without a supportive environment that can help the treatment process, the treatment process for schizophrenia will be ineffective (20). In addition, for the occupation and social economic factors, family members who do not have occupation certainly have more free time to caring for patient than occupied family member. Socio-economic factors in this study include the level of income of the family, family with high economic level will be more supportive and have a better decision-making in caring for schizophrenia patients. Family with excessively socio-economic will have an adequate level of family support. Family income is one manifestation of the intellectual support that will be used in looking for mental health services in treating family members with a history of schizophrenia (21).

As much 38 % of family with low burden had less ability of caring. While 4.8% of family with low burden had a good ability of caring. The results of this study indicated that families with low burden did not always have a good caring skills. These results are contradicted to the theory which explains that a low family burden should have high family ability of caring.

The cause of low-burden families with low caring ability is the length of time patients suffer from schizophrenia, work activities and family education. Eight respondents with low burden but low ability because they did not have enough time to treat patients with schizophrenia. In the education factor, some of them are elementary school. Education that makes family awareness low will be low

The results showed that 7 respondents with a poor coping also had poor ability to treat patients with schizophrenia even though caregiver activities were full of burdens, caregivers still wanted to care for family members because good coping was realized through constructive behavior that was full of wisdom and good values.
Conclusion

Family burden is not a factor that influences the family ability of caring for patient with schizophrenia due to various factors such as education and family economic social. However, family with good coping can provide good caring for patient with schizophrenia.

Ethical Clearance: The study was approved by ethics committee of Faculty of Nursing, Universitas Airlangga, Indonesia

Conflict of Interest: The author declared no conflict of interest.

Source of Funding: The authors have no source of funding to report.

REFERENCES

Antibacterial Activities of Extract n-Butanol-Methanol (1:1) Filtrat of the Fermentation Results of *Streptomyces sp.* B10 Against *Mycobacterium tuberculosis* H37Rv: An Experimental Study

Septa Devi Adetya Putri¹, Isnaeni¹, M. Faris Adrianto¹

¹Pharmaceutical Chemistry Department, Faculty of Pharmacy, Universitas Airlangga

**ABSTRACT**

**Background:** *Streptomyces* sp. is one of the sources of first choice antibiotic for tuberculosis treatment. *n*-butanol is the best solvent to extract antibacterial compound from fermented *Streptomyces* sp. isolates.

**Aim:** To analyze anti-tuberculosis activity of extract *n*-butanol-methanol (1:1) filtrate of the fermentation results of *Streptomyces sp.* B10 against *Mycobacterium tuberculosis* H37Rv.

**Method:** This was a laboratory experimental study. 3 comparisons of the type of solution were observed once a week for 3 weeks. Antibacterial activity test was analyzed from morphological observations on Ziehl-Neelsen staining, then minimum inhibitory concentration and minimum bactericidal concentration were determined.

**Result:** Bacterial growth began in the second week starting from a concentration of 10,50 ppm to a concentration of 1,31 ppm but a concentration of 43.000 ppm to a concentration of 5.375 ppm didn’t show any bacterial growth. The results of Ziehl-Neelsen staining show a red and rod-shaped *Mycobacterium tuberculosis* H37Rv colonies at a concentration of 2.687,5 ppm to a concentration of 1,31 ppm and at a positive control. A concentration of 2.687,5 ppm was determined as minimum inhibitory concentration and a concentration of 5.375 ppm was determined as minimum bactericidal concentration.

**Conclusion:** Extract *n*-butanol-methanol (1:1) filtrate of the fermentation results of *Streptomyces sp.* B10 at a concentration of 2.687,5 ppm to 5.375 ppm has antibacterial activity against *Mycobacterium tuberculosis* H37Rv. This extract can be used as an antibiotic formula for tuberculosis.

**Keywords:** *Streptomyces* sp, *n*-butanol, tuberculosis, antibacterial activities

**Introduction**

After first-line anti-tuberculosis drugs were released, the number of deaths was greatly reduced. The characteristic of tuberculosis that rapidly resistant to drugs, and the ability of bacteria to survive is a major problem for public health. In Indonesia, the total cases that reported in 2016 were 360,565 cases.

In 2014, the prevalence of 660 per 100,000 population with a case incidence of 403 per 100,000 population. The characteristic of *Mycobacterium tuberculosis* is the ability to make a persistent infection that requires long-term antibiotic therapy to cure tuberculosis patient. Tuberculosis (TB) has become a curable disease due to the antibiotic invention.

One genus of *Actinomycetes* which contributes most of its active metabolites to antibiotics is *Streptomyces*, this genus occupies the first position on several antibiotics. Antibiotic as anti-TB were discovered in 1943, known as Streptomycin.

Various strategies including bioinformatics are currently being tested to identify and improve
vaccines against TB. The researchers are undertaking and discovering new microorganisms which produce secondary metabolites. Domestic production of drug ingredients has not been going well, and still depends on imports ingredients. Five out of 15 isolates have been shown to have antibacterial activity from isolation using agricultural soil in Indonesia that planted with kale, spinach, and corn. One of the isolates known as Streptomyces sp. B10 which identified as Streptomyces violaceusniger. Water fraction and n-butanol fraction from fermented Streptomyces sp. B10 has antibacterial activities but the minimum inhibitory concentration remains unknown. Extract filtrate of the fermentation results of Streptomyces sp. B10 showing antibacterial activity against Escherichia coli. n-butanol is a solvent which has been shown to selectively extract antibiotic compounds from Streptomyces isolates with a large zone of inhibition. Methanol is a polar solvent that is mostly used because of its efficient penetration into the cell wall, so it produces more endocellular secondary metabolites.

This study aimed to analyze the activity of extract n-butanol-methanol (1:1) filtrate of the fermentation results of Streptomyces sp. B10 against Mycobacterium tuberculosis H37Rv.

**Method**

This study was an experimental study conducted in the Microbiology Laboratory Faculty of Pharmacy Universitas Airlangga and Tuberculosis Laboratory Institute of Tropical Disease Universitas Airlangga in 2017. Bacterial samples were Mycobacterium tuberculosis H37Rv and obtained from Tuberculosis laboratory Institute of Tropical Disease Airlangga University Surabaya. Streptomyces sp. B10 isolates were obtained from the Microbiology laboratory collection, Pharmaceutical Chemistry Department, Faculty of Pharmacy Universitas Airlangga. This study was conducted by researchers and expert lecturers.

The solution consists of 3 types: extract n-butanol-methanol (1:1) filtrate of the fermentation results of Streptomyces sp. B10, 1 ppm rifampicin (RIF) solution and DMSO solvent, and positive control (Middlebrook7H10 medium and Mycobacterium tuberculosis H37Rv). Incubation temperature, pH, and incubation duration were controlled in this study. Laboratory testing procedures were carried out by using Streptomyces sp. B10 culture, fermentate the Streptomyces sp. B10, freeze dry the culture, extract the crude dry powder using n-butanol-methanol (1:1), evaporate the extraction, extract n-butanol-methanol (1:1) filtrate of the fermentation results of Streptomyces sp. B10, and dilute. Antibacterial activity test was analyzed from morphological observations (shape, elevation, and color) on Ziehl-Neelsen staining, then minimum inhibitory concentration was determined. The assessment was determined by researchers and expert lecturers.

**Result**

Extraction using n-butanol-methanol (1:1) produced brownish yellow colored extract filtrate that has an oil-like consistency and non-distinctive smell. The summary of results from the first week to the third week can be seen in table 1.

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<thead>
<tr>
<th>No.</th>
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<th>Lab. Code</th>
<th>Concentration (ppm)</th>
<th>Result Per Week</th>
<th>Descriptions</th>
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<td>8</td>
<td>335,94</td>
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<td>+</td>
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<tr>
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<td>15</td>
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<td>-</td>
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<tr>
<td>16</td>
<td>1.31</td>
<td>-</td>
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<td>+</td>
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<tbody>
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<td>2</td>
<td>RIF</td>
<td>1.0</td>
<td>-</td>
<td>-</td>
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<tr>
<td>3</td>
<td>DMSO</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>Control (+) M. tbH37Rv</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Not inhibit the growth of *Mycobacterium tuberculosis* H37Rv (positive growth)

Inhibit the growth of *Mycobacterium tuberculosis* H37Rv (positive growth)

Not inhibit the growth of *Mycobacterium tuberculosis* H37Rv (positive growth)

**Note:** (-): no growth (+): Positive growth

On the first week, *Mycobacterium tuberculosis* H37Rv still has not shown any growth on Middlebrook 7H10 medium and Middlebrook 7H10 medium that contain solutions at several concentrations: 43.000 ppm, 21.500 ppm, 10.750 ppm, 5.375 ppm, 2.687.5 ppm, 1.343.75 ppm, 671.88 ppm, 335.94 ppm, 167.97 ppm, 83.98 ppm, 41.99 ppm, 21.00 ppm, 10.50 ppm, 5.25 ppm, 2.62 ppm, 1.31 ppm, likewise positive control (media and *Mycobacterium tuberculosis* H37Rv), Rifampicin (RIF) 1.0 ppm solution, and DMSO solvent. The growth of *Mycobacterium tuberculosis* H37Rv on Middlebrook 7H10 medium usually occur at the 1st-2nd week, so that observation continue for three weeks.

Observation at the second week shows that in a mastersolutionata concentration of 43.000 ppm to 21.00 ppm still has not shown the growth of *Mycobacterium tuberculosis* H37Rv. The solution at a concentration of 10.50 ppm to 1.31 ppm shows slight growth. The bacterial growth at a concentration of 10.50 ppm and 5.25 ppm can be seen as nebulous white dots, while at a concentration of 2.62 ppm the bacterial growth spread evenly as several small dots and at a concentration of 1.31 ppm show the most amount of growth compared to other concentrations. Positive control (media and *Mycobacterium tuberculosis* H37Rv) show a lot of growth with a white colored and slightly rough texture, in the Rifampicin (RIF) solution and DMSO still has not shown the bacterial growth. But it is not yet known whether the growth appears from *Mycobacterium tuberculosis* H37Rv or other bacteria.

At the third week, the inhibiting ability of extract n-butanol-methanol (1: 1) were decreasing. In a master solution at a concentration of 43.000 ppm to 5.375 ppm on Middlebrook 7H10 medium still has not shown the bacterial growth, which means at a concentration of 43.000 ppm, 21.500 ppm, 10.750 ppm, and 5.375 ppm has the inhibiting ability. Whereas at a concentration of 2.687.5 ppm to 1.31 ppm show bacterial growth. Since the first week to the third week, Rifampicin solution did not show any bacterial growth, which means Rifampicin as a standard that has the ability to inhibit *Mycobacterium tuberculosis* H37Rv growth. While positive control (Middlebrook 7H10 medium and *Mycobacterium tuberculosis* H37Rv) in the second week to the third week show bacterial growth increment, this shows that *Mycobacterium tuberculosis* H37Rv can grow on selective Middlebrook 7H10 medium. But it was not yet known whether the growth appears from *Mycobacterium tuberculosis* H37Rv or other bacteria. Therefore Ziehl-Neelsen staining was undertaken to determine the bacteria that grow in each concentration.

Microscopic observation on Ziehl-Neelsen staining did not show *Mycobacterium tuberculosis* H37Rv at a concentration of 43.000 ppm; 21.500 ppm; 10.750 ppm; and 5.375 ppm, it was plain blue. Whereas at a concentration of 2.687.5 ppm; 1.343.75 ppm; 671.88 ppm; 335.94 ppm; 167.97 ppm; 83.98 ppm; 41.99 ppm; 21.00 ppm; 10.50 ppm; 5.25 ppm; 2.62 ppm; and 1.31 ppm show red, straight, slim rod shaped *Mycobacterium tuberculosis* H37Rv, with blue background.
To determine the bacterial activity in quantitative approaches, the lowest concentration that can inhibit bacterial growth was observed. At a concentration of 10.750 ppm has not shown the bacterial growth, which means this concentration has the ability to inhibit *Mycobacterium tuberculosis* H37Rv growth. At a concentration of 5,375 ppm also hasn’t shown any bacterial growth, so this concentration still able to inhibit *Mycobacterium tuberculosis* H37Rv growth, but at a concentration of 2.687,5 ppm bacterial growth began to appear.

Microscopic observation on Ziehl-Neelsen staining did not show *Mycobacterium tuberculosis* H37Rv colony at a concentration of 43.000 ppm; 21.500 ppm; 10.750 ppm and 5.375 ppm, it was plain blue. Whereas at a concentration of 2.687,5 ppm; 1.343,75 ppm; 671,88 ppm; 335,94 ppm; 167,97 ppm; 83,98 ppm; 41,99 ppm; 21,00 ppm; 10,50 ppm; 5,25 ppm; 2,62 ppm and 1,31 ppm show red, straight, slim rod-shaped *Mycobacterium tuberculosis* H37Rv, with blue background. So that the Minimum Inhibitory Concentration (MIC) from extract n-butanol-methanol (1:1) filtrate solution of fermentation results of *Streptomyces sp.* B10 against *Mycobacterium tuberculosis* H37Rv is 2.687,7 ppm. While the concentration of 5,375 ppm is the highest concentration that still able to kill the bacteria (MBC).

**Table 2: Observation result of Minimum Inhibitory Concentration (MIC)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Materials</th>
<th>Lab. Code</th>
<th>Concentration (ppm)</th>
<th>Result Per Week</th>
<th>Description</th>
</tr>
</thead>
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<td>Extract</td>
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<td>Inhibit the growth of <em>Mycobacterium tuberculosis</em> H37Rv (no growth)</td>
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<td></td>
<td>2</td>
<td>21.500</td>
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<tr>
<td>9</td>
<td></td>
<td>9</td>
<td>167,97</td>
<td>- - +</td>
<td>Not inhibit the growth of <em>Mycobacterium tuberculosis</em> H37Rv (appear growth)</td>
</tr>
<tr>
<td>10</td>
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<td>10</td>
<td>83,98</td>
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<td>Inhibit the growth of <em>Mycobacterium tuberculosis</em> H37Rv (no growth)</td>
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<tr>
<td>3</td>
<td>DMSO</td>
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<td>- - +</td>
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<td>Not inhibit the growth of <em>Mycobacterium tuberculosis</em> H37Rv (appear growth)</td>
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<tr>
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<td>Control (+) M.tbH37Rv</td>
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<td>- + +</td>
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<td></td>
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</tbody>
</table>

**Note:** (-) : no growth (+) : appear growth

The microscopic observation did not show *Mycobacterium tuberculosis* H37Rv colony at a concentration of 43.000 ppm; 21.500 ppm; 10.750 ppm and 5.375 ppm, it was plain blue. Whereas at a concentration of 2.687,5 ppm; 1.343,75 ppm; 671,88 ppm; 335,94 ppm; 167,97 ppm; 83,98 ppm; 41,99 ppm; 21,00 ppm; 10,50 ppm; 5,25 ppm; 2,62 ppm and 1,31 ppm show red, straight, slim rod-shaped *Mycobacterium tuberculosis* H37Rv, with blue background.
Discussion

Extract n-butanol-methanol (1:1) filtrate solution of the fermentation results of Streptomyces sp. B10 has antibacterial activity against Mycobacterium tuberculosis H37Rv. n-butanol is the selective solvent that can extract antibiotic compounds from Streptomyces sp. with a large zone of inhibition15. Ethanol extract has potent ability to inhibit bacterial growth, both gram-positive and gram-negative bacteria17. Methanol is a polar solvent that mostly used because of its efficient ability to penetrate into the cell wall, so it produces more endocellular secondary metabolites16. Several isozymes show high substrate specificity and various homogeneity from Streptomyces sp. Cell extract for several types of alcohol18.

Dilution using this extract can support the attack against Mycobacterium tuberculosis (TB). Since Mycobacterium tuberculosis has a high acquisition to drug resistance, new drug discovery to put into tuberculosis regimen is required19. Streptomyces potential for expressing foreign proteins indicate that Streptomyces can be a useful vector in designing new TB vaccine. Streptomycin is the first antibiotic that attacks Mycobacterium tuberculosis by moomotherapy, so it leads to generate resistance. The mechanism of action of streptomycin is inhibiting mycobacterial protein synthesis in ribosomes. Resistance arises when mutations appear on rRNA and protein-encoding genes. ATCC27294 strains are sensitive toward the activity of streptomycin, rifampin, ethambutol, and isoniazid and ATCC35820 strains are resistant to streptomycin. Several mutated genes are evidenced to cause drug resistance20,21. The clinical trials of streptomycin show a good outlook to suppress TB. Although patient improved compared to the patient without therapy (considered as the first randomized controlled clinical trial), recurrence occurs in many patients and organisms are found to be resistant to streptomycin22.

The concentration ranges from 2,687.5 ppm to 5,375 ppm effective against Mycobacterium. Antibacterial activity against Mycobacterium tuberculosis H37Rv occurs at a concentration of 2.687,5 ppm, which is determined as Minimum Inhibitory Concentration (MIC). Whilst the concentration of 5.375 ppm is determined as Minimal Bactericidal Concentration (MBC), which is the lowest concentration that able to kill bacteria. This result shows that antibacterial activity increased as the increasing extract n-butanol-methanol (1:1) filtrate solution of the fermentation results of Streptomyces sp. B10 concentration, because the extract in this study has not become an antibacterial pure compound.

There are few things as consideration for further research: further analysis with separation of active compounds from Streptomyces sp. B10 using TLC bioautography method or other separation methods, further identification to find out another pure compound as antibacterial that produced by Streptomyces sp. B10, and limiting concentration range from 5.375 ppm to 2.687,5 ppm for antibacterial activity test and MIC determination.

Conclusion

Extract n-butanol-methanol (1:1) filtrate solution of the fermentation results of Streptomyces sp. B10 has antibacterial activity against Mycobacterium tuberculosis H37Rv. This indicates that this extract can be used as an alternative antibiotic formula to fight tuberculosis.

Ethical Clearance: This research has gone through ethical tests and permits from Faculty of Pharmacy Universitas Airlangga

Conflict of Interest: The author reports no conflict of interest of this work.

Source of Funding: This study is done with individual funding

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The Correlation between Goat Maintenance Management to the Incidence of Gastrointestinal Parasite Infections

Zahrotul Hurriyyah1, Nunuk Dyah Retno Lastuti1, Lianny Nangoi1
1Faculty of Veterinary Medicine, Airlangga University, Surabaya 60115

ABSTRACT

Background: Gastrointestinal parasite infection in goats is one of the diseases that lead to a poor productivity of livestock. This infection might be caused by a poor maintenance management.

Aim: This study was to study the correlation between a goat maintenance management and the severity level of gastrointestinal parasite infections.

Method: This study used 42 fresh feces as samples which taken randomly from a large population. Sample examination was done by using simple sedimentation method and modified Fulleborn floating method. The degree of parasite infection was measured using the calculation of fecal worm egg count (FEC), 0-500 gram of feces considered as mild infection. Data from the maintenance management questionnaire and the severity of infection in goats were analyzed using the Classification and Regression Tree (CART) test.

Result: Samples examination was conducted in department of parasitology. It resulted 23 samples were positive with worm eggs from Haemonchus contortus and Strongyloides papillosus species. The prevalence of Helminthiasis was 54.76% with a mild degree of infection. The type of worm eggs found in the examination of faecal samples came from the class of Nematodes, namely Haemonchus contortus species (60.87%) and Strongyloides papillosus (39.13%). Single infection was found in 11 positive samples (47.82%) and 12 positive samples were in mixed infections (52.18%) 

Conclusion: Maintenance Management is a major factor in the degree of gastrointestinal parasite infection.

Keywords: the severity level of parasite infection, goat, maintenance management

Introduction

Parasite infections in goats rarely cause death, but this disease is chronic and have an impact to adult goats in decreasing milk production, meat quality, and work ability, whereas in young goats can results in stunted growth, decreased appetite, anemia, diarrhea, and dehydration1. Environmental conditions outside the host’s body which greatly influence the occurrence of helminthiasis cases, include the suitable temperature, humidity, and the availability of oxygen2.

The appropriate environment will promote worm eggs to come out through goat feces. The worms will hatch and develop into infective larvae which will infect new hosts. This means that the more ideal the environmental conditions, the higher opportunities of infection occurrence because the worms will grow well. The environmental sanitation of the host’s residence is need to be considered. Poor sanitation, especially if feces is not cleaned regularly, it can trigger a severe and sustained re-infection3.

Maintenance management in goats is influenced by the limited knowledge of farmers about raising goats method is one of the factors causing worm infections, especially the problem of sanitation cages, poor environmental conditions, extreme climate, and contaminated feed with worm eggs. Infectious larvae attach to grasses then infect the goats. Furthermore, the larvae will mature in the abomasum of goats4. However,
in the effort to develop livestock production, there were obstacles in the livestock industry, one of which was poor livestock management among farmers.

Some efforts to control parasites that exist in livestock because if the parasite is left untreated, it will become very detrimental to farmers. Good maintenance management of goat swill reduce and eradicate the occurrence of parasites infections. Therefore, this study aimed to determine the relationship between the type of worm eggs in digestive tract, the degree of severity, and maintenance management in goats.

**Method**

The study was conducted in Turi Village, Lamongan Regency, Indonesia. Sample examination was carried out at the Helminthology Laboratory, Airlangga University, Surabaya. The sampling period time was from May to June 2017. The time of the faecal examination at the laboratory was in June to July 2017. Feces samples were taken randomly, limited to 10% of the total population with a total of 42 faecal samples. Feces was taken in moderation (approximately 10 grams) with a 2.5% potassium bicarbonate solution and taken to the laboratory for examination. Sample examination was done by simple sedimentation method and modified Fulleborn floating method.

**Simple Sedimentation Method:** The feces sample was put in a plastic cup and then added water with a ratio of 1:10 then filtered. The filter results were put into the centrifuge tube then centrifuged for 2-5 minutes at a speed of 1500 rpm. Supernatant from the centrifuge was removed and the water was added again as well as the previous stage and then centrifuged for 2-5 minutes at a speed of 1500 rpm. This process was repeated until the supernatant is clear. After clear, the supernatant was removed and left a little, then the sedimentation was stirred with Pasteur pipette and taken a little and then dropped over the glass object and covered with a glass cover after it was examined under a 100x magnification microscope.

**Modified Fulleborn Floating Method:** Modified Fulleborn Floating Method was done by making feces suspension then filtered and put into a centrifuge tube to be centrifuged for 2-5 minutes at a speed of 1500 rpm. The supernatant was discarded, while the sediment with added water will be centrifuged for 2-5 minutes at the same speed. The process was repeated to obtain a clear supernatant. After that the supernatant was discarded and left a little, then add the brown sugar solution to 1 cm from the mouth of the tube and do the refining again in the same way. The centrifuged tube was placed on a tube rack then slowly dripped with a brown sugar solution until the surface of the liquid looks convex on the surface of the tube mouth. The glass cover was placed on the surface of the tube for 5 minutes, then the glass cover was lifted and placed on the glass object to be observed under a microscope with 100x magnification.

**Calculation of Fecal Egg Count (FEC):** In a positive sample infected with gastrointestinal worms, the examination was continued with the calculation of Fecal Egg Count (FEC). Calculations use the Lucient Brumpt method. One gram of faeces is mixed with water and made a suspension with dilution 10 times, then filtered and calculated the number of drops in 1 ml of suspension using a pasteur pipette. Examination is carried out under a microscope with 100x magnification. The results of the FEC calculation are classified into three levels, namely the degree of mild infection if FEC ranges from 0-500. The degree of infection is moderate if FEC ranges from 501-1000. And the degree of infection is severe if FEC is more than 1000.

**Prevalence Calculation:** Prevalence calculation of goat digestive tract worms was based on the percentage of positive samples that found worm eggs, divided by the number of all samples multiplied by 100% (8).

**Statistical Analyze:** Data from the maintenance management questionnaire and the severity of goats were analyzed by statistical tests (Classification and Regression Tree (CART) test).

**Results**

Laboratory results obtained 23 positive faecal samples containing worm eggs. This shows the prevalence and degree of gastrointestinal worm infection in goats as much as 54.76%. From the results of the examination found worm eggs from the Nematode class, namely from the species *Haemoncus contortus* and *Strongyloides papillosus*. Figure 1 shows *Strongyloides papillosus* worm egg measures 55.58 x 25.53 μm. The form of *Strongyloides* sp. eggs are elliptical, thin walled and larva shaped like the letter S or U.
The results of examination of faecal samples that have been done, shows the presence of *Haemonchus contortus* worm eggs with a size of 80.28x47.93 μm, oval-shaped worm eggs, and when coming out with feces already in the morula stage (in eggs containing 16-32 cells). Numerous *Haemonchus contortus* eggs are thin-shelled, oval shape with equal polish, edges mombate and morula is not fully filled the eggs cavity. This following picture in Figure 2 is *Haemonchus contortus* eggs.

*Figure 2: Haemonchus contortus eggs. (Magnification are up to 100X).*

*Haemonchus contortus* eggs have an oval shape and there is a clear area inside. Identification of worm eggs was done by looking at the morphology of the egg shape and size of the worm egg. Measurements of worm eggs were carried out using the Optilab Imageraster program. The following is the mean value of worm eggs that infect goats.

**Table 1: Mean Value of Worm Eggs that Infected Goats and Its Degree of Infection**

<table>
<thead>
<tr>
<th>No.</th>
<th>Amount of Sample</th>
<th>FEC</th>
<th>Degree of Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>13</td>
<td>0-500</td>
<td>Small</td>
</tr>
<tr>
<td>2.</td>
<td>6</td>
<td>501-1000</td>
<td>Medium</td>
</tr>
<tr>
<td>3.</td>
<td>3</td>
<td>&gt;1000</td>
<td>Heavy</td>
</tr>
</tbody>
</table>

From 23 positive samples, 13 samples were in mild degrees of infection with an average number of 0-500 egg per gram faces (EPG). The degree of moderate infection with a sample size of six had been obtained with average number of worm eggs about 501-1000 EPG, and the degree of severe infection with a sample number of three and the average worm eggs was more than 1000 EPG.

The types of worms that infect goats was *Haemonchus contortus* worm eggs (60.87%) and *Strongyloides papillosus* worm egg (39.13%). Mixed infection were found in 12 positive samples or equal to 52.18% consisting of two worm species from the Nematode class, *Haemonchus contortus* and *Strongyloides papillosus*. While the incidence of a single infection was found in 11 positive samples or equal to 47, 82%.

Based on the results, management of goat maintenance showed an influence on the degree of worm eggs infection in the digestive tract. Wastes disposed of less than 15 meters from the cage have a mild infection rate of 50% and a severe infection of 50%, while the waste disposed at a distance of more than 15 meters from the cage has a mild infection rate of 66.7% and a severe degree of infection 0%.

Goats who had never been given worm medicine had a greater degree of infection than goats who were given worm medicine. Goats given worm medicine had a mild infection rate of 100% while goats who had never been given worm medicine had a mild degree of infection of 57.1%, moderate of 14.0%, and severe of 28.6%. While goat manure stored in closed sacks has a mild infection rate of 50%, medium 25%, and severe of 10%. Whereas the dirt deposited on the ground has a mild infection rate of 75%, medium 25%, and severe of 0%.

The results of research conducted on feeding methods showed that breeders who provided feed from inside the cage had a higher degree of infection than goats which were released to graze in the rice fields. Breeders who provide feed from inside the cage have a mild degree of infection of 65%, moderate of 25%, and severe 10%. Whereas the goats released in the paddy fields have a mild degree of infection of 33.3%, moderate of 66.7%, and severe of 0%. Beside of that, farmers who clean their cages once a week have a mild and moderate infection rate of 0% and severe of 100%. Whereas farmers who clean their cages every day have a mild degree of infection 60.9%, moderate of 30.4%, and severe of 8.7%.
Discussion

The results showed that two species of worm eggs from the Nematode class (Haemonchus contortus and Strongyloides papillosus). Cattle frequently has mixed parasite infections. From the results, mixed parasitic infections was more common than single infections. Mixed infections were found in 12 positive samples or equal to 52.18%. Whereas the single infection was found in 11 positive samples or equal to 47.82%. This was caused by the characteristic of parasite infection does not cause death to the host, but only causes a decrease in host’s immune system, allowing secondary infection from other types of parasites. Seasonal dynamics and age of hosts are significantly influenced by the prevalence of gastro-intestinal nematode infection. Besides, all these worm parasites spend more their life cycle in the host body. The appropriate environment promotes worm eggs to come out with goat’s feces, then it hatch and develop into infective larvae which will infest new hosts. This means that the more ideal the condition of the environment, the more opportunities for the emergence of cases of worm infections.

The results of the FEC calculation did not show a significant effect on the incidence of gastrointestinal worm infections in goats, so the incidence of gastrointestinal worm infections in goats was classified as a mild degree of infection with a range of 0-500 EPG. Differences in the number of FEC calculations on definitive hosts can be influenced by several factors, namely, type of worm, age of worms, time of egg production, amount of feces produced by definitive hosts, density or consistency of faeces, and spread of eggs in feces.

Feces waste that discharged nearby the cage with a distance of approximately 15 meters sometimes has a greater degree of infection than feces that is discharged at a distance of more than 15 meters from the cage. This is affected because the waste that is thown away closer than the cage will make the chance of worm eggs survive and hatch, so that they can re-contaminate the environment around the cage or feed of the goat. In poor sanitation, especially if feces is not cleaned regularly, can be a source of severe and sustained re-infection.

The location of waste disposal on the provision of worm medicine showed that goats who had never been given worm medicine had a greater degree of infection than goats who were given worm medicine. This is because regular administration of worm medicine to livestock will reduce and cut the life cycle of worms in the body of livestock.

The treatment of parasite medication in feces waste management showed that the management of manure stored in closed sacks has more severe degree of infection than the goat manure that is piled above the ground. This is because the dirt stored in a closed sack will cause the condition to become moist, the moist condition that makes the growth of worms become fast and rapid, making the degree of infection greater. Temperature and moisture are dominant influences on the free-living stages of Haemonchus contortus. The condition of a humid climate is the best condition for the life phase of various digestive tract parasites.

The feeding behavior of the ruminant species is a major factor in the development of parasitism. Goats left to graze themselves are more at risk of being infected with worms than goats in cages. Animal grazed for short period (2-3 weeks) Larval reflect availability. However, in this study goats bred more at risk of being infected with worms. The method of feeding in this study shows that breeders who provide feed from inside the cage had a higher degree of infection than goats that are released to graze in the rice fields. This is because feed goats in paddy fields containing fewer worm larvae than the feed given to goats in cages. Breeder clean their cages once a week and this condition may have a greater degree of worm infections, especially Haemonchus contortus and Strongyloides papillosus worms.

Cleanliness of the cage is a major factor in the degree of gastrointestinal worm infection where cleaning the cage is done every day, feeding in the cage, feces was that been stored in closed sacks, not administering worm medicine, and removing sewage waste less than 15 meters from the cage is an action that lacking in maintaining the cleanliness of the cage, thus showing the high degree of reduced worm infection. Farmers should give worm medicine to goats on a regular basis to reduce the number of gastrointestinal worm infections in goats.

Conclusions

From the results, it can be concluded that maintenance management gave a great influences the degree of parasitic infection in gastrointestinal tract of goats.
Ethical Clearance: The research process involves participants in the survey using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice.

Conflict of Interest: The author reports no conflict of interest of this work.

Source of Funding: This study is done with individual funding.

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Histopathology of Esophagus and Crop of Pigeon (*Columbia livia*) Infected by *Trichomonas gallinae*

Aprilia Eva Widiawati¹, Muchamad Yunus², Thomas V Widijatno²

¹Department of Veterinary Medicine, Faculty of Veterinary, ²Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya

ABSTRACT

**Background:** *Trichomonas gallinae* is a protozoa that causes trichomoniasis which is common found in pigeons and it attacks the digestive tract of pigeons. Proper examination can be done to differentiate from healthy pigeons.

**Purpose:** to observe the changes in histopathological images of the esophagus and the crop of pigeons (*Columba livia*) that infected with *Trichomonas gallinae*.

**Method:** Observations were carried out on 20 pigeons with symptoms of presence *Trichomonas gallinae*. Swab examination in the esophagus with the Natif Test and Giemsa Staining. Esophagus and crop was collected through necropsy in the upper digestive tract. Then histopathological examination was performed with Hematoxylin Eosin (HE) staining. Data was analyzed descriptively.

**Result:** Histopathological features of pigeons (*Columba livia*) infected with *Trichomonas gallinae* were different from healthy pigeons. Pigeons infected with protozoa *Trichomonas gallinae* showed changes of the esophagus in the form of erosion and cell necrosis in stratified non-keratinized epithelium (mucosa) and infiltration of inflammatory cells in the mucosa layer and sub esophageal mucosa. In addition, changes in the crop were cell necrosis in the mucosa layer, infiltration of inflammatory cells in the submucosal layer, and congestion in the sub mucosal cavity.

**Conclusion:** There were histopathological changes in the esophagus and crop of pigeons that infected with *Trichomonas gallinae*.

**Keywords:** Histopathology, Esophagus, Crop, *Trichomonas gallinae*, pigeon.

**Introduction**

Pigeon (*Columba livia*) is one type of fowl with a well known species in the Columbidae family. It is one of the fauna diversity in Indonesia which has a high diversity of phenotypes, both qualitative and quantitative characteristics. Pigeons are also farmed for their meat as a source of animal protein. The problem is poor maintenance management causes pigeons become susceptible to disease. One of parasitic infection that can attack a pigeon is *Trichomonas sp.* *Trichomonas gallinae* is a flagela protozoa that causes trichomoniasis in pigeons. *Trichomonas gallinae* is most commonly found in pigeons and has been reported to infect 67.3% of pigeons species. Trichomoniasis causes high mortality in young pigeons and affect the pigeons mortality with a percentage of 77.5% in one subpopulation. *Trichomonas gallinae* attack the digestive tract of pigeons, mostly found in the oral cavity, pharynx, esophagus, and crop of adult pigeon as carriers of the disease.

*Trichomonas gallinae* infection has a pathognomonic clinical signs. The identification can be done from taking samples of lesion in the mouth both necrotic and fluid lesion. Transmission can occur through milk from parent and child of pigeons, as well as through contaminated food and beverages. This infection can spread between

**Corresponding Author:**
Muchamad Yunus
Faculty of Veterinary Medicine,
Universitas Airlangga,Surabaya
Email: muchammadyunusfkhunair@yahoo.com

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species such as bird and eagle, then considered risk for human health. Species that infect birds and domestic mammals have been identified in human clinical samples. Several phylogenetic analyzes have identified trichomonas derived from animals as taxa of closed relatives of two species of humans. This confirms that efforts to detect disease in pigeons are an important to improve an animal health while distinguishing infected pigeons from healthy pigeons. To reduce the risk of zoonosis more effectively from industrial food animal production, the application of biosecurity must be in harmony with the interest of public health. Surveillance of diseases, as well as in transmission model for poultry and zoonotic diseases are the main things. In addition, the most important is rapid detection and diagnosis.

Observation of symptom is part of the framework of detection and diagnosis. Pigeons infected with T. gallinae will have clinical symptoms namely weight loss, weakness, depression with lesion in the upper gastrointestinal tract. Infection Trichomonas gallinae causes ulceration in the crop, esophagus and proventriculus. Microscopic examination of pigeons infected with Trichomonas gallinae will show an infiltration of heterophil and eosinophil cells in the mucosal layer and submucosal lamina propria. Parasitic infection Trichomonas gallinae can cause infected birds have clinical symptoms that similar to avian fowl pox, deficiency of vitamin A, poultry (fowl diphtheria), capillariasis, candidiasis and aspergillosis, namely the presence of necrotic lesions or lesions in the esophagus. Trichomonas gallinae infection can be established by identification of the T. gallinae parasite in the esophageal swab examination. The method to determine the presence of Trichomonas gallinae is by examining the esophagus swab. Esophageal swab is conducted by the negative method to detect the movement of the parasitic Trichomonas gallina flagella. Giemsa staining is used for morphological identification of Trichomonas gallinae.

In the course of this disease, the difference from other diseases that have similar clinical symptoms can be used as guidelines for management according to the disease found. The information about certain organs changes in pigeon will open up the opportunities for the virus schemespreading. This study aimed to determine the histopathology of the esophagus and crop in pigeons infected with Trichomonas gallinae.

Method

This study was an an observational study. Laboratory examination were conducted at the Parasitology Laboratory, Department of Veterinary Parasitology, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya Indonesia for 20 weeks. The preparation of esophageal and crop histopathological preparations was conducted in the Department of Veterinary Pathology, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya Indonesia. This study used replacement, reduction and refinement. Animals were modified in research procedures in such a way that to reduce pain and stress in experimental animals, and considered to the 5 principles of freedom in animal prosperity.

A total of 20 pigeons (Columba livia), both male and female contributing to the sample with the criteria have clinical symptoms of Trichomonas gallinae infection. The symptoms were depression, weight loss, hair standing like cold and gloomy color, when standing curled up, there were lesions with wet and sticky exudates in the oral cavity, especially in acute diseases and in chronic infections there are hard exudations.

Sample examination was carried out in several stages. The first step was a swab examination in the esophagus through Natif tests and Giemsa staining when the pigeons were still alive. The samples were positive if found Trichomonas parasites, proven by the movement of flagellars from Trichomonas gallinae with a 100-400 times magnification microscope. Pigeons with a lesion in the esophagus were positively infected with Trichomonas gallinae. Esophagus and crop collecting was done through necropsy in the upper digestive tract, then were given formalin 10%. After that making histopathological preparations with Hematoxylin Eosin (HE) staining for microscopic examination. Data of changes in esophagus histopathological histories and crop was analyzed descriptively.

Result

Total of 20 pigeons (Columba livia) with clinical symptoms of Trichomonas gallinae infection were positively infected with Trichomonas gallinae. Histopathological changes in the esophagus and crop will be seen as a decrease in blood flow (congestion), irreversible tissue necrosis, partial loss mucosa (erosion), and cells with a defensive reaction as a
response to injury in the form of a vascular reaction to infection (inflammatory cells). Changes in oral lesions and esophagus swab results that showed infection with Trichomonas gallinae are shown in figure 1.

![Figure 1: Lesions in the oral cavity (A), esophagus infected with Trichomonas gallinae (B).](image)

The result of the esophagus swab examination with the natif method was obtained by the movement of flagella from the parasite Trichomonas gallinae. Protozoan was detected from the motility or movement of flagella and in Giemsa staining will leave a bluish color up to purple. The movement of flagella Trichomonas gallinae was found in all samples of pigeons’ esophagus.

Based on the results of examination and microscopic observations carried out there was a histopathological change in the esophagus of pigeons infected with Trichomonas gallinae. These changes in histopathological features included erosions of cell mucosa necrosis due to Trichomonas gallinae infection. Description of histopathological changes in the esophagus of pigeons (Columba livia) infected with Trichomonas gallinae which has erosion and cell necroses can be seen in figure 2.

![Figure 2: Tropozoite Trichomonas gallinae. A: Independent swab check (400x) without staining. B: Swab checks using Giemsa coloring (1,000x).](image)

Other damage that occurs due to Trichomonas gallinae infection was the infiltration of inflammatory cells in the mucosal and sub mucosal layers of the esophagus of the pigeons which cause thickening of the esophageal mucous layer. Histopathological images of the esophageal layer undergoing inflammatory cell infiltration can be seen in figure 3.

![Figure 3: Hitopathological features fromthe esophagus of naturally infected pigeons Trichomonas gallinae has erosion and necrosis of cells in the mucosa (H.E coloring; 100x magnification (A1 and A2) and 200x magnification (B); Nikon microscope H600L ; camera of DS Fi megapixel). (): Erosion and cell necrosis.](image)
The results of examination and microscopic observation showed there were histopathological feature changes in the crop of pigeons with *Trichomonas gallinae* infection. These changes included cell necrosis in the mucosal layer, infiltration of inflammatory cells in the sub-mucosal layer, and there are tendons in the sub-mucosal layer. Histopathology of cell necrosis in the mucosal lining of the crop of pigeons (*Columba livia*) infected with *Trichomonas gallinae* can be seen in figure 4. Histopathology in the sub-mucosal layer experiencing inflammatory cell infiltration can be seen in figure 5. Congestion in the sub-mucosal layer can be seen in figure 6.

**Figure 4:** Histopathological picture of pigeon esophagus which has inflammatory cell infiltration due to *Trichomonas gallinae* infection (H.E staining; 100x magnification (C1) and 200x magnification (C2); Nikon H600L microscope; Camera DS Fi megapixels).

**Figure 5:** Histopathological features of the crop of pigeons infected with *Trichomonas gallinae*. Visible cell necrosis in the mucosal layer. (H.E coloring; 100x magnification (D1) and 200x magnification (D2); Nikon H600L microscope; camera of DS Fi megapixel).
Discussion

Based on the results of esophagus swab examination of 20 samples of pigeons (Columba livia) suspected of being infected with Trichomonas gallinae by showing clinical symptoms of depression, weight loss, feathers stands like feeling cold and gloomy color, when standing curled up, yellow necrotic lesions were seen in the esophagus and crop, and a greenish liquid in the oral cavity. Histopathological changes were supported by the results of a research report that pigeons infected with Trichomonas gallinae will experience infiltration of inflammatory cells in the mucosal layer and esophagus mucosa. In the crop of pigeons infected with Trichomonas gallinae showed histopathological changes of necrosis in the mucous layer and inflammatory cell infiltration in the sub layer mucosal.

Basically, Trichomonas gallinae infects the upper digestive tract of pigeons. All positive samples of T. gallinae detected by microscopic examination were also detected as positive by the PCR test. Most of the samples
identified negatively by microscopic examination were
detected as positive *T. gallinae* by PCR testing and
confirmed in sequence. Positive samples of *T. gallinae*
collected will provide relevant data for studying the
ecology and genetic structure of the population of
*Trichomonas gallinae* and for disease prevention
and control.\(^1\) The degree of change and virulence of
pathological strains was low to high heterogeneity of
*T. gallinae* causes trichomoniasis.\(^1\) Infiltration
of the trachea and lungs is associated with a severe
inflammatory response to the surrounding tissue.\(^1\)

Cytopathological analysis revealed many pyriform
protozoa, compatible with *Trichomonas gallinae*. Protozoa are not proven histopathologically in lesions
after staining the sample with Hematoxylin and Eosin
staining or Gomori Methenamine Silver (GMS).\(^1\)
Histopathological changes in the esophagus of pigeons
undergoing erosion and necrosis occur in the mucosal
esophagus layer of pigeons. Erosion is the erosion or
partial release of the mucosal epithelium. This occurs
because of a traumatic reaction to *Trichomonas gallinae*
infection.\(^1\) Changing histopathological of crop that
undergoes cell necrosis in the mucosal layer. Changes
in infiltration of inflammatory cells in the sub mucosal
layer of the crop. The severity of lesions that occur as
a result of *Trichomonas gallinae* infection in the upper
digestive tract varies from mild mucosal inflammation to
sub-mucosal inflammation.\(^2\)

However, the virulence of *Trichomonas gallinae*
depends on other factors such as exposure to previous
pathogens (protective immunity) and individual
immunocompetence. Factors such as age, concurrent
disease, genetic heterogeneity, geographical variation,
habitat differences, abundance of means of transmission
and availability of food.\(^3\) In addition, livestock should
pay attention to the management of sanitary cages
and feed to break the chain of distribution. Further
studies regarding the degree of infection in esophageal
histopathological changes and caches infected with
Trichomonas gallinae need to be done as a step towards
better diagnosis.

**Conclusion**

There were histopathological changes in the
esophagus and crop of pigeons with infection of
*Trichomonas gallinae*. 

**Ethical Clearance:** This research has gone through
ethical tests and permits from Faculty of Veterinary
Universitas Airlangga

**Conflict of Interest:** The author reports no conflict of
interest of this work.

**Source of Funding:** This study is done with individual

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The Effectiveness of Back Exercise for the Reduction of Low Back Pain Prevalence on the Emergency Room Nurses

Dinda Nur Fajri Hidayati Bunga1, Harmayetty1, Candra Panji Asmoro1

1Faculty of Nursing, Universitas Airlangga, Mulyorejo Street, Surabaya, East Java, Indonesia

ABSTRACT

Background: Low back pain is a major problem in the musculoskeletal system which affects nearly 84% of adults. Those working for more than 42 hours in a week, including nurses, are at the highest risk of developing low back pain. This research aimed to figure out the effectiveness of back exercise intervention for low back pain on the emergency room nurses.

Method: This research is quasi-experimental research with a control-group pretest-posttest design. This research was conducted on 12 nurses. The respondents were divided into two groups, treatment group and control group, with 6 respondents each. The intervention was measured using McKenzie’s back exercise SOP, general data questionnaires, and the Ovako Work Posture Analysis System (OWAS). The results of the measurements were analyzed using the Wilcoxon Signed Rank Test, while the results of the post-test were analyzed using the Mann-Whitney Test.

Results: The difference in the nurses’ work postures was significant according to the Wilcoxon Signed Rank Test but insignificant according to the Mann-Whitney Test. In the pain measurement, pain frequency was the only factor that yielded a significant value (p < 0.05) in both tests. The risk factors pain scale and pain duration were significant in the Wilcoxon Signed Rank Test but insignificant in the Mann-Whitney Test.

Conclusion: Back exercise intervention for low back pain in nurses is effective in lowering low back pain prevalence by reducing the risk factor pain frequency, especially prior to patient mobilization.

Keyword: low back pain, back exercise, nurse, pain

Introduction

Low back pain is an important health problem from a socioeconomic perspective and is related to high cost and work disability. Sitting has now become the most common posture in today’s workplace. Idea of using motor control learning approach provides the optimal control and coordination of the spine. The McKenzie evaluation was received using repeated movements and sustained positions. Therefore high quality randomized clinical trial was required to compare the effectiveness of these treatments for work related low back pain. Objectives: To compare the effectiveness of motor control exercises and McKenzie exercises in reducing pain and disability in work related low back pain. Method: The study included 40 subjects with work related low back pain due to prolonged sitting. They were randomly allocated into two groups (Group A and Group B. Some 12% of low back pain prevalence occurs in adults, while 40% does in the elderly until the end of their lives. Every year, the world’s LBP prevalence rate stands between 40%–50%. Nine in 10 adults experience back pain at some point in their lives, and 5 in 10 do annually.

The highest risk of low back pain may be faced by those who work for more than 42 hours a week. Nurses work 7- through 8-hours shifts, and the number of hours may increase during night shifts. Of 250 nurses 61% complained low back pain at medium- to high-scale of pain. The prevalence rate of back pain in Hong Kong

Correspondence Author:
Harmayetty
Faculty of Nursing, Universitas Airlangga,
Mulyorejo Street, Surabaya, East Java, Indonesia 60115
Email: harmayetty123@gmail.com
nurses stood at 40.6%. A higher prevalence rate of LBP in nurses was reported in a Turkey-based study to stand between 62% and 88%. In Indonesia, as many as 45.5% of the nurses of a type A hospital in Surabaya complained back pain.

From a preliminary observation at the emergency department of a type B hospital in Surabaya, Indonesia, low back pain was found in 12 of 27 nurses (44.4%). This, according to the Public Satisfaction Survey (SKM), has caused the hospital’s service quality to fall from excellent (A) to good (B). The complaint was experienced by the nurses for two years, yet no mutation took place due to the restriction in the number of nurses.

McKenzie exercises were first introduced by doctor Robin McKenzie in 1981. The technique of these exercises is altering the distorted shape of posterior discs. McKenzie exercises are performed by extension that creates pressure at a certain point in vertebrae, reducing the distance between vertebrae and pressing the disc nucleus or pushing it to its initial position, causing the nucleus to move more easily because the disc shifts forward and eventually removing protrusion in the posterior area and reducing back pain. This research aimed to figure out the effectiveness of back exercise for low back pain in nurses of a hospital in Surabaya, Indonesia.

Method

Design, Sampling, Variables: This research is quasy-experiment research with a control-group pretest-posttest design. The research sample was selected randomly by a non-probability sampling technique named purposive sampling. The sample consisted of 12 emergency nurses of RSU Haji Hospital Surabaya, Indonesia. The respondents were randomly divided into two groups: 1) a group of respondents receiving no back exercise intervention and 2) a group receiving a therapy according to the hospital’s program.

In this research, an observation of 4 dependent variables—work posture, pain frequency, pain duration, and pain scale—was conducted. Measurements were carried out based on McKenzie’s back exercise SOP, general data questionnaires, and Ovako Work Posture Analysis System (OWAS) observation sheet.

Procedure: All procedures in this research were approved by the Health Research Ethics Committee of the Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia with an ethical clearance No. 220-KEPK. In the preparation, letters of permission were sent to a number of institutions, including the type B hospital RSU Haji Surabaya, Indonesia.

All respondent candidates were informed about the benefits, aim, and procedure of the research as well as their rights based on the ethics before the research was conducted. The respondent candidates willing to take part in the research were asked to sign an informed consent. In the first session prior to the research, the respondents were asked to complete low back pain complaint questionnaires then subjected to a matching process aimed to distribute the respondents into two groups equally based on the pre-test results. Together with the emergency department party the researchers made a schedule according to the nurses’ shift hour.

The treatment group performed back exercises twice a week for two weeks for a duration of 30 minutes per session. In every back exercise session, the treatment group was guided by a physiotherapist. Follow-up was undertaken every week to monitor the outcome of the intervention. In the last session, the respondents filled the low back pain complaint questionnaires after given the back exercise procedure. On the same day, the researchers also distributed the questionnaires to the control group who received no intervention in a separate place to prevent data bias between both groups.

Data Analysis: The data were analyzed using the Wilcoxon Signed Rank Test (administered to both treatment and control groups) at a significance level (α) of ≤ 0.05. Hypothesis testing for figuring out the post-test results of the treatment and control groups were undertaken using the Mann-Whitney Test at a significance level (α) of ≤ 0.05.

Results

Based on the interview with the head of the emergency department of RSU Haji Surabaya, it was found that in a 24-hour period, there were approximately 100 visits to the emergency department daily.
Table 1: Demographic characteristics of the respondents

<table>
<thead>
<tr>
<th>No.</th>
<th>Characteristic of the Respondents</th>
<th>f (number) treatment</th>
<th>%</th>
<th>f (number) control</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>1</td>
<td>16.7</td>
<td>4</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>5</td>
<td>83.3</td>
<td>2</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6</td>
<td>100</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>2.</td>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 - ≤ 35</td>
<td>3</td>
<td>16.7</td>
<td>1</td>
<td>16.7</td>
</tr>
<tr>
<td></td>
<td>&gt; 35 - ≤ 45</td>
<td>2</td>
<td>33.3</td>
<td>5</td>
<td>83.3</td>
</tr>
<tr>
<td></td>
<td>&gt; 45 - ≤ 60</td>
<td>1</td>
<td>50</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6</td>
<td>100</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>3.</td>
<td>Time working at the hospital</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;5 years</td>
<td>1</td>
<td>16.7</td>
<td>1</td>
<td>16.7</td>
</tr>
<tr>
<td></td>
<td>5–10 years</td>
<td>2</td>
<td>33.3</td>
<td>2</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>&gt; 10 years</td>
<td>3</td>
<td>50</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6</td>
<td>100</td>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>

After identifying the characteristics of the treatment and control group respondents, the researchers assessed the work posture and pain of the treatment and control groups as outlined below.

Table 2: Results of the work posture assessment of the treatment and control groups before and after back exercise intervention

<table>
<thead>
<tr>
<th>Resp. No.</th>
<th>Treatment Group</th>
<th>Change (Δ)</th>
<th>Control Group</th>
<th>Change (Δ)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OWAS Category</td>
<td>Pre-Test</td>
<td>Post-Test</td>
<td>OWAS Category</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>2</td>
<td>1</td>
<td>-1</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>3</td>
<td>1</td>
<td>-2</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5.</td>
<td>3</td>
<td>2</td>
<td>-1</td>
<td>3</td>
</tr>
<tr>
<td>6.</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Wilcoxon Signed Rank Test p = 0.046 Wilcoxon Signed Rank Test p = 0.157

Description: Wilcoxon Signed Rank Test significant at p < 0.05

The questionnaire responses show that in the working posture pre-test, two of six respondents in the treatment group fell into category 3, namely dangerous and in need of immediate correction. Meanwhile, most respondents in the control group (three people) had no problem with their posture.

In the Wilcoxon Signed Rank Test, the treatment group yielded a p value of 0.046, suggesting that there was a significant difference in the nurses’ work posture between pre-test and post-test. Meanwhile, the control group yielded a p value of 0.157 in the Wilcoxon Signed Rank Test, which suggests that there was a significant difference in the nurses’ work posture between pre-test and post-test. As for the Mann-Whitney analysis results, a p value of 1.000 shows that back exercise was ineffective for the nurses’ work posture correction.
Table 3: Results of Pain Observation before and after Back Exercise Intervention in the Treatment Group

<table>
<thead>
<tr>
<th>Resp. No.</th>
<th>Pain Frequency</th>
<th>Pain Period</th>
<th>Pain Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>1.</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6.</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

\[ p = 0.025 \quad p = 0.317 \quad p = 0.083 \]

Description: Wilcoxon Signed Rank Test significant at \( p < 0.05 \)

From the Wilcoxon Signed Rank Test on the treatment group, a \( p \) value of 0.025 was obtained in the pain frequency category, meaning that there was a significant difference in the pain frequency between pre-test and post-test. No change in the pain frequency value was found in all control group respondents who received no intervention at all \( (p = 0.157) \). The \( p \) value of 0.014 obtained from the Mann-Whitney analysis shows that back exercise was effective in reducing the frequency of pain felt by the nurses.

The Wilcoxon Signed Rank Test results for the treatment group in the pain period category show a \( p \) value of 0.317, meaning that there was no significant difference in the pain period between pre-test and post-test. Two control group respondents experienced a change in category. As for the control group, the \( p \) value obtained from the Wilcoxon Signed Rank Test was 0.317, which means that there was no significant difference in the pain period between pre-test and post-test. Meanwhile, from the Mann-Whitney analysis, a \( p \) value of 0.523 was obtained, meaning that back pain intervention was ineffective in reducing the period of pain felt by the nurses.

From the Wilcoxon Signed Rank Test on the treatment group, a \( p \) value of 0.083 was yielded in the pain scale category, meaning that there was no significant difference in the pain scale between pre-test and post-test. As for the control group, the \( p \) value from the Wilcoxon Signed Rank Test was 0.317, meaning that there was no significant difference in the pain scale between pre-test and post-test as well. A \( p \) value of 0.269 from the Mann-Whitney analysis suggests that back exercise intervention was ineffective in reducing the scale of pain felt by the nurses.

Discussion

Low back pain occurs as a result of muscular strain or spasm, strain of ligaments, degenerative discs, or herniation of nucleus pulposus from the middle section of intervertebalis discs. Ninety-five percent of disc herniation occurs somewhere between the fourth and fifth lumbar regions \((L4–5)\), while the remaining 5% occurs in cervical and thoracic regions. Continuous muscular strain or spasm will induce the breaking down of glycogens into lactic acids. The accumulated lactic acids can irritate muscular nerve fibers and trigger low back pain.

Pain scale may be effectively controlled by exercise therapy (either land- or water-based). A high level of habit may reduce the scale of pain. Back exercises that are performed properly and correctly within a relatively long period will actively increase the muscular strength, hence the name active stabilization. The increased muscular strength will in turn improve the body’s endurance against changes in motion and static and dynamic loading.

Back exercise intervention was also performed in the treatment group with low back pain due to spondylosis lumbalis, which resulted in an increased range of motion. The increase in the range of motion would affect the postures displayed by the nurses during work. Back exercise is highly effective for musculoskeletal strengthening, thereby reducing pain in patients with chronic back and neck pain. Low back pain management principally aims at eliminating pain, returning activity and movement to their normal condition, and preventing relapse.

Back exercise is highly recommended for health lifestyle, longevity, mental health, and management.
of some chronic diseases such as low back pain\textsuperscript{16,17}. After receiving back exercise, nurses will have higher flexibility and endurance in lifting, pushing, or pulling patients when working. The more the nurses improve their muscular strength and grow used to perform the movements appropriate for spinal mechanics, the better they will endure the pain.

**Conclusion**

The dominant factor that influences low back pain is the posture of the nurses. Back exercise is effective for reducing low back pain prevalence by reducing pain frequency, as is the case in the pain frequency reduction in nurses who work at hospitals. After receiving back exercise intervention, nurses will have higher flexibility and endurance in lifting, pushing, or pulling patients when working.

**Ethical Clearance:** This study has obtained the feasibility of ethical review in the Health Research Ethics Commission of the Faculty of Nursing, Airlangga University, Surabaya, Indonesia with No. 220-KEPK.

**Conflict of Interest:** The author reports no conflict of interest of this work.

**Source of Funding:** This study is done with individual funding.

**REFERENCES**


The Effect of Breeding Management on the Prevalence and Trematode Infection Degree in Calves

Haris Setiawan¹, Kusnoto¹, Mas’ud Hariadi¹
¹Department of Veterinary Education, Faculty of Veterinary, Universitas Airlangga, Jl. Mulyorejo, Surabaya, East Java

ABSTRACT

Background: Poor management in farms can have a negative effect on livestock. The low hygiene of animal feed is one-factor causing various kinds of parasitic agents which can infect livestock.

Objective: Examining the effect of breeding management on the prevalence and degree of Trematode worm infection in calves.

Method: The samples of this study were 49 calves aged less than 205 days which were randomly selected; 5-7 grams of fresh fecal samples were taken directly from the rectum rectally and put in a plastic pot containing 10% formalin. Sample examination was carried out by sedimentation method and buoyancy method.

Results: It was found that 12 samples contained Trematode worms. There are several types of worm eggs, including Fasciola spp., and Paramphistomum spp. Calculation of Worm Eggs per Gram of Stool in 12 positive samples showed a single infection of Fasciola spp. on an average of 0-460 worm eggs per gram of stool, a single infection of Paramphistomum spp. on an average of 0-100 worm eggs per gram of stool, and mixed Fasciola spp. and Paramphistomum spp. infection on an average of 0-700 worm eggs per gram of stool. The livestock breeding system which is widely applied is caging. The prevalence of Trematodes in calves was 24.4%, and the average degree of infection was mild, between 1-499 eggs per gram of stool.

Conclusion: The prevalence and degree of infection of Trematode worms are influenced by breeding management applied by farmers.

Keywords: Breeding management, Trematode, Calves, Prevalence, Infection degree

Introduction

Parasites affect not only the health of livestock but also the productive and reproductive performance. Livestock infected with Trematode worms will experience physical changes; the body becomes very thin, resulting in low market value in the market. Calves aged 3 to 12 months are more susceptible to infection with various types of worms such as Nematodes, Trematodes and Cestoda compared to cows. One type of parasites which often infects calves is Trematode worms. Trematodes in the digestive tract is a problem for livestock managers, especially in dairy cattle. Trematode worms commonly infect livestock with low health and immunity. Infection in livestock with a shepherd breeding system occurs passively because the livestock drinks water or eat feed which has been infected by Trematode Metacercariae.

Diagnosis of the possibility of worm infection can be done by looking at the clinical symptoms identified in livestock, such as anorexia, anemia, diarrhea, dirty and gloomy hair, decreased body weight and stunted livestock growth. When a worm infection is found in livestock, the most common drug given to animals is Anthelmintics. Anthelmintics are a group of drugs used to expel worm parasites in the digestive tract and in other body tissues such as the liver, lungs, skin, and blood.
Livestock management is a factor that influences the prevalence of worm infections \(^9\). The breeding system is also one of the causes of parasitic infections \(^10\). Based on the above explanation, the purpose of this study was to determine the effect of breeding management on the prevalence and degree of Trematode worm infection in calves. The hypothesis of this study is that good livestock management results in the low prevalence and degree of Trematode worm infection in calves.

**Method**

This research was conducted at a dairy farm located in Malang Regency, East Java Province. The samples in this study were 49 calves Holstein breeders who were less than 205 days old \(^11\). The first phase of the research is taken the stools from the samples. The stool is freshly released fresh feces or taken directly from the rectum rectally with the amount 5-7 grams. The stools put in a plastic pot containing 10% formalin solution as a preservative. Each plastic pot was given a label indicating the number, origin, owner, information about the calf, and data management applied. The collected stools were examined at the Helminthology Laboratory of the Faculty of Veterinary Medicine, Universitas Airlangga.

Sample examination was carried out by two methods, sedimentation method and buoyancy method. In the sedimentation method, the stools were inserted into a centrifuge tube, added with distilled water with a ratio of 1:10, then filtered and centrifuged for 2-5 minutes at a speed of 1500 rpm. After being centrifuged, the supernatant at the top was removed and few deposits were left. Distilled water was added to the remaining sediment and centrifuged for 2-5 minutes until the supernatant looked clear. After it was clear, the supernatant was removed and the remaining filtrate was left. The sediment then taken with a Pasteur pipette and dropped on an *object glass* and covered with a glass cover. It was then examined with a microscope with a magnification of 100 times.

Examination of the samples using the floating method is similar to the sedimentation method, except that the buoyant method results in clear deposits of the supernatant being replaced with float substances. In this study, the float substance used was sucrose solution. The floating agent was added to 1 cm from the upper part of the tube. The results of the mixture were stirred and then centrifuged for 3-5 minutes at a speed of 1500 rpm. The floating agent was gradually added to the solution with Pasteur pipette until the surface looked convex. The glass cover was taken and placed on an object glass. It was then examined in a microscope with a magnification of 100 times.

The stools positively infected by Trematode worms were then calculated by the Worm Per Gram Stool Egg using the Lucient Brumpt method to determine the degree of infection. The stools were weighed \(\pm\) 1 gram and mixed with water. Dilution suspension was made 10 times and filtered. One drop of suspension was taken from the result. It was placed on an object glass and examined using a microscope with a magnification of 100 times. The examination result then analyzed using the prevalence formula to determine the prevalence percentage of Trematode. Data obtained from the questionnaire analyzed using the Classification and Regression Tree. Data from the calculation of Worm Per Gram Stool Eggs analyzed using Correspondence test.

**Results**

The results of laboratory tests indicated that 12 samples contained worm eggs, including *Fasciola* spp., and *Paramphistomum* spp. The types of eggs from Trematode class were *Fasciola* spp. and *Paramphistomum* spp. From a single infection in calves, 8 samples contained *Fasciola* spp. and 1 sample contained *Paramphistomum* spp. eggs. For the mixed infection, 3 samples contained *Fasciola* spp. and *Paramphistomum* spp. eggs. The identification of worm eggs was conducted by observing the worm morphology. The measurement of the eggs was done using *Optilab Imageraster* software. Sample examination using the sedimentation method revealed that *Fasciola* spp eggs had a shape of an ovoid with an operculum at one end of the egg. The egg size ranged from 162.76µm x 78.64µm. The number of *Paramphistomum* spp. eggs found in the samples using the sedimentation method was 4, where 1 sample was a single infection and 3 were a mixed infection. The wall was clear and the egg size ranged from 143.76µm x 75.02µm.
From the calculation of the Worm Eggs per Gram Stool of the 12 samples, detailed data of the degree of infection based on worm species were obtained. Single infection of Fasciola spp. was on average 0-460 worm eggs per gram of stool, a single infection of Paramphistomum spp. was on average 0-100 worm eggs per gram of stool and mixed infection of Fasciola spp. and Paramphistomum spp. was on average 0-700 worm eggs per gram of stool.

**Table 1: Degree of Trematode Infection in Calves**

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Types of Worm Eggs</th>
<th>TCPGT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Fasciola spp. dan Paramphistomum spp.</td>
<td>400</td>
</tr>
<tr>
<td>3</td>
<td>Fasciola spp.</td>
<td>90</td>
</tr>
<tr>
<td>8</td>
<td>Fasciola spp.</td>
<td>400</td>
</tr>
<tr>
<td>10</td>
<td>Paramphistomum spp.</td>
<td>100</td>
</tr>
<tr>
<td>17</td>
<td>Fasciola spp.</td>
<td>300</td>
</tr>
<tr>
<td>18</td>
<td>Fasciola spp.</td>
<td>840</td>
</tr>
<tr>
<td>19</td>
<td>Fasciola spp.</td>
<td>450</td>
</tr>
<tr>
<td>21</td>
<td>Fasciola spp. dan Paramphistomum spp.</td>
<td>500</td>
</tr>
<tr>
<td>24</td>
<td>Fasciola spp.</td>
<td>600</td>
</tr>
<tr>
<td>47</td>
<td>Fasciola spp. dan Paramphistomum spp.</td>
<td>1200</td>
</tr>
<tr>
<td>48</td>
<td>Fasciola spp.</td>
<td>700</td>
</tr>
<tr>
<td>49</td>
<td>Fasciola spp.</td>
<td>300</td>
</tr>
</tbody>
</table>

**Table 2: Management Aspects of Holstein Friesian Breeding**

<table>
<thead>
<tr>
<th>Livestock Management</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>The feed given every day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-grown grass</td>
<td>21</td>
<td>42.9</td>
</tr>
<tr>
<td>Wild grass</td>
<td>11</td>
<td>22.4</td>
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<tr>
<td>Self-grown and wild grass</td>
<td>17</td>
<td>34.7</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>100</td>
</tr>
<tr>
<td>Origin of feed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetland</td>
<td>8</td>
<td>16.3</td>
</tr>
<tr>
<td>Dryland</td>
<td>32</td>
<td>65.3</td>
</tr>
<tr>
<td>Wetland and dry land</td>
<td>9</td>
<td>18.4</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>100</td>
</tr>
<tr>
<td>Livestock breeding system</td>
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<tr>
<td>Caged</td>
<td>35</td>
<td>71.4</td>
</tr>
<tr>
<td>Pastured</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Caged and pastured</td>
<td>14</td>
<td>28.6</td>
</tr>
<tr>
<td>Total</td>
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<td>100</td>
</tr>
<tr>
<td>Livestock treatment record</td>
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<tr>
<td>Receiving medication against worms</td>
<td>38</td>
<td>77.6</td>
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<tr>
<td>Never receiving medication against worms</td>
<td>11</td>
<td>22.4</td>
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<tr>
<td>Total</td>
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<tr>
<td>Livestock housing conditions</td>
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<tr>
<td>Clean</td>
<td>16</td>
<td>32.7</td>
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<tr>
<td>Moderate</td>
<td>22</td>
<td>44.9</td>
</tr>
<tr>
<td>Dirty</td>
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<td>22.4</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>100</td>
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### Table 3: Trematodes Prevalence Data based on Calf Breeding Management

<table>
<thead>
<tr>
<th></th>
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<td>Self-grown grass</td>
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<td>Wild grass</td>
<td>6</td>
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<td>Self-grown and wild grass</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4.10%</td>
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<tr>
<td><strong>Prevalence</strong></td>
<td><strong>16.30%</strong></td>
<td><strong>2%</strong></td>
<td><strong>6.10%</strong></td>
<td><strong>24.40%</strong></td>
</tr>
<tr>
<td>Origin of feed</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Wetland</td>
<td>5</td>
<td>0</td>
<td>3</td>
<td>16.30%</td>
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<tr>
<td>Dryland</td>
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<td>0</td>
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<tr>
<td>Wetland and dry land</td>
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<td>0</td>
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<tr>
<td><strong>Prevalence</strong></td>
<td><strong>16.30%</strong></td>
<td><strong>2%</strong></td>
<td><strong>6.10%</strong></td>
<td><strong>24.40%</strong></td>
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<tr>
<td>Livestock breeding system</td>
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<td>0</td>
<td>2%</td>
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<tr>
<td>Semi-intensive</td>
<td>7</td>
<td>1</td>
<td>3</td>
<td>22.40%</td>
</tr>
<tr>
<td><strong>Prevalence</strong></td>
<td><strong>16.30%</strong></td>
<td><strong>2%</strong></td>
<td><strong>6.10%</strong></td>
<td><strong>24.40%</strong></td>
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<td>Recording of medication</td>
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<td>Having received medication</td>
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<td>0</td>
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<tr>
<td>Never receiving medication</td>
<td>7</td>
<td>1</td>
<td>3</td>
<td>22.40%</td>
</tr>
<tr>
<td><strong>Prevalence</strong></td>
<td><strong>16.30%</strong></td>
<td><strong>2%</strong></td>
<td><strong>6.10%</strong></td>
<td><strong>24.40%</strong></td>
</tr>
<tr>
<td>Condition of housing</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Clean</td>
<td>0</td>
<td>0</td>
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<td>0</td>
</tr>
<tr>
<td>Moderate</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2%</td>
</tr>
<tr>
<td>Dirty</td>
<td>7</td>
<td>1</td>
<td>3</td>
<td>22.40%</td>
</tr>
<tr>
<td><strong>Prevalence</strong></td>
<td><strong>16.30%</strong></td>
<td><strong>2%</strong></td>
<td><strong>6.10%</strong></td>
<td><strong>24.40%</strong></td>
</tr>
</tbody>
</table>

Based on the livestock breeding system, the prevalence of Trematodosis was 2% for livestock intensively bred and 22.4% for those semi-intensively bred. In terms of medication against trematodes, calves receiving helminthiasis medication were 2% and those never receiving the medication were 22.4%. Based on the condition of housing, clean housing was 0%, housing in a moderately clean condition was 2%, and dirty housing was 22.4%.

Based on the value (p<0.01), the data are significantly different. Samples infected by trematodes were 75.5%; infected by *Fasciola* spp. were 16.3%; those infected by *Paramphistomum* spp. were 2.0%; and samples infected by both *Fasciola* spp. and *Paramphistomum* spp. were 6.1%. The prevalence of Trematodes infection was affected by the medication given to the calves. The prevalence of *Fasciola* spp. infection in calves which never received anthelmintic medication was 63.6%; the prevalence of *Paramphistomum* spp. infection was 9.1%; and the prevalence of mixed infection of *Fasciola* spp. and *Paramphistomum* spp. was 27.3%. On the other hand, the prevalence of *Fasciola* spp. in calves which had received anthelmintic medication was 2.6%. The types of Trematodes in calves which had received anthelmintic medication are affected by the breeding system. There was no Trematode infection in calves bred intensively or caged, while *Fasciola* spp.infection of 25% was found in calves bred semi-intensively. The results of a correspondence test on the relationship between the type of worm and infection degree indicate light infection due to *Fasciola* spp. *Paramphistomum* spp. infection also resulted in light infection degree, while mixed infection of *Fasciola* spp. and *Paramphistomum* spp. resulted in a moderate infection degree.
Discussion

The results of the laboratory tests show that two species of Trematode class were identified: Fasciola spp. and Paramphistomum spp. Most of the farmers had their own farming for growing grass. Some farmers obtained feed from dry land. If the grasses taken are still wet, the farmers will wither the grasses. This treatment is applied to avoid bloating or tympanic cases in livestock and also reduce the chance of livestock being infected by metacercaria.

The feed from wetlands or rice fields might result in higher Trematode infection due to the influence of the hosts which are likely to appear in runny areas because the hosts need water. The prevalence of Trematode in calves which never receive anthelmintic medicine was 22.4%. Meanwhile, the prevalence of Trematode in calves which have received medicine against helminthiasis was 2%. The cleanliness of housing has an effect on the prevalence of Trematode. The highest prevalence was found in dirty housings, which was 22.4%. In moderately clean housings, the prevalence was 2%. There was a mixed infection in the positive samples. The mixed infection from the whole samples was 6.1%. Based on the data, the prevalence of Trematode worms was 24.4%. The prevalence of Trematode varies in different areas. This is due to geographical conditions affecting the presence of snails as the host in the environment. As farming is at an altitude of ± 1,100 meters above the sea level, the rainfall in the area is relatively high. The geographical condition is not suitable for the host of Trematodes, which is the freshwater gastropods [12]. Most freshwater gastropods live in shallow waters with the slow current so that the risk of Trematode infection will be lower in environments which do not support the life of gastropods [13].

This is related to the habitat of the host which tend to be runny areas as the host needs water for living [14]. Calves that have never received Anthelmintic medication have Fasciola spp. prevalence of 63.6%; Paramphistomum spp. of 9.1%; and mixed infection of Fasciola spp. and Paramphistomum spp. of 27.3%. These numbers are greater compared to the figures obtained from calves that have received anthelmintic medicine. The Fasciola spp infection was 2.6%; the number for Paramphistomum spp. infection, and mixed infection of Fasciola spp. and Paramphistomum was 0%. The administration of Anthelmintic is considered effective for eliminating Trematodes, but its effectiveness is influenced by the accuracy of the dose, the Anthelmintic spectrum, and the method of administration [15]. Calves that are bred semi-intensively and those grazed have Fasciola spp worm infection of 25%. This is different from calves that are bred intensively. There was no Trematode infection found. Calves that received Anthelmintic medication but are bred extensively or semi-intensively could be infected by Trematodes. From the results of the correspondence analysis, the relationship between the types of worms and the degree of infection were obtained. A mild infection is often caused by Fasciola spp., followed by infection due to Paramphistomum spp., which also results in mild infection. Meanwhile, mixed infections of Fasciola spp. and Paramphistomum spp. cause moderate infection. Infection of the Fasciola spp. is closer to mild infection compared to that of the Paramphistomum spp. because the host of Fasciola spp., the Lymnea rubiginosa species, can easily be found in the field.

Conclusions

The prevalence and infection degree of Trematode infecting calves are influenced by the breeding management implemented by farmers, especially the administration of Anthelmintic medication and breeding system. No Trematode infections were found in calves receiving Anthelmintic medication and bred with the intensive breeding system.

Ethical Clearance: This research is in accordance with ethical clearance, has not been published before and is not being considered for publication elsewhere.

Conflict of Interest: There is no conflict of interest in this study.

Source of Funding: This research was carried out by a team and funded independently.

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The Effectiveness of *Cynodon dactylon* Leaf Extract as Hepatoprotector in Liver Damage of Hyperglycemic *Mus musculus*

Ade Mahendra Putra¹, Retno Sri Wahjuni¹, Rahaju Ernawati¹

¹Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia

**ABSTRACT**

**Background:** The number of people with diabetes rises every day. Its treatment commonly causes significant side effects that can even cause damage to body organs, including liver. Herbal medicine development is currently carried out widely as in the *Cynodon dactylon* plant. *C. dactylon* plant contains antioxidant compounds and hepatoprotective effects.

**Purpose:** The study aims to investigate hepatoprotective effect of *C. dactylon* leaf extract on liver histopathological changes of hyperglycemic *Mus musculus* and to investigate how much the dose of *C. dactylon* extract is most effective in protecting the liver.

**Method:** Experimental animals, *M. musculus*, were set up in hyperglycemic condition by administrating 10% glucose with a dose of 2,000 mg/kg of body weight (bw), and administrating extract of *C. dactylon* leaves with the doses of 250 mg/kg bw; 500 mg/kg bw; 750 mg/kg bw; and 1,000 mg/kg bw. Then, observation on the results of *M. musculus* liver histopathology was conducted by a scoring method. Afterward, a statistical test was performed.

**Result:** The most optimal hepatoprotective effect of *C. dactylon* extract was at the lowest administration dose of 250 mg/kg bw. This finding was evident from lowest scores for degeneration damage at 6.50 ± 0.00; necrosis damage at 6.00 ± 0.57; and inflammation rate at 7.13 ± 0.50.

**Conclusion:** Extract of *C. dactylon* leaves has a hepatoprotective effect on the liver histopathological changes of hyperglycemic *M. musculus*.

**Keywords:** hepatoprotective effect, *C. dactylon* leaf extract, liver, hyperglycemia

**Introduction**

In 2015, 415 million adults had diabetes. This figure was a 4-fold increase from 108 million people suffered from diabetes in 1980. In 2013, one of the biggest burdens of the global health expenditure was diabetes, reaching approximately 612 billion dollars ¹. Sixty percent of diabetics are type 2 diabetics in which insulin is incapable of carrying out its task of reducing blood glucose. This condition is commonly referred to as insulin resistance. The cost spent on diabetes treatment is very expensive. The total health budget spent to deal with diabetes was US$ 147 billion for 25.8 million people affected by diabetes ².

Hyperglycemia can deteriorate all organs, including liver. Liver can bind chemicals that enter the body. Liver cells are the main tissue that becomes target of increasing concentration of free radicals. It occurs because liver is organ where xenobiotic metabolism induces death of liver cells ³. Liver also has a central role in metabolism of toxic substances in the body ⁴. Up to the present, people with diabetes require lifelong therapy with various side effects. The application of herbal medicine as an alternative is currently being encouraged as it has natural compounds with fewer side effects as a good alternative⁵. *C. dactylon* contains 12.4% essential oils of triticin,
glycoside, saponin, tannin, flavonoid, and carbohydrate. The contained saponin, tannin, and flavonoid in other herbal plants, so far, are believed to be able to overcome diabetes cases affordably and naturally.

Based on these facts, this study was conducted to investigate the hepatoprotective effect of *C. dactylon* leaf extract on liver histopathological changes of hyperglycemic *M. musculus*. This study is also expected to be able to determine the optimal dose of *C. dactylon* leaf extract to reduce the impacts of liver tissue damage of hyperglycemic *M. Musculus*.

### Materials and Method

This research was conducted in October 2015 at the Laboratory of the Faculty of Veterinary Medicine, Universitas Airlangga.

**Instruments and Materials:** The instruments in this study included 6-7 wire-covered plastic tubs, rat feed, and drink, microtome, cage, paraffin block casts, tweezers, light microscope, 20 G needles, hot plate, digital scales, rat feeding tubes, Easy Touch® digital glucometer, tuberculin syringes, Soxhlet extractor, syringe, freeze drying extract dryer, surgical scissors, tweezers, blade, and scalpel.

The materials in this study were 2-3 months old BALB-C strain mice (*Mus musculus*), weighing 20-30 grams, mice feed, mice drinking water, Bermuda grass (*Cynodon dactylon*), 10% glucose, 70% alcohol, 96% ethanol, Hematoxylin-eosin (HE) stain, generic metformin from Kimia Farma®, tween 80, aquades, label paper, object glass, glass cover, and formalin buffer.

**Work Procedures:** This study used twenty four *M. Musculus* animals to be treated for 22 days. They were classified into 6 groups, i.e., hyperglycemic control group without therapy; hyperglycemic control group with metformin therapy; treatment groups with *Cynodon dactylon* extract therapy with the doses of 250 mg/kg bw, 500 mg/kg bw, 750 mg/kg bw, and 1,000 mg/kg bw. Environmental adaptation process took the first seven days. Then, from 8th until 22nd day, the treatment process was conducted. Research animals were administered with 10% glucose on the 8th day to the 22nd day at a dose of 2,000 mg/kg to obtain hyperglycemic conditions. P1 to P5 treatment groups were administered with 10% glucose treatment with a dose of 2,000 mg/kg bw from 8th day to 22nd day.

However, on 13th to 22nd day, the glucose infusion was carried out 60 minutes after the present of metformin therapy or *C. dactylon* leaf extract with different doses. The treatment group 1 (P1) used metformin therapy amounting to 65 mg/kg bw. P2 used *C. dactylon* extract therapy at a dose of 250 mg/kg bw. P3 used *C. dactylon* extract therapy at a dose of 500 mg/kg bw. P4 used *C. dactylon* extract therapy at a dose of 750 mg/kg bw. Last, P5 used *C. dactylon* extract therapy at a dose of 1,000 mg/kg bw.

Preparation of *C. dactylon* leaf extract employed a solid-liquid extraction method with decocta water solvent. The extract obtained was then diffraction to separate non-polysaccharide fraction by adding ethanol until the precipitation stopped and then filtered to separate the polysaccharide and non-polysaccharide components. Filtrate that was extracted from the results of filtration was a non-polysaccharide fraction evaporated with a Rotary evaporator to vaporize ethanol and aquades solvents until a thick extract was obtained. Thick extract was dried through a freeze-drying method so that it became powder extract.

Measurements of *M. musculus* sugar levels utilized the Easy Touch® digital glucometer after the animals were put to fasting conditions for 6-8 hours. Measurements were carried out on 7th, 10th, 12th, 19th, and 22nd days. Preparation of hepatic histopathology of *M. musculus* was carried out through euthanasia of cervical dislocation. *M. musculus* livers were placed in a pot containing 10% formalin buffer fixation solution. Histopathology was made by Hematoxylin-Eosin (HE) staining. Histopathological examination was carried out by using a microscope at 400x and 1,000x magnifications.

Scoring of liver histopathology changes that occurred in each visual field was carried out by using the scoring method. The degree of damage of each sample was determined by summing up all determined histopathological lesions. In scoring method assessment, there were three forms of observed lesions, i.e., degeneration and focal necrosis, perportal and bridging necrosis, and last inflammatory cell infiltration (inflammation).

**Data Analysis:** The data obtained from scoring results of hepatic histopathology were analyzed with Kruskal-Wallis test and if there were significant differences among treatment groups (p < 0.05), Mann-Whitney test would be applied.
Result

Hepatic cell histopathology changes of hyperglycemic *M. musculus* occurred in the form of degeneration, necrosis, and inflammation. Scoring results of hepatic histopathology were analyzed with the Kruskal-Wallis test and then analyzed with the Mann-Whitney test. The results of analysis can be observed in Table 1.

Table 1: The mean and standard deviation scores of degeneration, necrosis, and liver inflammation of *M. musculus* for each treatment.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Degeneration Mean ± SD</th>
<th>Necrosis Mean ± SD</th>
<th>Inflammation Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0</td>
<td>17.50^b ± 0.00</td>
<td>20.50^b ± 0.00</td>
<td>21.88^c ± 0.50</td>
</tr>
<tr>
<td>P1</td>
<td>10.75^a/b ± 1.41</td>
<td>20.50^b ± 0.00</td>
<td>9.00^a ± 0.00</td>
</tr>
<tr>
<td>P2</td>
<td>6.50^a ± 0.00</td>
<td>6.00^b ± 0.57</td>
<td>7.13^a ± 0.50</td>
</tr>
<tr>
<td>P3</td>
<td>10.75^a/b ± 1.41</td>
<td>8.00^a ± 0.50</td>
<td>7.13^a ± 0.50</td>
</tr>
<tr>
<td>P4</td>
<td>12.00^a/b ± 0.57</td>
<td>10.00^a ± 0.00</td>
<td>13.75^a/b ± 1.15</td>
</tr>
<tr>
<td>P5</td>
<td>17.50^b ± 0.00</td>
<td>20.50^b ± 0.00</td>
<td>16.13^b ± 1.00</td>
</tr>
</tbody>
</table>

Note: P0 = control, P1 = metformin at a dose of 65 mg/kg bw, P2 = *C. dactylon* extract at a dose of 250 mg/kg bw, P3 = *C. dactylon* extract at a dose of 500 mg/kg bw, P4 = *C. dactylon* extract at a dose of 750 mg/kg bw, P5 = *C. dactylon* extract at a dose of 1,000 mg/kg bw. Letter notations stated significant differences (p < 0.05) among each treatment. Same-letter notation means that the difference was not significantly different. Different letter notations mean that the results were significantly different.

Based on Table 1, test results were significantly different (p <0.05) in all treatments. The lowest score of degeneration damage was in P2, reaching 6.50 ± 0.00. Highest score result was in P0 and P5 amounting to 17.50 ± 0.00 and 17.50 ± 0.00 respectively. Lowest score of necrosis damage was in P2, reaching 6.00 ± 0.5.

Highest scores of inflammation damage were in P0 and P5, reaching 20.50 ± 0.00 and 20.50 ± 0.00 respectively. Lowest score was in P2, reaching 7.13 ± 0.50. Highest score was found in P0 with 21.88 ± 0.50. Thus, administering *C. dactylon* extract at the dose of 250 mg/kg bw resulted in best hepatoprotective effect. Qualitative hepatoprotective effects of *C. dactylon* leave extract can be observed in liver histopathology of *M. musculus* in every treatment.
Based on Figure 1, the liver cells seemed to experience degeneration, necrosis, and inflammatory lesions in P0, which was the most severe inflammatory lesion among the other treatment groups. The histopathological descriptions in the P1 shows liver cells experienced degeneration, necrosis, and inflammation but not as severe as in P0 group.

The P2 treatment group with C. dactylon extract therapy was the treatment with the lowest score in the quantitative test. However, there was still degeneration, necrosis, and inflammation damages in a lower intensity. The P3 treatment group suggested that the damages in the livers of M. musculus were similar to the P1 treatment group. The P4 suggested increased damage compared to P1. The liver histopathology of P5 treatment group suggested severe damage comparable to the liver hyperglycemic of P0 group.

The blood sugar examination levels also suggested an influence on each treatment administered by C. dactylon extract. The sugar content can be observed in Table 2.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean ± SD</th>
<th>7th day</th>
<th>10th day</th>
<th>12th day</th>
<th>19th day</th>
<th>22nd day</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0</td>
<td></td>
<td>60.00 ± 12.19</td>
<td>108.25 ± 16.33</td>
<td>144.25 ± 20.69</td>
<td>139.50 ± 32.74</td>
<td>185.00 ± 32.74</td>
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<tr>
<td>P1</td>
<td></td>
<td>91.50 ± 6.55</td>
<td>133.25 ± 30.80</td>
<td>102.50 ± 10.75</td>
<td>120.00 ± 34.72</td>
<td>113.25 ± 25.68</td>
</tr>
<tr>
<td>P2</td>
<td></td>
<td>70.75 ± 14.99</td>
<td>136.75 ± 22.80</td>
<td>119.50 ± 26.21</td>
<td>75.50 ± 19.97</td>
<td>93.75 ± 12.68</td>
</tr>
<tr>
<td>P3</td>
<td></td>
<td>76.00 ± 20.11</td>
<td>145.00 ± 26.91</td>
<td>114.50 ± 11.81</td>
<td>128.75 ± 34.63</td>
<td>110.00 ± 36.79</td>
</tr>
<tr>
<td>P4</td>
<td></td>
<td>75.75 ± 3.50</td>
<td>134.25 ± 6.75</td>
<td>123.75 ± 33.64</td>
<td>133.75 ± 33.43</td>
<td>120.50 ± 23.10</td>
</tr>
<tr>
<td>P5</td>
<td></td>
<td>81.25 ± 7.67</td>
<td>124.50 ± 22.39</td>
<td>140.00 ± 17.10</td>
<td>130.25 ± 11.84</td>
<td>140.00 ± 9.05</td>
</tr>
</tbody>
</table>

Note: P0 = control variable, P1 = metformin at a dose of 65 mg/kg bw, P2 = C. dactylon leaf extract at a dose of 250 mg/kg bw, P3 = C. dactylon extract at a dose of 500 mg/kg bw, P4 = C. Dactylon leaf extract at a dose of 750 mg/kg bw, P5 = C. dactylon extract at a dose of 1000 mg/kg bw.

Based on Table 2, it was suggested that the general M. musculus’s normal blood sugar content on the 7th day was normal at less than 100 mg/dL. On the 10th day after 10%, glucose was administered for three days, all M. musculus’s sugar levels increased at more than 100 mg/dL, meaning that M. musculus had reached hyperglycemia conditions. On the 19th day, after the treatment with metformin therapy or C. dactylon leaf extract was administered, the P2 treatment group suggested a drastically decreasing sugar level. On the last treatment day, the 22nd day, only in P2 treatment did the sugar level decreased to less than 100 mg/dL.
Discussion

The lowest liver histopathological degeneration score was in P2, which was significantly different from the control group (P0) and P5 treatment group with C. dactylon leaf extract administration at the high dose of 1,000 mg/kg bw. Many liver cells that experienced degeneration could not maintain its balance so that the damaged cells were irreversible. The prolonged disturbances could result in the initial reversible injury at first. Then, it reached the point of no return phase, and it became irreversible where the cells could not recover and experienced death, known as necrosis. The dead cell nucleus looks smaller and the chromatin, and reticular fibers multiply, the nucleus becomes denser, and then the cells become eosinophilic (karyolysis) 12.

The P2 treatment group reached the lowest histopathological necrosis score, and its value was insignificantly different from P3 and P4 because the antioxidant composition in C. dactylon was capable of protecting liver cells. One of the hepatoprotectors that improves liver function is the antioxidant activity of C. dactylon was capable against hyperglycemic mice’s liver. The highest hepatoprotective plant compounds, including flavonoids, can protect the liver cells and repair the damaged liver tissue 13. P5 and P0 groups were significantly different from the other treatments because both of them regulated the level of severe damage. P5 group had the highest dose of C. dactylon leaf extract. It could be analogized with the optimal dose of drug consumption. The dosage curve and effect had the sigmoid-shaped, so if the administered dose were more than the maximum limit, it would decrease the drug function 14. This fact was similar to C. dactylon dosage, where if the dosage were more than it should be, it would reduce the hepatoprotective effect.

According to the histopathology score, the lowest degeneration score and necrosis score were experienced by the P2 group. The hepatoprotective plant compounds, including flavonoids, can protect the liver cells and repair the damaged liver tissue 15. Quercetin contained in flavonoid extract of C. dactylon leaves is predicted to be capable of preventing liver damage through its activity in suppressing TNF-α production as a hepatotoxic mediator and increasing the production of IL-10 as a hepatoprotective mediator. Thus, TNF-α activity can reduce the spurring of inflammation or damage to the liver tissue. The increasing production of IL-10 by quercetin can prevent the liver from being damaged due to glucose induction 16.

The lowest liver histopathological inflammatory scores in P2 and P3 groups were not significantly different from the P1 group as the standard drug treatment method for metformin. Phenolic compounds, such as flavonoids, have free radical scavenger antioxidant activity 17. In this study, the highest inflammatory score was experienced in P0 group. This situation caused oxidative stress and increased the levels of Reactive Oxygen Species (ROS), which lead to insulin resistance. The hyperglycemia pathogenic effects were mediated to a significant degree by increasing the production of ROS. Oxidative damage could lead to lipid destruction or even hardening, which is the composer of all cell membranes. The destructing or hardening cells occurs due to lipid peroxidation. It causes cell death or the cells inability to get nutrients or the inability to communicate with other cells properly 18.

Low dosage of C. dactylon leaf extract at a dose of 250 mg/kg bw was capable of obtaining a hepatoprotective effect and was capable of reducing blood sugar levels to its normal values. The blood glucose levels in the mice are classified as hyperglycemic if the mice’s blood glucose levels exceed 125 mg/dL after setting up in fasting conditions for 6-8 hours. In fasting condition, the mice’s normal blood glucose levels range from 50-125 mg/dL 19.

Conclusion

C. dactylon leaf extract has the potential to be a hepatoprotector against hyperglycemic mice’s liver. The effective dosage of C. dactylon as a hepatoprotector is at a dose of 250 mg/kg bw.

Further research is required to investigate the effect of administering C. dactylon leaf extract towards the levels of ROS (Reactive Oxygen Species) and other organs in the hyperglycemic M. musculus.

Ethical Clearance: The research process was using experimental method that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice for animal.

Conflict of Interest: The author reports no conflict of interest of this work.

Source of Funding: This study is done with individual funding.
REFERENCES


The Relationship between the Forms of Social Interactions and the Life Quality of the Elderly

Muthmainnah¹, Elida Ulfiana¹, Setho Hadisuyatmana¹
¹Faculty of Nursing, Universitas Airlangga, Surabaya, Jawa Timur

ABSTRACT

Background: The decreasing social interactions in the elderly can make them feel isolated. Some of them feel lonely and experience social isolation and stress, which can affect the quality of life of the elderly.

Purpose: This research aims to analyze the relationship between social interactions, the quality of life of the elderly, and the forms of the social interactions.

Method: This research is a cross sectional study with the population of elders living in Nursing Home. Fifteen respondents were recruited using total sampling technique. Social interaction is used as an independent variable and quality of life is the dependent variable. Research data were obtained using a questionnaire and analyzed using Spearman Rho with a significance level of p <0.05.

Results: The results indicate that there is no significant relationship between social interaction and quality of life in the elderly (p = 0.760).

Conclusion: Social interactions in nursing homes do not have a correlation with the quality of life in the elderly who live in the nursing homes. Other variables that influence social interactions in nursing homes need to be examined. Nurses must maintain social interactions by improving some activities for better quality of life.

Keywords: Social Interaction, Quality of Life, Elderly

Introduction

In Indonesia, the elderly population grows more rapidly compared to other age groups. The rapid growth has occurred since 2013 at 8.9% and 13.4% in the world (¹). Three provinces have the highest percentage of the elderly population compared to the other provinces, which are DI Yogyakarta (13.81%), Central Java (12.59), and East Java (12.25%) (²). It is estimated that the elderly population in Indonesia will continue to grow by around 450,000 people per year. In 2017, there were around 23.4 million elders in Indonesia, or 8.97% of the total population. Most of the elderly were women with a percentage of 52% (³). Therefore, in 2025, the number of elderly people in Indonesia is estimated to be around 34.22 million (⁴). The increasing number reflects the success of the Government in improving the welfare and life expectancy of the community. The Central Bureau of Statistics (BPS) stated that life expectancy within the period of 1995-2000 was 66.0 years; within the period of 2000-2005 was 67.8 years; within the period of 2005-2010 was 69.1 years; and within the period of 2010-2015 was 70.1 years.

This increasing number of the elderly poses quality of life problem. At the moment, there are many families that decide to leave the elderly in nursing homes. Thus, in the future, the nursing homes play an important role in maintaining and improving the quality of life of the elderly. This is not necessarily acceptable to the elderly and can make them feel abandoned, ignored and lonely (⁵). World Health Organization defines quality of life as an individual’s perception of life in the society in the context of existing culture and value systems related to goals, expectations, standards and concerns (⁶). Some
previous studies have shown how social interactions affect the quality of life of the elderly.

The first study indicated that 10% of the elderly in the community had poor interactions, 76% had moderate interactions and 15% had good interactions (7). The second study showed that the percentage of the elderly with poor social interaction who experienced severe depression was 71.4%, while the percentage of the elderly with moderate social interaction who experienced severe depression was 31.4%, and the percentage of the elderly with good social interactions who experienced major depression was 12.5% (8). This shows that the better the elderly in social interactions, the less likely they experience major depression. Social interaction can also affect the psychological condition of the elderly (9)(10). The better the social interaction, the better the psychological condition of the elderly is, and this affects the quality of life of the elderly.

This study aims to provide insights into how social interactions affect the quality of life of the elderly living in nursing homes. It focuses on examining the forms of social interactions that can affect the quality of life of the elderly in Indonesia.

**Method**

**Design:** This study employed the Cross Sectional approach which emphasizes the moment of measurement or observation of independent and dependent variables at one time. In this research, the independent and dependent variables were assessed simultaneously at one time; so, there was no follow-up data measurement (11). This research was conducted at Anugerah Nursing Home, Surabaya from May to June 2016.

**Sample and Sampling:** The samples of this study were 15 elders who met the criteria. The sampling technique used was total sampling.

**Research Variables:** The independent variable in this study is the forms of social interactions while the dependent variable is the quality of life of the elderly.

**Research Instrument:** This research employed three types of questionnaires. The first type was the demographic questionnaire containing such data as number of respondents, gender, age, religion, ethnicity, recent education, period of living in nursing homes, daily activities to spare time. The second questionnaire focused on the form of social interactions which was adopted from the social interaction questionnaire (12) with a total of 20 questions and 5 questions in each form of social interaction. The last was World Health Organization-Quality of Life-BREF (WHOQOL-BREF) quality of life questionnaire (13).

**Data Analysis:** The data analyzed using the spearman rho test and All statistical tests used a significance level of \( \alpha = 0.05 \) (SPSS 20 windows program).

**Results**

**Demographic Characteristics of the Respondents:** The samples of this research were 15 respondents. The demographic characteristics of the respondents were female aged 60-69 years old (33.3%), 70-79 years old (33.3%) and above 80 years old (33.3%). All respondents were Christians and most of them were Javanese (80%). In terms of education background, almost half of the respondents did not have any education background (46.6%). Based on the period of living in the nursing home, 13 elders (86.6%) have lived in the nursing home for 0-5 years and all of the elderly did not work.

**Forms of Social Interactions:** Social interactions have several forms in social situations. The forms are cooperation, competition, conflict and accommodation (14). Data on the forms of social interactions are presented in the following table.

<table>
<thead>
<tr>
<th>Respondent Code</th>
<th>Cooperation</th>
<th>Competition</th>
<th>Conflict</th>
<th>Accomodation</th>
<th>Dominant Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
<td>14</td>
<td>11</td>
<td>19</td>
<td>Kode 1</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>11</td>
<td>11</td>
<td>16</td>
<td>Kode 1</td>
</tr>
<tr>
<td>3</td>
<td>14</td>
<td>12</td>
<td>13</td>
<td>18</td>
<td>Kode 4</td>
</tr>
<tr>
<td>4</td>
<td>22</td>
<td>13</td>
<td>10</td>
<td>20</td>
<td>Kode 1</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>9</td>
<td>9</td>
<td>21</td>
<td>Kode 4</td>
</tr>
<tr>
<td>6</td>
<td>15</td>
<td>9</td>
<td>10</td>
<td>16</td>
<td>Kode 4</td>
</tr>
</tbody>
</table>
Table 2: Respondent Distribution based on Research Variables, May-June 2016

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form of Social Interaction</td>
<td>Cooperation</td>
<td>6</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>Competition</td>
<td>1</td>
<td>6.7%</td>
</tr>
<tr>
<td></td>
<td>Conflict</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Accomodation</td>
<td>8</td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>15</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2 indicates that the highest value is code 4, which is accommodation with a total of 8 respondents or 53.3%.

Quality of Life of the Elderly: The quality of life of the elderly is measured from several aspects: health, psychological condition, social relation, and the environment. The life quality of the elderly in the nursing home is generally moderate (13 respondents or 80%) while the rest of the elderly have good quality of life. The analysis on the correlation between the forms of social interactions and the quality of life of the elderly conducted based on the Spearman’s rho test generated a correlation value of 0.760 and a p-value of 0.86. This indicates that there is no significant relationship between the forms of social interactions and the quality of life of the elderly living in Anugerah nursing home.

Forms of Social Interactions: The most dominant form of social interactions is accommodation. Most of the elderly living in the nursing home are Javanese. Based on the anthropology of Javanese, the Javanese culture is seen as elastic. The elasticity of the culture refers to flexibility in overcoming problems or inputs from the social environment. This suggests that Javanese people and Javanese culture have the ability to continuously adapt to challenges and changes.

Discussion

The results of this study are different from those of previous studies focusing on the relationship between social interactions and the quality of life of the elderly. This study reveals that at the nursing home, social interaction does not have a significant relationship with the quality of life of the elderly. This is related to the low number of activities which can facilitate social interactions between elders living in the nursing home. This might be due to the lack of health workers in the nursing home. Most of the activities in the nursing home are spiritual activities such as praying in the morning and evening. Spiritual activities are considered sufficient to meet the needs of the elderly because the higher the religiosity level of a person, the person will be happier, and might have better mental and physical conditions.

Forms of Social Interactions: The most dominant form of social interactions is accommodation. Most of the elderly living in the nursing home are Javanese. Based on the anthropology of Javanese, the Javanese culture is seen as elastic. The elasticity of the culture refers to flexibility in overcoming problems or inputs from the social environment. This suggests that Javanese people and Javanese culture have the ability to continuously adapt to challenges and changes.

The ability of the elderly to continuously establish social interactions is the key to maintaining their social status based on their ability to interact. Good social interactions allow the elderly to get a feeling of having a group in which they can share stories, interests, and concerns. They also have opportunities to do various activities together. The nursing home will become a place for the development of social interactions, because they will live together with fellow elderly people. Besides that, at the nursing home, they will receive trainings aimed at empowering them to remain productive. Physical and health development of the elderly will be effectively monitored.
In this study, social interactions refer to spiritual needs which provides comfort and peace. Based on the social theory, nurses should be able to facilitate social interactions among the elderly by holding discussions, exchange of ideas, and telling stories related to spirituality. Nurses must be able to provide inner peace in the religion which the elderly follow, especially if the elderly are sick or dying. Providing opportunities for the elderly to gather with fellow elderly people means creating interactions for the elderly. In the implementation, nurses can create social relations among the elderly, as well as between the elderly and the nurses themselves. The nurses should provide opportunities for the elderly to interact.

**Quality of Life of the Elderly:** The quality of life of the elderly in Anugerah Nursing Home is at moderate level. Quality of life is a measure of happiness; it comprises five aspects, which are feeling happy with daily activities, considering life meaningful and accepting life, feeling successful in achieving goals, having a positive self-image, and having an optimistic attitude and a good mood. Quality of life refers to individuals’ emotional, social and physical well-being as well as their ability to function in daily life. The quality of life of the elderly is influenced by several factors, which are the ability to adapt and accept all changes and setbacks, and the appreciation and reasonable treatment from the elderly’s social environment.

The decreasing quality of life is related to physiological diseases among the elderly, such as stroke and diabetes mellitus. Nursing is a holistic science which studies individuals from various aspects of life, including physiological, psychological, social, and spiritual aspects. Understanding the effect of social environment on health is important to help implement appropriate nursing care. Data on the quality of life of the elderly in various social settings can be used as an evaluation material for determining empowerment programs for the elderly, so that the program can effectively improve the quality of life of the elderly.

**The Relationship between the Forms of Social Interactions and the Quality of Life of the Elderly in Anugerah Nursing Home:** The forms of social interactions and the quality of life of the elderly at Anugerah Nursing Home are not significant in this study. The results of this study are in contrast with Lemon’s (2009) theory which states that elders who are socially active are more likely to adjust to aging well. Social interaction is the key to carrying out social activities. If the elderly are active in social activities, they will have high enthusiasm and life satisfaction as well as more positive mental health compared to those who are less active. Theory of activity states that in order for the elderly to succeed, they must remain socially active. The older a person is, the more active he or she should maintain social relations, both physically and emotionally. The life satisfaction of the elderly is very dependent on the continuity of their involvement in various activities (Latrancois 1984). This theory supports the elderly who are still active in various activities. The elderly will get satisfaction if they are still involved in various social activities.

This study shows that the elderly in Anugerah Nursing Home have moderate and good quality of life because they can accept their conditions. They pray do some activities with their abilities. They also feel happy and enjoy their time. In line with the role of nurses in providing excellent service through Teach and Support caregivers, nurses can facilitate social interactions among the elderly by holding discussions, exchanging ideas, and telling stories related to spirituality so that interactions between the elderly occur. This is one of the efforts in carrying out social approach. Nurses must be able to provide inner peace in their relationship with God or in the religion they follow, especially if the elderly are sick or dying. Providing opportunities to gather with fellow elders means creating interactions for the elderly so that they can improve their quality of life and enjoy the atmosphere of the nursing home.

Other studies in line with this study also conclude that there is no meaningful relationship between social interactions and the quality of life of the elderly at Abiyoso Paken Nursing Home. The researchers believe that each individual will have different social interactions that can affect the quality of life of the elderly. The results of this study are limited only to female respondents and the number of samples. Because the research subjects were all women, the results could not be generalized to all of the elderly population.

**Conclusion**

In conclusion, the social interactions that occur in the nursing home do not always have a significant influence on the quality of life of the elderly. However, there are
several aspects which can affect the quality of life of the elderly, such as the psychological aspect of the elderly accepting their current situation. This does not have a significant effect on the quality of life of the elderly in nursing homes. In addition, nursing homes can improve social activities based on the needs of the elderly living in the nursing homes.

**Ethical Clearance:** The current study was carried out in correspondence with the research principles. It is implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice. The research process entangles participants in the survey using a compatible questionnaire that was in accordance with the ethical research principle based on the research ethics committee’s regulation.

**Conflict of Interest:** The author reports no conflict of interest of this work.

**Source of Funding:** This study is completed with individual funding.

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Educational Game Methods of Attaching Images to Slide Calendar towards School-Age Children’s Knowledge and Attitudes on Choosing Healthy Snacks

Adzan Fachrurrozi¹, Tiyas Kusumaningrum¹, Praba Diyan Rachmawati¹
¹Faculty of Nursing, Universitas Airlangga, Mulyorejo Street, Surabaya, East Java, Indonesia

ABSTRACT

Introduction: There are several problems of fulfilling nutrition that disrupts health, growth, and development in children. There is no knowledge in children that resulting they consume unhealthy snacks. The purpose of this study was to determine the effect of educational game methods of attaching images to slide calendar towards school-age children’s knowledge and attitudes on choosing healthy snacks.

Method: This study was a quantitative study design with quasi experiment approach. There were 47 respondents selected in the treatment group and the control group, by using the method of educational game tools towards their knowledge and attitudes. The instruments used in this study were educational tools of attaching images to slide calendar and a modified questionnaire about attitudes and knowledge. Data analysis used the Mann Whitney test and the Wilcoxon signed rank test.

Results: The results showed there was a significant difference (p≤ 0.05) in the level of knowledge between the treatment and control groups after treatment. Whereas the attitude between the treatment and control groups after treatment resulted no significant difference (p≥ 0.05).

Conclusion: The educational tools methods of attaching images to slide calendar had an influence on increasing the knowledge of choosing healthy snacks in school-age children. Children did not experience changes in attitude of choosing healthy snacks, but children would increase their knowledge with the method of attaching images to slide calendar.

Keywords: paste the slide image calendar, knowledge, attitude, healthy snacks

Introduction

Children often do not have much knowledge, especially related to healthy foods selection¹. Children’s eating patterns give a strong influence on their health, especially in their growth and intellectual development². There are many cases that children experience allergies to foods, so that it is necessary to choose the right food for children³. The mistake in food selection can cause a variety of health problems such as anemia, obesity, and other nutritional disorders³.

Prevalence of children aged 6 to 11 years who experience a problem of nutrients exceeds in the United States as much as 7% then increased to 13% in the following year². In addition to nutrients exceeds, another problem that found is food poisoning. According to the Indonesian food and drug supervisory agency, known as Badan Pengawas Obat dan Makanan (BPOM) data in 2014, showed that schools are ranked second (28.9%) after residence (59.25%) in the most common places where the food poisoning cases found in Indonesia. Surveillance data on food poisoning in East Java, Indonesia, is still very high from year to year. In 2013, the number of outbreaks reached 60 incidences of food poisoning with 1,106 cases and the number of case fatality rates (CFR) of 0.27%⁴.

The results of preliminary data collection on students’ knowledge and attitudes about a healthy
snacks selection in two elementary schools, namely Sumbersekar I and SDN Mulyoagung II, found that the knowledge and attitudes of fourth grade students were still poor. Schools only overcome the problems by using posters about healthy snacks and providing a canteen with a healthy environment but still unable to increase the student’s awareness. There are still many students who often experience nutritional disorders such as vomiting, stomach ache, or diarrhea.

Children tend to like to consume random and unhealthy snacks, and not often occur dental caries. Children can recognize a variety of snacks that sold in schools by buying snacks. Snacks can contribute to 36% energy intake for school children, 29% protein, and 52% iron. Therefore, snacks have an important role in the growth and learning achievement of school children. According to Food and Agriculture Organization (FAO) in 2008, food or drinks sold by the street vendors are sold without proper preparation and processing. Snacks for children who are less nutritious will disrupt the child’s learning process.

Environment and society will shape children’s behavior and activities. One of places that can be used as a media for promoting health nutrition for children is school. Almost half a day spent by children at school, they also spend their breakfast and lunch time at school. Schools are the right medium for developing children to improve the children’s knowledge and attitudes. This study aimed to determine the effectiveness of educational game methods of attaching images to slide calendar towards knowledge and attitudes about the selection of healthy snacks for school-age children.

Method

This study used a quasy experimental design, which try to reveal a causal relationship by involving a control group in addition to the experimental group. The selection of these two groups did not use random techniques.

Population in this study were all elementary schools in the Dau Malang region which were reachable populations, namely all students in SDN Sumbersekar I and SDN Mulyoagung II. The inclusion and exclusion criteria were determined, so that 47 respondents were obtained for the treatment and control groups.

This study aimed to determine the effect of a educational game tools methods of attaching images to slide calendar on changes in knowledge and attitudes about the healthy snacks selection in school-age children. Some of the research instruments used in this study were the attaching images to slide calendar and modified questionnaire about knowledge and attitudes.

Attaching images to slide calendar game was made from modified images and used calendars. Images are presented by relating to the healthy snacks, which consists of the definition of snacks, types of snacks, characteristics of snacks, the positive or negative effects of snacks, sanitation and safety of snacks, and also the foodborne illnesses. When implementing health education by attaching an image to slide calendar, the researcher used the event program unit. The data obtained were processed and analyzed using the SPSS for Windows 21 software. Statistical analysis used in this study were the Mann Whitney test analysis to compare between the control group and the treatment group, then it was continued with the Wilcoxon signed rank test analysis to determine the difference between before and after treatment.

Results

The results of this research related to the educational game method of attaching images to slide calendar towards the knowledge and attitudes about the healthy snacks selection in school-age children were explained through demographic characteristics. General data describes the demographic characteristics of respondents including (1) age and sex, (2) number of siblings, (3) father’s education, (4) mother’s education, (5) father’s work, (6) mother’s work, (7) parents’ income, (8) breakfast, (9) information about healthy snacks, and (10) sources of information, for more details here is a following table of demographic respondents:

Table 1: Demographics of Respondents in the treatment and control groups

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Treatment</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 years</td>
<td>16</td>
<td>67</td>
</tr>
<tr>
<td>10 years</td>
<td>7</td>
<td>29</td>
</tr>
<tr>
<td>11 years</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Man</td>
<td>11</td>
<td>46</td>
</tr>
<tr>
<td>Woman</td>
<td>13</td>
<td>54</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>10</td>
</tr>
</tbody>
</table>
Table 2: Distribution of respondents based on knowledge about the healthy snacks selection in the treatment and control groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Treatment group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Knowledge levels</td>
<td>Good</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>Fair</td>
<td>9</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>12</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>24</td>
<td>100</td>
</tr>
<tr>
<td>Wilcoxon Test</td>
<td></td>
<td>p = 0.000</td>
<td></td>
</tr>
<tr>
<td>Mann-Whitney Test Pretest</td>
<td></td>
<td>p = 1.000</td>
<td></td>
</tr>
</tbody>
</table>

The results shown in the treatment group and the control group were mostly 9 years old. Most of respondents in both treatment group and control group had a breakfast habits. Most of respondents in the treatment group had received information related to healthy snacks with sources of information from their parents. While the entire respondents in the control group had received information about healthy snacks and the information sources mostly obtained from the school teachers.
The results of the Wilcoxon test analysis in the treatment group showed a p value = 0.000 so that p ≤ 0.05, which means there was a significant difference in the level of knowledge in pre test and post test. While the results of the Mann Whitney test analysis at post test showed a p value = 0.000, so that p ≤ α ≤ 0.05, which means that there was a significant difference in the level of knowledge between the treatment and control groups after the intervention. This proved that health education with educational game tools of attaching images to slide calendar had a significant influence on the level of children’s knowledge in the healthy snacks selection.

Table 3: Distribution of respondents based on attitudes about choosing healthy snacks in the treatment and control groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Treatment group</th>
<th>Control group</th>
<th>Wilcoxon Test</th>
<th>Mann-Whitney Test Pretest</th>
<th>Mann-Whitney Test Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes</td>
<td></td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td></td>
<td>6</td>
<td>25</td>
<td>10</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td></td>
<td>18</td>
<td>75</td>
<td>14</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>24</td>
<td>100</td>
<td>24</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Wilcoxon Test</td>
<td></td>
<td>p = 0.102</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mann-Whitney Test Pretest</td>
<td></td>
<td>p = 0.933</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mann-Whitney Test Posttest</td>
<td></td>
<td>p = 0.147</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of the Wilcoxon test and the Mann Whitney test in the treatment group and the control group obtained p values p ≥ α ≥ 0.05, which means there were no significant differences in attitude levels during pre-test and post-test. This proved that health education with educational game tools of attaching images to slide calendar did not have a significant effect on the level of children’s attitudes in the healthy snacks selection.

Discussion

Before being given a health education with the educational game tools of attaching images to a slide calendar, most of the respondents in the treatment group had a poor knowledge about healthy snacks. After intervention in a period of one day to one week, then post test was performed. Age affects person’s perception and mindset. An increase in age will also develop the ability to capture the information and mindset, so that the knowledge gained is getting better. Based on this theory, changes in knowledge can occur because the respondents in this study were 4th graders who aged 9 to 11 years. Children aged 9-11 years was in the developmental stage that have entered an operational concrete stage where children are able to think logically, make sense, and increasingly socialized. This resulted in an increase in the post test in the treatment group.

The economic status of the respondents’ parents in the treatment group was mostly in a low condition, which as many as 16 respondents. The average income of the respondents’ parents is below the regional minimum wage standard of Malang city. Respondents’ parents who have a low economy often have a difficulty in reaching the healthy food. Many children who have a high BMI due to parent’s inability to provide proper food.

Educational game methods of attaching images to slide calendar was effective enough to improve the children’s knowledge level. Previous studies on an educational program attracted the attention of the children so that children easily apply with the things they learned. Children tend to be interested in a creative learning system that contains elements of education. An activity in the form of a game that contains education will be easy for children to absorb. The creative health education program is also able to control the eating habits of the overweight children.

Educational game tools used in the learning activity provide an optimal function in children’s development, where children can develop physical abilities, language, cognitive abilities, and social adaptation through this game. One educational game tool is attaching images to slide calendar. This game has 3 stages process that can increase children’s knowledge, the first stage is the learning process (entering information obtained into memory), the second stage is the retention process (storing information obtained), and the third stage is
the recall process (recall information obtained). So that someone is expected to be able to improve his/her understanding of information and remember information obtained. Health education with educational game tools of attaching images to slide calendar is used as a method of health promotion to increase a knowledge level about the healthy snacks selection.

This study showed there was no improvement attitudes because respondents did not meet the level of attitudes which included receiving, responding, respecting, and being responsible which took time in the process. This can caused by when the intervention of health education with educational game tools was given, there were some male students who are not paying attention when the researcher gave an explanation, so that disturbed other students to concentrate on receiving the information. According to Gurian (2010) most boys are very active and unable to calm down while studying so they have more difficulty in concentrating than girls.

**Conclusion**

The method of educational tools of attaching images to slide calendar had an effect on increasing the knowledge level in school-age children regarding the healthy snacks selection. Respondents’ attitudes about choosing healthy snacks did not change, but almost all respondents got an increased scores after being given the intervention of educational game tools of attaching images to slide calendar. The method of educational game tools of attaching images to slide calendar can be used as one of the health promotion intervention methods for children in school.

**Ethical Clearance:** This study has obtained the feasibility of ethical review in the Health Research Ethics Commission of the Faculty of Nursing, Airlangga University, Surabaya, Indonesia with No. 168-KEPK.

**Conflict of Interest:** The author reports no conflict of interest of this work.

**Source of Funding:** This study is done with individual funding.

**REFERENCE**


The Correlation between Dementia Severity and Caregiver Burden Level in Community

Eryin Sulistyani¹, Joni Haryanto², Makhfudli²
¹Faculty of Nursing, Universitas Airlangga; ²Department of Psychiatric Nursing and Community, Universitas Airlangga, Jl. Mulyorejo Kampus C Universitas Airlangga, Surabaya, Indonesia

ABSTRACT

Objective: This research aim is to investigate the correlation between dementia severity and caregiver burden level.

Methodology: This research is a cross-sectional research involving 23 respondents who took care of the elderly with dementia. The questionnaire employed in the data collection was MMSE (Mini-Mental Status Examination) questionnaire to assess the dementia severity level, while the data on the caregiver burden level was collected through the Caregiver Burden questionnaire by Zarit.

Result: Among 23 elderly taken care, 61% of them suffered from severe dementia. Meanwhile, the caregiver burden level of the respondents was measured in mild-moderate level. There were no respondents with severe caregiver burden level. The caregiver burden level suggested a different result in each dementia severity level. Furthermore, the correlation between dementia severity and caregiver burden level indicated p value of 0.001 and r value of 0.694 (significance α < 0.05).

Conclusion: There was a significant relationship between dementia severity level and caregiver burden level. Positive coping played a highly critical role in minimizing the caregiver burden level experienced by elderly caregivers.

Keywords: caregiver burden level, dementia severity, elderly patients

Introduction

Along with the increase in life expectancy, currently, there are 35.6 million people suffering from dementia. This number will double in every two decades where the figure is estimated to reach 65.7 million by 2030. Furthermore, it is estimated that 11.4 million elderly will suffer from dementia in 2050 ¹. Dementia is a primary chronic disease that contributes to disability and care needs in the elderly ². The increase in dementia incidence is one of the health crisis currently observed in the community. It is estimated that 47 million people worldwide in 2017 suffered from dementia and most of them lived together and were taken care of by their families in the community ³. Dementia is the factor of major disability in the world that causes 11.9% of years lived with disability (YLDS). Moreover, dementia leads to the dependence of the elderly life, in either high, medium, or low-income countries. In 2010, the cost to take care of dementia patients was estimated to reach US$ 604 billion globally ⁴. It is generally known that taking care of dementia in elderly patients extremely burdens the caregivers ⁵.

From the previous research, it is discovered that taking care of the elderly with dementia might lead to caregiver burden ¹,²,⁵–⁸. The caregiver burden includes emotional, social and financial hardship, as well as routine activity constraints that can threaten the caregivers in helping the elderly patients to fulfill their daily life ⁶,⁹. Moreover, several studies also state that
taking care of the elderly with dementia can be stressful for the caregivers due to the behavior issue, time spent to take care and psychological well-being provision. In addition, the family taking care of the elderly with dementia incurs financial burden. As a matter of fact, 95% of the elderly live with their family and depend on their family to provide health care and other aids. Family members who are in charge of being the caregivers include the spouse, the adult children, and other close relatives.

The assistance provided by a caregiver is not only limited to housework. Instead, it is divided into four categories: 1) physical care, including feeding, putting on clothes, cutting nails, cleaning rooms, etc.; 2) social care, including visiting entertainment venues, acting as an informant from all over the world outside of the home care; 3) emotional care, including showing concern, love, and affection for the elderly, not only with words but also through the tasks done; and last 4) quality care, covering monitoring the level of care, standard of treatment, and attention to problems that arise due to illness. Another assistance provided by the caregiver include spiritual assistance.

Caregiving to the elderly with dementia requires a lot of time and physical assistance. A survey in 2003 in the United States described that a quarter of caregivers spent 40 hours per week to take care of elderly dementia patients.

Taking care of elderly patients might put on burden or strain to caregivers which affect the family life quality. Caregiver burden is a multi-dimension response toward physical, psychological, social, and financial stressors associated with the caregivers’ experience in treating their clients. The burden in taking care of the elderly are, among others, related to physical problems, such as fatigue, sleep disorder, and chronic condition. Meanwhile, the psychological problems consist of the feelings of anxiety, worry, pessimism, shame, guilt, self-esteem disorders, and depression. The social issues include limitations in building relationships with other people, conducting social activities, and having free time. in addition, financial problems may arise, namely cost and financial limitation since the caregivers cannot work as they take care of their sick family member. This research aims to identify the correlation between dementia severity level and caregiver burden of the family taking care of the elderly with dementia in the community.

Methodology

This research applied cross-sectional approach with quantitative method. The research was carried out in Ponorogo, Indonesia. The sample amount was 23 caregivers for the elderly and was selected based on purposive sampling technique with the following inclusion criteria: i) the elderly taken care aged more than 65 years; ii) family member’s age who took care for dementia patients was more than 21 years; iii) the family member took care for the elderly for more than 6 months.

The independent variable in this research was the dementia severity level of patients treated by their family members. The variable was measured by MMSE questionnaire covering orientation parameter, motorist registration, attention, and calculation, as well as re-introduction of language. On the other hand, the dependent variable in this research was the caregiver burden level of the family members treating the elderly. The variable was assessed by caregiver burden questionnaire of Zarit covering physical load, psychology, social and economy parameter.

The data was analyzed using the correlation test of Spearman Rank Correlation with significance level α < 0.05. Furthermore, the data was tested using SPSS for Windows software.

Results

Demography Data: Based on the research result, the data obtained from 23 respondents indicated that approximately 20 respondents (87%) were female. Meanwhile, nine respondents (39%) were aged around 36-45 years old. A total of 11 respondents (50%) were the biological children of the elderly with dementia. Meanwhile, a total of 8 respondents (35%) had treated the elderly with dementia for approximately 4 to 5 months. in addition, 11 respondents (48%) graduated from elementary schools. Last, 13 respondents (57%) worked as farmers.

This research aims to identify the correlation between dementia severity level and caregiver burden of the family taking care of the elderly with dementia in the community.
Table 1: Demographic data of respondents

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>20</td>
<td>87</td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
<td>13</td>
</tr>
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<table>
<thead>
<tr>
<th>Age</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-35</td>
<td>5</td>
<td>22</td>
</tr>
<tr>
<td>36-45</td>
<td>9</td>
<td>39</td>
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<tr>
<td>46-55</td>
<td>5</td>
<td>22</td>
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<td>56-55</td>
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<td>13</td>
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<tr>
<td>&gt;65</td>
<td>1</td>
<td>4</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Caregiver relationship with the elderly</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological children</td>
<td>11</td>
<td>50</td>
</tr>
<tr>
<td>Children in law</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>Grandchildren</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>Wife</td>
<td>2</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Taking care period</th>
<th>Total</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>0-1 year</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>1-2 year</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>2-3 year</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>3-4 year</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>4-5 year</td>
<td>8</td>
<td>35</td>
</tr>
<tr>
<td>5-6 year</td>
<td>5</td>
<td>22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Last Education</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary School</td>
<td>11</td>
<td>48</td>
</tr>
<tr>
<td>Junior High School</td>
<td>7</td>
<td>31</td>
</tr>
</tbody>
</table>

Table 2: Caregiver Burden Scale

<table>
<thead>
<tr>
<th>Caregiver burden scale</th>
<th>None-Mild</th>
<th>Mild-Moderate</th>
<th>Moderate-Severe</th>
<th>Highly Severe</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMSE</td>
<td>Σ</td>
<td>Σ</td>
<td>Σ</td>
<td>Σ</td>
<td>Σ</td>
</tr>
<tr>
<td>Mild</td>
<td>2</td>
<td>9%</td>
<td>1</td>
<td>4%</td>
<td>3</td>
</tr>
<tr>
<td>Moderate</td>
<td>1</td>
<td>4%</td>
<td>5</td>
<td>22%</td>
<td>6</td>
</tr>
<tr>
<td>Severe</td>
<td>0</td>
<td>0%</td>
<td>6</td>
<td>26%</td>
<td>14</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3</td>
<td>13%</td>
<td>12</td>
<td>52%</td>
<td>23</td>
</tr>
</tbody>
</table>

Note: * p < 0.005  
Correlation test with Spearman Rank Correlation α < 0.05

Correlation between the severity of dementia and the caregiver burden: Table 2 indicates that out of 23 respondents, three respondents (13%) taking care of the elderly suffered from light caregiver burden; six respondents (26%) suffered mild-moderate caregiver burden; five respondents (22%) suffered from mild-moderate caregiver burden. Meanwhile, eight respondents (35%) out of 14 caregiver respondents who took care of the elderly with severe dementia suffered from moderate-severe caregiver burden.
Discussion

Some issues complained by the caregivers were neuropsychiatric syndrome (NPS), functional disorders, memory disorders, and cognitive impairments. Some caregivers even detected that NPS was a functional disorder that mostly lead to strain and depression. In addition, coping toward behavioral problems of the elderly with dementia was also a heavy burden for the caregivers.

Based on the research results, it was identified that there was a correlation between the severity of dementia and the caregiver burden level. The correlation occurred since the behavioral change shown by the elderly dementia patients became the stressor for the family members taking care of them. These changes comprised of weakening physicality and inability to complete daily activities independently. Consequently, the elderly needed more help from the caregivers to perform their daily activities.

The elderly who were at the level of mild dementia were still capable of carrying out daily activities independently, and most of them could still be oriented to time and place. Nevertheless, the elderly sometimes forgot small things with a low value in the language domain. This finding was congruent with previous studies arguing that the elderly with mild dementia had begun to neglect house chores and were hard to have two-way communication. However they could still recognize people, home addresses and the streets around them. Respondents taking care of the elderly with mild dementia experience a caregiver burden at the level of none-mild and mild-moderate, which might result from the minimum assistance required by the elderly. In addition, the low score in the language domain based on the MMSE evaluation might be caused by the lack of knowledge, hence, the elderly sometimes found difficulties in understanding the assessor’s instruction.

Most of the respondents treating the elderly patients with moderate dementia level were in mild-moderate caregiver burden level. This might result from the respondents’ occasional assistance in fulfilling basic needs such as feeding and bathing. Usually, the elderly only required help in preparing their clothes because they often forgot where they put them. Respondents also stated that they should remind the patients to eat, take a bath and pray for the elderly with moderate dementia.

Moreover, if the elderly met their relatives, they would find it difficult to remember their names. Thus, the respondents should remind them. The elderly with moderate dementia encountered problems in completing a sequenced instruction. It implies that their language aspect was weak. Even, some elderly found it hard to mention time and place.

The respondents taking care of the elderly with severe dementia were at the caregiver burden level of mild-moderate and moderate-severe. It was because the elderly with severe dementia suffered from a decline in doing their activities independently. They occasionally did not recognize their caregivers, often talked digressively, and required maximum assistance in fulfilling ADL. The elderly with severe dementia were in the worst decline condition. They could not maintain their personal health (hygiene), had changed in thinking behavior and could not remember new information. The elderly with severe dementia were not supposed to be left alone since they could harm themselves and other people. Consequently, the family members of the elderly with severe dementia should supervise them strictly.

This study had several limitations, among others; the data collection in this study was based on self-report with questionnaires so that the perception of caregivers was highly personal. The assessment of caregiver burden was in a range. It was probable that the respondents encountered difficulty in selecting the available answers, i.e. “never, rarely, sometimes, often, and always.” Furthermore, the accuracy in completing the questionnaire was highly affected by the respondents’ honesty and understanding. This research detected a significant correlation between dementia severity and caregiver burden level. Nonetheless, further studies should be taken into account by involving larger samples in order to obtain better research objectivity.

Conclusion

This research discovered the significant relationship between dementia severity and caregiver burden level. The elderly with mild and moderate dementia did not require much help from their caregivers since they were still capable of performing their activities of daily living independently. In contrast, the elderly with severe dementia relied more on the caregivers’ help in fulfilling their activities in everyday life. Therefore, the caregivers should bear a heavier burden. It is expected that the caregivers could improve positive coping to decrease the burden they felt.
Ethical Clearance: The research was reviewed and approved by the Health Research Ethics Commission of Universitas Airlangga Number 06-KEPK. The research process involves participants in the survey using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice.

Conflict of Interest: The author reports no conflict of interest of this work.

Source of Funding: This study is done with individual funding.

REFERENCES


An Exploratory Study in the Indonesian Archipelago: Are There Influenza B Virus (B-Victoria Sub-Type) in the Bat’s Respiratory Organs?

Muhammad Anas Wildanu Rahman1, Chairul Anwar Nidom1, Setya Budhi1
1Faculty of Veterinary, Universitas Airlangga, Surabaya, Indonesia

ABSTRACT

Bats act as hosts in carrying Influenza B disease and can act as a natural reservoir of various types of viruses, including Nipah virus, Hendra virus, and Ebola virus in mammals. This research aimed to study the presence of Influenza B virus (B-Victoria sub-type) in the respiration organs of bats (Chynoptera sp.) in Indonesian Archipelago. A total of 99 bats from several regions representing the islands in Indonesia were taken in Snowball sampling technique. Samples that had been isolated and passed the incubation period were tested using the Hemagglutination (HA) test and Hemagglutination Inhibition (HI) test. The data obtained were processed descriptively. The result showed that there were 13 samples positively in the Hemagglutination (HA) test (13.13%), but after going through the Hemagglutination Inhibition Test (HI) with B-Victoria antisera, no positive samples were found. We conclude that there was no virus type B influenza virus (B-Victoria sub-type) in the bat respiration organ.

Keywords: Influenza B virus, Respiratory Organ, Bats, B-Victoria sub-type

Introduction

Influenza viruses circulate and cause disease in humans every year. Influenza type B is considered a mild disease and lack of attention compared to influenza A, even though it has caused 20 to 50% of the total incidence of influenza in several regions of the world 1. The genus of Influenza B virus is generally considered a human virus. A chain of events that allows influenza viruses to be successfully transmitted in alternative host populations needs to be known 2. Animals can function as an intermediary spread of disease. Cats, like pigs, can act for the emergence of a new virus that has the potential for a pandemic 3. In recent years, bats (Chiroptera order) are known to act as important reservoirs of several viral diseases which allow infection in humans and other mammals 4. Bats play an important role in the emergence of severe acute respiratory syndrome (SARS). Interestingly, bats infected with various viruses rarely show clinical symptoms of the disease. The pathogenesis and potential threat of most viruses transmitted by bats to public health is still unknown. Besides, this host-virus interaction may result in a large diversity of zoonotic viruses in bats.5

Bats are important to be noticed because they consist of nearly 1,200 species in the world 6. The diversity of hosts raises questions about transmission of viruses between individuals of species that same and between species. In the case of multispecific roots, bats show high seroprevalence levels observed and related to ecology 7. Type B influenza is one of the important components of all major influenza diseases that attack humans, both B-Yamagata and B-Victoria. Normally, this Influenza B virus is only found in humans and pigs 8. However, the process of transmitting this virus needs to be known since bats are an important medium in transmitting other infectious viruses. Transmission of influenza viruses may occur directly from the dynamic interactions between animals, environmental factors and the human immune system even though barriers can occur between species and the virus itself 9. Short-term decisions on patient care, for example, in the case of vaccines and...
early onset of epidemiological examination, including WHO’s decision on vaccine composition are important 9.

Infectious diseases are a major threat to the welfare of animals and humans globally through threats from old and new pathogens that continue to emerge. Along with global climate change, agricultural practices and demographic presentations make conditions very favorable for the spread of diseases. Interaction between animals and humans can pose significant additional threats to human health, including influenza viruses10. The spread of viruses/zoonotic infections can occur through direct and indirect contact even though the spread of current diseases depends on strong assumptions about the contribution of indirect contact to the spread of infection 11.

If the Influenza B virus (B-Victoria sub-type) is found in the bat’s respiratory organs, it will easily be carried out further research for prevention of cross infection and treatment on veterinary medicine. Therefore this study aimed to identify the Influenza B virus (B-Victoria sub-type) in the respiratory organs of bats in the regions representing all islands in Indonesia.

Method

This descriptive study was conducted at the BSL-2 Avian Influenza Research Center (AIRC) Laboratory, Surabaya for 12 weeks in 2017. Sampling of 99 bats was carried out through the Snowball sampling method. Samples in the form of Cynoptera sp. bats were captured using bat trapped nets on trees and attics installed for 72 hours.

The research was carried out through several stages. The respiration organs of the bat which included the trachea and lung were taken through the freezing process (thawing). Next, the storage was carried out in 15 ml conical tube with a solution of 1:10 Phosphate Buffer Saline (PBS) at a speed of 3000 rpm for 10 minutes at 10°C. The samples were then placed in eppendorf, mashed, centrifuged, candling then isolated in ECE (embryonated chicken eggs) which have SAN (Specific Antibody Negative) characteristic. Isolation was carried out for 9-11 days to multiply the virus. ECE was then stored in an incubator at 37°C for three days by checking it every day. Embryos which were dead before the third day were removed and stored in the 4°C refrigerator for one night.

After going through the inoculation and isolation stages, the Hemagglutination Test (HA) of the Microtechnics was carried out using a 24-unit 4HA antigen. The Retraction Test was also performed to test the accuracy of the dilution of the antigen used. Positive samples on the Hemagglutination Test were then examined using Microtechnic Hemagglutination Inhibition (HI) Test with B-Victoria subtype Influenza type B antisera with HAU titers/0.025 mL. RBC used in this test came from chickens with a concentration of 0.5%. Data obtained from the results of virus isolation, Hemagglutination test and Hemagglutination inhibition test (HI) are presented in descriptive form.

Result

A total of 99 bats with the type of Cynoptera sp. represented all bats in the Indonesian archipelago. In the several regions, the largest number of samples were taken from the Sumatra Island region, 32 of which were Bintan, but the samples with the most positive Hemagglutination Test (HA) were found on the Borneo island, Pontianak. Therefore, 13 positive samples were obtained by forming hemagglutination at the bottom of the “V” microplate hole and presented in Table 1.

<table>
<thead>
<tr>
<th>No.</th>
<th>Sample Origin</th>
<th>Positive</th>
<th>Negative</th>
<th>Total Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Pontianak</td>
<td>8</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Bawean</td>
<td>2</td>
<td>25</td>
<td>27</td>
</tr>
<tr>
<td>3</td>
<td>Bintan</td>
<td>3</td>
<td>29</td>
<td>32</td>
</tr>
<tr>
<td>4</td>
<td>Padang</td>
<td>0</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>13</td>
<td>86</td>
<td>99</td>
</tr>
</tbody>
</table>
A total of 13 samples were known to get Hemagglutination Test results with HA titers of more than 22, followed by HI test using B-Victoria antisera. The results of the HI test were positive at the highest dilution which could still inhibit complete clotting of erythrocytes. However, it was found that no sample received a positive Hemagglutination Inhibition Test. So that it can be seen that from all samples, no hepatitis B virus (sub-type B-Victoria) was found in bat respiration organs. The Hemagglutination Inhibition Test (HI) results are described in Table 2.

### Table 2: Hemagglutination Inhibition (HI) Test Results

<table>
<thead>
<tr>
<th>No.</th>
<th>Sample Origin</th>
<th>Positive</th>
<th>Negative</th>
<th>Total Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>1.</td>
<td>Pontianak</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>2.</td>
<td>Bawean</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Bintan</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>0</td>
<td>0</td>
<td>13</td>
</tr>
</tbody>
</table>

### Discussion

This study found that in bat respiration organs there was no Influenza B virus (B-Victoria Sub-type) found. So far, there has been no risk of transmission of type B (sub-type B-Victoria) through bat respiration organs. The negative results in 86 of these samples may be caused by a virus that cannot be detected in this way. The causes include virus titers that are still low while this study was being conducted, the presence of viral deaths caused by tissue autolysis, viral predilection is more common in other organs, and less diverse sampling locations.

Reagents or diagnostic tests are indeed available for all viruses, but to detect previously unknown viruses, new reagents and approaches must be developed through PCR exploration. Classic methods, including test of hemagglutination inhibition, need to be widely developed.

Viruses originating from bats are the most famous zoonoses that spread from wildlife to domestic animals and human. Transmission of the virus from bat to human requires a hierarchy of conditions that allow the relationship between the host reservoir, viral infection in the host, and exposure and susceptibility of the recipient host. Human cells do not support the growth of bat flu viruses in the test tube. This shows that bat flu viruses may not grow or replicate in humans. However, bat virus genome examination showed that the bat’s internal genes were compatible with human flu viruses. Scientists cannot rule out the possibility of this virus eventually becoming able to infect humans. Although bats are not in close contact with humans, the spread of viruses from bat to intermediate host animals, such as horses, pigs, ferrets, or nonhuman primates, is considered the most likely mode of infection in humans. Humans can also be infected with viruses through aerosols by entering bat caves or through direct contact with bats, such as catching bats or being bitten by bats.

B-Victoria’s subtype of Influenza B virus was previously found in street cats through 26 blood serum samples in the nasopharynx which contained Victoria B-type subtype Influenza B antibodies. In addition, the pathogenesis of type B influenza virus was found in ferrets. B/Brisbane/60/2008 virus and B/Yamagata strains cause the most severe clinical disease in the middle to lower respiratory tract with a high viral load. This type forms the lower respiratory tract that becomes persistent and begins the process of developing the virus in the airways. Although this infection does not induce the initial epithelium, the lesion causes severe damage to the small airways resembling the pathology of Influenza A. The virus then spreads to the lower respiratory tract. The response of specific influenza antibodies is also measured by the haemagglutination inhibition (HI) test. In the hemagglutination inhibition (HI) test, a positive result will show the presence of point erythrocytes deposited in the middle of the microplate well because the antiserum is used homologously with antigens so that the virus is able to agglutinate erythrocytes. In addition to bats which are thought to be related to influenza type B, certain pigs become agents of the B virus, i.e., guinea pig. As in the case of influenza A viruses, transmission of influenza B virus is increased at colder temperatures, providing an explanation for seasonal influenza epidemics in temperate regions.
Influenza B virus B-Victoria subtype is less dominant compared to Influenza B subtype B-Yamagata. Currently, viruses with B/Victoria/2/87 strains are genically and antigenically more closely related to strains B/Brisbane/60/2008. Virus was recommended to be used as a vaccine in the seasonal Influenza region of the northern world in 2015. Research on B-Yamagata Influenza B subtypes on bats showed similar results, i.e. no positive results were found in bats. Although bats are a strong reservoir of human bacterial pathogens in some cases, a large number of pathogenic viruses colonize bats, the bacterial flora of bats and its zoonotic threats remain unclear. Influenza viruses can occur and spread through commercial farms.

Bats are a natural reservoir of a number of high-impact viral zoonoses. Bats host special zoonotic viruses compared to mice, the role of other important hosts. Bats do have more viral zoonoses per species than mice but the total number of zoonotic viruses identified in bats is lower than mice. As a result, there are about twice of rat species number as bat species. Bats are also increasingly known as a host reservoir for viruses that can across species boundaries to infect humans and other wild and domestic mammals, although bats have the function of helping to control insects, replanting logged forests, and pollinating plants that provide food for humans and other species, and their guano is used as fertilizer and for making soap, gasohol, and antibiotics.

Further research needs to be done to check the sample which may react positively to other viral antisera that have hemagglutinin proteins. The strategy used by viruses targets innate and adaptive responses to the immune response phase. With regard to bats, there is evidence that “healthy bats” can be asymptomatic as in the rabies virus. The infected bat which survive are known to have no virus in the brain or saliva.

Conclusion

This study recommend that apart from bats as other viral agents, there is no risk of exposure and transmission of influenza B virus (B-Victoria sub-type) in bats. Further research needs to be done on the pattern of viral development on other virus dan other organs of bat. Vigilance must be increased because bats are still at risk as an important part of the spread of other viruses.

Acknowledgement

We thank to the Staff of Research Center (AIRC) Laboratory and Universitas Airlangga for supporting this research.

Ethical Clearance: This research has gone through ethical tests and permits from the veterinary faculty of Universitas Airlangga and through licensing in the area where the samples were taken

Conflict of Interest: The author reports no conflict of interest of this work.

Source of Funding: This study is done with individual funding

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Factors Influencing Publishing Scientific Papers among Iraqi Medical Academic

Yossra K Hanoon¹, Riyadh K Lafta²

¹ MD, Ph.D., Department of Family and Community Medicine, College of Medicine, Mustansiriya University, Iraq; ² MD, Ph.D., Department of Family and Community Medicine, College of Medicine, Mustansiriya University, Affiliated Prof., Global Health Department, University of Washington, Seattle, USA.

ABSTRACT

Background: Assessing research productivity in academic institutions is an important measure of the magnitude of their contribution to knowledge.

Objective: to assess research productivity among a sample of Iraqi medical academic, and to shed light on the barriers that may influence this practice.

Method: This cross-sectional study was conducted during the period from March through June 2018 in Ten medical schools. A questionnaire form was distributed to 200 academic and inquired about the number of articles published during the last five years, types of journals and the obstacles that may influence the rate of productivity.

Results: Most of the respondents reported publishing their articles in local and regional journals, 44% didn’t get a chance to publish in any International journal, 61% reported no previous experience in publishing in “Scopus” journals or journals with an impact factor (38%), and 66% haven’t published any research article after getting their professorship. Career promotion was the main motive for conducting researches (69.7%), followed by job requirements (64.6%). The main reasons behind low research productivity were workload pressure (74.3%), and lack of funds (61.7%).

Conclusion: there are many obstacles that make research productivity and article publishing among Iraqi academic still way beyond ambition.

Keywords: Iraqi, Academic, Publishing, Medical, Papers

Introduction

Assessment of research productivity in academic institutions is an important measure of the magnitude of contribution to the advancement of new knowledge. Research productivity is considered one of the most important markers of ranking universities quantitatively and qualitatively.¹

Medical faculties are subjected to an increasing pressure to raise their research productivity.² The number of publications is frequently used as an index for the scientific output, while the impact is appraised by using data regarding the number of times these publications are cited in subsequent years.³

Globally, the number of scientific papers increased between 2008 and 2014 by 23%, higher in upper middle-income countries (95%) than low-income countries (68%).⁴ A study done on 6874 medical and health science publications from 18,883 different authors revealed that the countries with the highest relative publication productivity were Canada (37.1), Netherland (28.3), New Zealand (27), UK (23), and U.S.A (17.1).⁵
A study conducted among faculty members of Iraqi medical schools in 2001 revealed that 25% have published an article in a peer-reviewed journal in that year. A similar study in Saudi Arabia showed that the research productivity was 38%.

Factors that thought to influence the rate of research publications include gender and race as individual factors, academic discipline, work values and preferences as career factors, and institutional mission, resources, rewards of promotion, salary and challenges of family responsibilities as environmental factors.

This study was conducted to find out the current status of the productivity of researches (and related factors) among academic, after years of weakness resulted from the devastation that affected all the aspects of life following the 2003 war.

Method

This cross-sectional study was conducted in Iraq during the period from March through June 2018. Ten medical schools were included in this survey: the five schools of Baghdad; one from the North, one from the South and three from the middle of Iraq. A purposive sampling technique was adopted for choosing the colleges, so as for the academic; ten to twenty percent of the faculty from each college was included with an inclusion criterion of being working in the high education field for at least five years. A questionnaire form was developed by the researchers, revised and validated by an expert committee of professors from the Department of Family and Community Medicine, Mustansiriya School of Medicine, the validity was 0.84. The questionnaire was then distributed to 200 professors, assistant professors and lecturers from all medical departments in the chosen ten medical schools (20 from each) after explaining to them the purpose of the study, giving them the full choice to participate, and assuring them that all the information would not be used for other than research work. The questions inquired about the number of articles published during the last five years, the quality and rank of the journals and the obstacles they think might influence the rate of articles' productivity.

Statistical analysis was done using IBM/SPSS (Statistical Package for Social Sciences) version 24. Chi-square test was used to describe the association between related variables. P value less than 0.05 was considered statistically significant.

Results

Only 175 forms were collected (out of the 200 that were distributed) giving a response rate of 87.5%.

Table (1) describes the socio-demographic characteristics of the faculty members, whose age ranged from 29 to 68 years, distributed into four age groups, 37% of whom was in the age group (35-44) years, 59% of the sample was males, and 88% carry the degree of Ph.D. (or Board), 26% were full professors and 44% were assistant professors.

<table>
<thead>
<tr>
<th>Variable</th>
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<tr>
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<tr>
<td>45-54</td>
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<td>41</td>
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<tr>
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<tr>
<td>10-19</td>
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<tr>
<td>20+</td>
<td>42</td>
<td>24</td>
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*There is no degree of “Associate Professor” in the Iraqi education system

Figure (1) details the research productivity; most of the respondents (87.5%) reported publishing articles in local and regional journals, while 44% didn’t get a chance to publish their articles in any International journal, 61% had no previous experience in publishing in “Scopus” journals or in journals with an impact factor (38%), and 66% of the participants haven’t published any article after getting their professorship.
Only 18.9% of the studies were randomized or non-randomized clinical trials while 66.3% were either cross-sectional, case-control, or cohort studies (not tabulated).

The results also revealed that career promotion was the main motive for conducting researches (69.7%), followed by job requirements (64.6%). (Figure 2)

Figure (3) demonstrates that the main reasons behind low research productivity were workload pressure (74.3%), lack of funds (61.7%) and deficient experience in practicing teamwork concept (45.7%).
Table (2) shows the association of age, gender, qualification and academic degree with the flow of research productivity. Age and being a professor were associated with high rates of publishing in International journals, Scopus journals and journals that have an impact factor, while old age, male gender and being a professor were significantly associated with medium to high research publishing (5 or more during the last 5 years) in local and regional journals (p=0.0001).

Table 2: Association between research productivity and age, gender, academic degree and qualification

<table>
<thead>
<tr>
<th></th>
<th>Local/Regional journals</th>
<th>International journals</th>
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<tr>
<td></td>
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<td>Low (&lt;5)</td>
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<tr>
<td>No</td>
<td>%</td>
<td>No</td>
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<td>---</td>
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<tr>
<td>Age (years)</td>
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<tr>
<td>35---44</td>
<td>17</td>
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<tr>
<td>45---54</td>
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<tr>
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<td>16</td>
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<tr>
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<td>42.9</td>
<td>30</td>
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### Highest qualification

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<td>28</td>
<td>36.4</td>
<td>32</td>
<td>46.4</td>
<td>12</td>
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<tr>
<td>Lecturer</td>
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<td>50.6</td>
<td>16</td>
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### Published articles in Scopus/IF

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<tr>
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<td>47.5</td>
<td>30</td>
<td>41.7</td>
<td>13</td>
<td>29.5</td>
<td></td>
</tr>
</tbody>
</table>

| Highest qualification | PhD/Board | 48    | 81.4  | 65    | 90.3 | 41   | 93.2 | 0.140  |
|                       | MSc      | 11    | 18.6  | 7     | 9.7  | 3    | 6.8  |        |

| Academic degree | Prof     | 4     | 6.8   | 19    | 26.4 | 23   | 52.3 |       |
|                | Assist. Prof | 23    | 39.0  | 34    | 47.2 | 15   | 34.1 |       |
|                | Lecturer  | 32    | 54.2  | 19    | 26.4 | 6    | 13.6 |       |

*Chi Square test of significance was used

### Discussion

The findings of this study demonstrate that about half of the sample reported authoring less than five articles that are published in local journals; this is in the same line with a study conducted in Brazil in 2009, while a previous local study in 2001 revealed that 83% of the articles were published in local journals. This change may be attributed to the new policy of the Iraqi universities that encourages the trend of publishing abroad, however, 38% had no articles published in journals with an impact factor, this is higher than what was found in an Egyptian study in 2014 which revealed that 20% had no articles published in journals with an impact factor.

Unexpectedly; many professors recessed their research activity after getting their professorship, might be because some academic exert their greatest efforts when their promotion is imminent, but immediately after been promoted, their activity slopes down. This is an alarming sign as the opposite should happen; reaching the degree of professorship with all the accumulative experience should improve and upgrade the capacity of the academic making them more productive. This finding is inconsistent with the results of a study done in Taiwan which revealed that only 10% did not publish articles after getting their professorship.

The study revealed that more than two-thirds of the academic embark on doing researches for the sake of promotion to the next academic degree. This matches the outcome of a Nigerian study in 2015 which showed that scientific promotion was on the top of the motives’ list to produce research.

The second motive was job requirements; more than half of the academic stated that they publish researches to contribute to knowledge and because they have a real interest in research work.

The faculty members indicated some barriers that represent the main reasons behind their low research productivity; the top rated reason was workload pressure. In accordance with this result, a previous study done in Bahrain in 2017 concluded that workload pressure due to full-time faculty work and engagement in administrative duties was the main barrier as it leaves no time for research activity. In Iraq; the situation is similar with a different scenario since workload pressure resulted from the...
noticeable shortage in the number of faculty members that leads to an extra teaching load. This shortage is attributed to the void of most of the expertise from Iraq after and as a consequence of, successive wars and continuous violence, especially after the 2003 US invasion. 15,16

Faculty members also indicated that low research productivity is directly related to the lack of funds. This goes with the findings of a study in 2011 which concluded that barriers like teaching load, extra administrative duties along with lack of funds, can negatively affect the attitude of the faculty towards research work. 17

The scarcity of funding is an undeniable obstacle for research papers suitable for high impact journals, particularly randomized trials. Many of the regional and international universities support research activity with a large annual budget, 18 a policy that is unfortunately not applied in the Iraqi universities.

Following the 2003 US invasion and the following anarchy, there was massive devastation to the infrastructure of most of the scientific research centers; this led to lack of information resources and research infrastructure that seriously affected the progress of scientific research work in the Iraqi universities. 19,20

Lack of research equipment was an important barrier especially for the clinician; this disagrees with the results of an Indian study which concluded that interpreting results were the main research conduction difficulty. 21

Surprisingly, language difficulties were the least to state as a barrier. Although this goes with a Bahraini study which found that language was in the bottom of the list of difficulties, 14 but we believe that the journals’ editors may have a different opinion.

Age appeared to be significantly associated with publishing in local, regional and international journals, with no decline when the academic gets older. This is expected since knowledge is cumulative with increasing age and experience. 22 This finding matches results from other studies which concluded that age has a positive effect on the publication rate that increases with time. 23

The results also revealed that male gender is highly associated with the publishing rate in local and regional journals. The probable explanation is that female academic are still having more responsibilities and duties regarding managing the house and looking after the needs of their family members, which leaves a limited time for them to look after their research activities. 24 This finding is seconded by a Canadian study in 2011, 25 but Dutch female academic contradicts that for they are more productive than males. 26

**Conclusion**

There are many obstacles that make research productivity and article publishing among Iraqi academic still way beyond ambition. Efforts through joined collaborated work are needed to bring back the Iraqi academic to their normal position among the International medical schools.

**Conflict of Interest:** No conflict of interest

**Source of Funding:** No financial disclosure

**Ethical Clearance:** This manuscript: “Factors Influencing Publishing Scientific Papers among Iraqi Medical Academic” was approved by the Ethical Committee for research work in the Department of Family and Community Medicine, College of Medicine, Mustansiriya University.

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Effect of Eating Even or Odd Number of Dates, on Blood Glucose Level

Yossra K. Al-Robaiaay¹, Maha A. Al-Nuaimi¹, Tawfeeq F. R. AL-Auqbi²
¹College of Medicine, ²National Diabetes Centre, Al-Yarmook Teaching Hospital Campus, Al-Mustansiriyah University, Baghdad, Iraq

ABSTRACT

Objectives: There is a common belief among Muslims, to consume dates in odd number rather than even, based on cultural and religious claims; although nobody knows its effect on blood glucose level or other metabolic effects in the body.

The aim of our study is to illuminate the changes that affect the 2-hrs postprandial serum glucose level after the consumption of an odd number of dates among healthy young persons and even number.

Method: Intervention study was used to compare 2 groups, Fasting glucose levels was measured for all participants; group A (42 participants), who consumed even number of dates all at Tamer-stage, (net weight about 50 grams); and group B, (42 participants), presumed to consume an odd number of dates (net weight about 40 grams). Two-hrs postprandial blood glucose levels were measured altogether. Blood glucose levels were determined and compared as a means. Statistical analyses were performed using SPSS version 22.

Result: The fasting serum glucose of group A and B participants were 91.65 ± 13.61 and 93.69 ± 8.79 mg/dl, respectively, with an insignificant statistical difference between groups. Subsequently, the 2hrs Postprandial Glucose measurements of group A and B were 99.58 ± 19.56 and 100.33 ± 12.204 respectively; indicated an insignificant statistical difference between groups. All the participants were remaining within normal ranges of serum glucose level.

Conclusion: There is no difference between ingestion of the odd and even number of dates fleshes from the glycemic point of view on the glucose level in fasting and postprandial states.

Keywords: dates, odd, even, glucose level, eating.

Introduction

The date is one of the ancient plants, eldest diet with high energy producing value; it is widely cultivated and adopted in various tropical and subtropical countries worldwide. (¹)

Each date flesh consists of about 60-65% carbohydrates, 2.5% fiber, 2% protein, >2% fat, minerals, and about 15-30% water according to the stage of ripeness and the variety of dates. Additionally, date can provide more than 3000 Calories/kg; (²) that’s mean the consumption of 100 g dates daily (six to seven dates) can provide the human body with a wide variety of vitamins, salts, minerals and provided 50% -100% of the recommended daily intake of fiber. (³) These facts make dates as a most nourishing natural food and best food for consumption by all ages of the population all over the world. (², ⁴)

Even though, some researches, found that the glycemic index (GI) of dates is low and its consumption does not cause a significant shot in the post-prandial blood glucose level, with glycemic indices (GIs) range (35.5 - 47.2) putting the dates in the list of the low GI food items. (⁵, ⁶) Deserve to be one of the fruits which are widely consumed worldwide, particularly in the Arab

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and Islamic regions and it is one of the few numbers of foods that are directly mentioned in the Holly Qur’an. (7)

However, there is a common belief among Muslims, most of them, they advised to consume dates in odd number rather than even, (8) although, nobody knows the effect of date number on blood glucose level or other metabolic effects in the body, as well as there, was no previous scientific research spot the light on this subject. For these reasons, we try in this study to determine the effect of the date number on blood glucose levels.

The aim of our study is to illuminate the changes that affect 2-hrs. Postprandial Serum Glucose (2hs. PPSG) level after the consumption of odd and even numbers of deaths among healthy younger persons with normal Fasting Serum Glucose (FSG) level and their related variables.

Materials and Method

Study Design: Intervention study was used to compare the glucose levels before and after ingestion of odd and even pattern of dates among two matched study groups.

Sample Recruitments: Participants were recruited from the College members, employees, and students of the Chemical Engineering Department/College of Engineering/Baghdad University, who were informed to participate through invitation posters. The data collection extended from the 1st November to the 1st December 2017.

An 84 participants were completely eligible (42males and 42 females) fit for the inclusion criterion and were recruited for simple randomization to divide them into two groups (no blinding was used); group A (42 participants, 21 male and 21 female), who would consume even number of dates (net weight about 50 grams); and group B, (42 participants, 21 male and 21 female), presumed to consume an odd number of dates (net weight about 40 grams).

Study Protocol: All the participants were asked to have overnight fasting and to stay fasting until they attend the college at 7.30 -8.30 AM. A sample of blood was taken from each one for measurement of FSG level, and then everyone asked to eat 4 or 5 fleshes of dates according to their groups. All flesh of dates was of the same type, at Tamer-stage, each flesh had an average weight of 9.25-10.10 grams. Participants ingest the dates followed by a glass of water (100 ml) and to stay on this regimen without additional foods or drinks, till the 2hs.PPSG levels were measured. Upon the end of the trial, the subjects would become free to join their daily activity.

Samples of blood were collected from all participants to be examined later, in the National Diabetes Center (NDC)/Al-Mustansiriyah University laboratory, for the investigation of FSG and 2hs. PPSG levels; KENZA 240TX autoanalyzer was used for this purpose.

The inclusion criteria were non-smokers, healthy persons (no diabetes, no chronic disease, nor other co-morbidities even the metabolic problems), males and females of age ranging between 18-50 years.

The exclusion criteria were the obesity and morbid obesity (BMI > 35 kg/m²) or a history of previous obesity, pre-diabetes (fasting blood sugar ≥ 100 gm/dl), alcoholic persons, pregnant women.

Ethical Approval: Consents for participation in the study were obtained according to the Helsinki II Declaration (10) after a briefing about the project; and approved by the ethics committee and the scientific research committee at the National Diabetes Center and the College of Medicine/Al-Mustansiriyah University. The demographic data, family and past medical history of participants were recorded also; physical examination of pulse rate, blood pressure and anthropometric measurements of weight, height as well as BMI was measured for all participants.

Statistical Analysis: All obtained data and records were managed by SPSS, version: 22, for statistical analysis. The Anderson-Darling test was done to prove normal distribution of the obtained data, student t-test was used for the comparison of two means, and the chi-square test was used to compare nonnumerical discrete data.

Results and Discussion

Age, the gender distribution of group A and B and their BMI values, revealed insignificant statistical differences (P=0.48771, 0.01792, 0.801 respectively). This mostly due to the cautious manner of choosing samples, and randomization in-group recruitment rendered them equivalent and comparable. (Table-1)
Family history of diabetes mellitus among study participants showed a statistically significant difference between groups (P=0.00072). This expected figure may be because diabetes is a common disorder in Iraq and all over the world (11, 12). (Table-1)

Table 1: Characteristics of study groups participants

<table>
<thead>
<tr>
<th></th>
<th>Group A (EVEN) n = 41</th>
<th>Group B (ODD) n = 42</th>
<th>Sig. (P value)</th>
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<td>Age</td>
<td>30.41 ± 11.68</td>
<td>28.64 ± 11.46</td>
<td>0.4877</td>
<td>Student t-test, not significant (P ≥ 0.05)</td>
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<tr>
<td>BMI</td>
<td>24.22 ± 4.79</td>
<td>24.51 ± 5.54</td>
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<tr>
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<td>0.0179</td>
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<td>Family history of diabetes mellitus</td>
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<td>Yes 20</td>
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</table>

The mean of Measurements of the Fasting Serum Glucose (FSG) of group A and B participants’ were 91.65 ± 13.61 and 93.69 ± 8.79 mg/dl, respectively, with the insignificant statistical difference between groups (P=0.42327); indicates no any pre-diabetic was detected among the participants according to the diagnostic criteria. (13) This healthy metabolic state of respondents, often owing to the high commitment to the study protocol during sample selection. (Table-2)

Participants ingested the dates in an odd or even number of fleshes according to their groups. Dates ingested contain about the same amount of glucose used in oral glucose tolerance test, which is a more definitive test that has no serious risks and gives important clues about health; in addition, an Oral Glucose Tolerance Test (OGTT) shows how well your body handles sugar from foods. (14-16) Subsequently, after ingestion of dates, the means of 2 hours PPSG measurements of group A and B were 99.58 ± 19.56 and 100.33 ± 12.20 respectively, with insignificant statistical difference between groups, (P=0.83553), the higher figure of PPSG found in group B (odd group) may be attributed to the (extra one date) given to this group that might cause trifling personal differences. However, these changes did not manifest themselves statistically. Moreover, the Changes of the glucose level for each participant among group A and B before and after ingestion of the dates seem to be insignificantly different (P=0.62089). Furthermore, all the participants were remaining within normal ranges of serum glucose levels, despite 34.5% of them were found to be with positive family history but they showed no glycemic response to date ingestion. This may be because the vast majority of this sample was young and below the risk of development, such health problem. (17)

Obviously, this indicates the negligible and a trivial effect of ingestion of dates in odd or even manner on the glucose metabolic state with no statistical meaning. (Table-2)

Table 2: Characteristics of study groups participants, according to blood glucose measurement

<table>
<thead>
<tr>
<th></th>
<th>Group A (EVEN) n = 42</th>
<th>Group B (ODD) n = 42</th>
<th>Sig. (P value)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSG</td>
<td>91.65 ± 13.61</td>
<td>93.69 ± 8.79</td>
<td>0.4232</td>
<td>Student t-test, not significant (P ≥ 0.05)</td>
</tr>
<tr>
<td>2 hs. PPSG</td>
<td>99.58 ± 19.56</td>
<td>100.33 ± 12.20</td>
<td>0.8355</td>
<td></td>
</tr>
<tr>
<td>Change of glue. level</td>
<td>9.95 ± 21.19</td>
<td>7.97 ± 14.49</td>
<td>0.6208</td>
<td></td>
</tr>
</tbody>
</table>

Although there is no obvious indication to ingest dates in any manner in Islamic references, still there is a habitual concept designed or formatted on religious bases solidified through multiple eras to become virtually a traditional norm. Because it ignores the size, weight, dryness and serving a form of the dates which seriously affect its chemical components especially the carbohydrate, the glycemic index and glycemic load of any ingested food.
Conclusion

There is no difference between ingestion of odd or even number of date fleshes from the glycemic point of view on the glucose level in fasting and postprandial states.

Ethical Clearance: The Ethics Committee and the Scientific Research Committee at the National Diabetes Center and, the Ethics Committee and the Scientific Research Committee at the College of Medicine, Al-Mustansiriyah University.

Source of Funding: No financial disclosure

Conflict of Interest: No conflict of interest

REFERENCES


Management of Slum Settings Through the Private City Program (Kotaku) Towards a City of Health, Makassar Indonesia

Haslinah Ahmad¹, Indar², Sukri Palluturi², Suriah², Ahmad Yani³

¹Postgraduate Doctoral Program Students Hasanuddin University, Makassar, Indonesia, ²Akademik Keperawatan Reformasi Makassar; ³Public Health Faculty, Hasanuddin University, Makassar, Indonesia;

ABSTRACT

Slums are a strategic issue in spatial planning in Indonesia due to a tendency to increase slum areas. To prevent the occurrence of slums in Makassar which is to break the chain of factors causing slums. In terms of public health, one of the determinants of public health status is environmental factors. Therefore, various studies make recommendations in making a model for handling slums. This study will combine the two methods in analyzing the level of slum settlement as well as the most appropriate risk factor control model in reducing the rate of increase in the number of slum areas with a dynamic model approach. This study aims to look at slum settlement management models. In this study concludes most of the concepts and results of previous studies recommend a dynamic model approach to handling slums.

Keywords: Slums, Healthy Cities, Dynamic Models

Introduction

Slums are a problem faced by almost all big cities in Indonesia and even big cities in other developing countries. The study of slum settlements generally covers three aspects, first the physical condition, the second socio-economic and cultural condition of the communities that live in the settlement, and the third impact by both conditions. The physical condition can be seen from the condition of the building which is very tight with low construction quality, the road network is not patterned and not hardened, public sanitation and drainage are not functioning and the waste has not been managed properly.(1)

Slums can be interpreted into two parts, the first is an area whose formation process is due to the limitations of the city in accommodating the development of the city so that competition arises in using urban land. Whereas high density residential areas are embryos of slums. And the second is the area where the geographical distribution location is urged by the development of the city, which was initially good, gradually becoming slums. The cause is stagnant socio-economic mobility.(2)

The condition of slum housing in Indonesia is about 9.12% of the 64.1 million households in Indonesia living in unsuitable housing conditions, there are 38,431 Ha of urban slum areas spread across almost all regions of Indonesia, urban populations in Indonesia increased sharply between 2000-2010, from 7400 people per square kilometer to 9400 people per square kilometer, it is estimated that 68% of Indonesia’s population will live in cities by 2025.(3)

Slums are a strategic issue in spatial planning in Indonesia due to a tendency to increase slum areas. Since 2008, 26% of Indonesia’s population in urban areas have been living in slums. The tendency to increase the rate of population growth in urban areas empirically triggers the potential increase in the number of urban residents who live in slums by 32%. To face the challenges of the Indonesia Slum Free program in 2020 and the global agreement in the New Urban Habitat Agenda 100-0-
100 that set a target of 100% fulfillment of clean water, 0% of slums and 100% of fulfillment of sanitation facilities in 2020 carried out various programs to deal with slums both short, medium, and long term involving cross-stakeholders which is done through sectoral harmonization and hierarchical synchronization.(4)

In urban areas many problems occur due to the many factors that influence it such as the environment, social, economy, and slums. Kota Sehat is a World Health Organization (WHO) project which was officially launched in 1987-1988). Healthy City is a condition of the city that is clean, comfortable, safe and healthy for residents to live in. The implementation is achieved through the application of several arrangements with integrated activities agreed by the community and local government and Joint Minister of Health & Minister of Home Affairs Regulation No 34, 2015. (5)

Some of the causes of slums in various parts of the world are rapid migration of cities, economic stagnation and depression, high unemployment, poverty, informal economy, poor planning, politics, natural disasters and social conflicts. The strategy attempts to reduce and change slums in various countries, with varying degrees of success, including a combination of slum resettlement, slum relocation, upgrading of slums, and urban planning with infrastructure development throughout the city, and this public housing project. (6)

The focus of the problem in this study is to prevent the occurrence of slums in Makassar, which is to break the chain of factors causing slums. In terms of public health, one of the determinants of public health status is environmental factors. The environment has the greatest influence and role followed by behavior, health facilities and heredity. The environment is very varied, generally classified into three categories, namely those related to physical and social aspects. The environment is related to physical aspects, for example garbage, water, air, soil, science, housing, and so on. Whereas the social environment is the result of human interaction such as culture, education, economics, and so on.(5)

The decline in the quality of the urban environment, of course, is followed by an increase in the amount of pollution in the air, soil and rivers. Cities in Indonesia and several cities in the world, generally become customers of various diseases such as cholera, typhus, shortness of breath and others. The air in the City becomes hot and dusty. Water is polluted by a variety of bacteria and chemicals that are detrimental to health. WHO notes that water, sanitation and hygiene problems contribute 3.5% of total deaths in Indonesia.

In 2017 the government made a new breakthrough through the City without Slums (KOTAKU) program. This city program has advantages that include all aspects that can make city settlements become slum starting from buildings, environmental roads, drinking water supply, Drainage provision, Waste water management, fire fighting and green open space, this program runs from 2017 until 2019. However, there is still 35% of slum area that has not been handled by this program, therefore an effective and efficient model is needed to predict determinants of an increase in slum area in Makassar, which will affect the health status in the future.

Dengan demikian diperlukan pendekatan model dinamis dalam menggambarkan kejadian pemukiman kumuh yang merupakan bagian dari sistem kompleks pada dunia nyata ke dalam model sederhana. Hal ini penting megingat tinginya kawasan pemukiman kumuh di Kota Makassar. memodifikasi dan mengendalikan faktor risiko kejadiah kumuh untuk menekan dan mengurangi laju peningkatan kejadian pemukianan kumuh di Kota Makassar.

**Research Methodology**

This paper uses a two-stage methodology for the formation of initial models and conceptualizations. In this study collected several concepts, theories and some relevant research results with risk factors for slums to reduce and reduce the rate of increase in slums.

**Results & Discussion**

The results of this study found that the settlement is part of the environment outside the protected area, it can be an urban and rural area, functioning as a residential/residential environment and a place of activity that supports livelihoods and livelihoods. While the word “slum” according to the large Indonesian dictionary is interpreted as dirty or unclean. So, it is not dense, the meeting is muddy, smelly, rickety, or irregular, but it is dirty that makes something dirty. According to Johan Silas, Slum Settlement can be interpreted into two parts, the first is the area whose formation is due to the limitations of the city in accommodating the development of the city so that competition arises in using urban land. Whereas the high density settlement area is the embryo of slums, and the second is the area where the geographical distribution location is urged by the development of the city which was initially good, gradually becoming slums. The cause is stagnant socio-economic mobility.
One of the goals to achieve the MDG’s targets that have ended in 2015, a world agreement has been agreed on sustainable development goals (SDG’s), where the SDG’s point 11 target on Sustainables Cities and Communities is stated “Building cities and settlements that are inclusive, safe, resilient and sustainable. In 2030 (SDG’s point 11.1) is targeted to guarantee access in this case adequate and safe and affordable housing, access to basic services and handling of slums. (8)

Efforts to prevent and accelerate the improvement of the quality of residential areas in collaboration are carried out with a participatory approach that brings together macro planning (top down) and micro planning (bottom up) by placing the community as the subject of development and final decision makers.(9)

As an implementation of the acceleration of slum management, the Kotaku Program will improve quality, manage and prevent the emergence of new slums, with activities in rural/urban villages, as well as regions and districts/cities. These slum-handling activities include infrastructure development and social and economic assistance for better community livelihood sustainability in slum areas. The stages of implementing the Kotaku Program are data collection. The community institution in the village/kelurahan called the Community Self-Reliance Agency/Institution (BKM/LKM) has conducted a baseline survey of 7 Slum Indicators in each village/kelurahan. The data is integrated between community planning documents and district/city planning documents to determine priority activities to reduce slums and prevent new slums. Which will be implemented later, either by the community or by other parties, who have expertise in infrastructure development in regional and municipal entities.(10)

The Kotaku program has been socialized to local governments on April 27, 2016 in Jakarta. The Community Occupation Agency (BKM) will be a factor that can accelerate the achievement of habitable and sustainable settlements because of their experience in planning and implementing poverty reduction activities. This BKM is “revitalized” from before which was focused on poverty alleviation, now oriented to slum management.

Conclusions

In this study concludes most of the concepts and results of previous studies recommend a dynamic model approach to handling slums.

Ethical Clearance: Our study was not directly applied on human, hence ethical clearance was not required.

Source of Funding: Self funding.

Conflict of Interest: The author declare that he has no conflict of interest.

REFERENCE

**Prosthodontics Rehabilitation of a Surgically Repaired Cleft Palate Patient with Tooth Supported Telescopic Over Denture Prosthesis: Case Study**

Priyanka Debta¹, Anurag Dani², Fakir Mohan Debta³, Santosh Kumar Swain⁴, Somalee Mahapatra⁵

¹Associate Professor, Department of Oral Pathology and Microbiology, Institute of Dental Sciences, Siksha ‘O’Anusandhan (Deemed to University), Bhubaneswar 751003, Odisha, India, ²Professor; Department of Prosthodontics, C.D.C.R.I. Rajnandgaon, Chhattisgarh, India, ³Associate Professor; Department of Oral Medicine and Radiology, S.C.B. Dental College & Hospital, Cuttack, India, ⁴Professor, Department of Otorhinolaryngology, IMS and SUM hospital, Siksha ‘O’Anusandhan (Deemed to be University), Bhubaneswar 751003, Odisha, India, ⁵Tutor, Department of Oral Pathology and Microbiology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan, (Deemed to University), Bhubaneswar 751003, Odisha, India

**Abstract**

Telescopic crowns consist of coping, primarily telescopic permanently which is cemented to an abutment permanently, along with a secondary or outer, congruent detachable telescopic crown and is strictly embedded by a prosthesis of detachable type. There has been ample evidence that telescopic overdentures promote oral hygiene, periodontal health and protection of the abutment through primary coping. Telescopic crowns supported with natural teeth have been used successfully in removable partial overdentures. This article presents a successful alternative approach for rehabilitation of patient with removable partial overdenture prosthesis with telescopic crowns to enhance retention and stability.

**Keywords:** Telescopic crowns, Abutment, Telescopic overdentures, Primary telescopic coping, Secondary telescopic crown.

**Introduction**

High incidence and repercussions of lip and palatal clefts are among the most important congenital craniofacial malformation to be taken into account in general dental practice (Incidence 1:600). [1] The tooth supported telescopic prostheses are formed by a parallel surfaced double crown system. Telescopic crowns achieve retention using friction of parallel-surveyed surfaces. It allows cross-stenting of the dental arch thereby facilitating the tooth stabilization over the long term.¹

**Clinical presentation of case:** A 45 years old female patient reported to the Department of Prosthodontics, A.B. Shetty Memorial Institute of Dental Sciences, Deralakatte, Mangalore, Karnataka, India with the chief complaint of missing teeth in upper and lower jaw. History revealed that she had cleft lip and palate with several missing teeth, which was surgically treated five years ago. Patient revisited the hospital for the closure of an oro-antral fistula. Extra-oral examination revealed that there was a post-operative scar on the upper lip (Figure 1). Intra-oral examination revealed presence of maxillary right central incisor, maxillary right second premolar, maxillary left first premolar, maxillary left second premolar, mandibular left canine, mandibular left lateral incisor, mandibular left second premolar, mandibular left third molar, mandibular right first premolar and mandibular right third molar. Gingival examination showed generalized gingival recession and grade III mobility of mandibular left lateral incisor and mandibular left third molar with severe bone loss (Figure 2). Inter-arch space was 18mm measured from crest of the maxillary and mandibular alveolar ridges at the premolar region. Due to surgical repair, complete obliteration of maxillary labial vestibular area was noticed (Figure 3).
Following treatment options were listed for rehabilitation of present case

1. Extraction and complete denture prosthesis.
2. Cast partial denture prosthesis.
3. Simple over-denture prosthesis.
4. Overdenture prosthesis supported by abutment teeth with telescopic crowns.
5. Osseo-integrated implant supported prosthesis.

Treatment planning: The goal of treatment is to improve the functional efficiency, cosmetic result as well as to improve the psychological wellbeing of the patient. An interdisciplinary approach involving an Oral and Maxillofacial Surgeon, a Periodontist, an Endodontist, and a Prosthodontist was planned.

1. Extraction of mandibular left lateral incisor and mandibular left third molar with grade III mobility and severe bone loss.
2. Oral prophylaxis.
3. Advised intentional pulp space therapy in relation to maxillary right central incisor, maxillary right second premolar, maxillary left first premolar, maxillary left second premolar, mandibular left canine, mandibular left second premolar, mandibular right first premolar and mandibular right third molar.

Rehabilitation with Overdenture prosthesis supported by abutment teeth with telescopic crowns to be used to enhance the retention, stability, support and proprioception.2, 3

Steps in fabrication: After the required investigations and preliminary treatment, the definitive Prosthodontic treatment was started. Appropriate maxillary and mandibular stock trays were selected and primary impressions made with irreversible hydrocolloid (Tropicalgin, Zhermack, Italy). Tooth preparation was done by diamond of torpedo type (C&FG, Diamond Point Densply, United States of America). Impression of single stage done by light and putty viscosity polysiloxane vinyl impression material (3M ESPE, Express, U.S.A.) along with working cast made from dental stone of (TYPE III, Asian camicals, India).

Patterns of wax (Pattern wax, BEGO, Germany) for primary coping were prepared on the working cast and was surveyed (MERATHON-103, Saeyang Company, Korea) to achieved relative parallelisms between the abutment teeth with the help of wax knife surveying tool (Figure 4a). Cementation of primary metal coping on the prepared abutment teeth using Cement of permanent luting type (Glass Ionomer Cement typeI, Global Corporation, Tokyo, Japan) was carried out.

Border moulding and Definitive impression was made with custom acrylic resin tray (DPI-RR, Cold Cure, India) by impression material (3M ESPE, EXPRESS, USA.) of putty and light viscosity vinyl polysiloxane respectively then pouring of master cast was done. Wax up for reverse coping on the master cast in which grooves were made on occlusal surface (one horizontal line and one vertical line bisecting each other at right angle) and retention beads (Rententionen - retention beads no-461-0106, Renfert) were placed on the pattern with the help of adhesive provided and invested (Figure 4b). After casting of reverse coping, it was secured into the intaglio surface of heat cure denture base (Figure 4c). Orientation relation recorded using the Artex face bow (Rotofix-218600, Germany) and was transferred to the non-arcon semi-adjustable articulator (Girrbach-TS Germany,). After determining the vertical dimension and recording of centric relation mandibular cast was secured on the articulator and program the articulator using eccentric records.

Following trial of waxed up tooth supported telescopic overdenture prosthesis and acrylization was carried out. After remounting and correction of occlusal discrepancies fit and insertion of the prosthesis was done (Figure 4d). On periodic check-up enhanced retention, stability of the tooth supported telescopic overdenture prosthesis and improved psychological comfort of the patient was noticed (Figure 5).
Figure 2. Ortho Pantograph Radiograph

Figure 3. Maxillary arch - Occlusal View

Figure 4a. Surveying of Primary Coping; 4b. Reverse Coping- Occlusal View; 4c. Reverse Metal Coping Incorporated With Intaglio Surface Of Heat Cure Denture Base; 4d. Polished Prosthesis
Discussion

The tooth supported telescopic overdenture prosthesis is by the concept that the abutments are the retained teeth which provide adequate stimulation onto the dental alveoli hence prevent loss of bone adjacent to the abutments along with this enhancing retention, stability and support for the prosthesis. Yalisove specified that the sufficient tooth structure can be reduced to improve crown to root ratio by intentional extirpation. The poor crown to root ratio, in this case revealed that more reduction was necessary. So, in cases of poor crown to root ratio which arises by extensive loss of periodontal part is indicated for elective endodontic treatment. Balanced occlusion is the standard protocol for the stability of complete denture prostheses and incorporated the same in the present case. It reduces the lateral forces exerted on the residual ridge thereby helping in its preservation. The use of a tooth supported telescopic overdenture prostheses gives an option which is superior to traditional complete denture prostheses and also avoids expensive treatment option like implant supported prostheses. Moreover, the treatment option is highly predictable, reliable and comfortable for patients.

Conclusion

Nowadays, the Prosthodontics retain along with that they restore most of the natural teeth to serve as prosthetic abutments by modern modalities of preventive dentistry. The tooth supported telescopic prosthesis from numerous reports by cross- sectional and longitudinal studies contemplates that – there is conservation of the alveolar bone, proprioceptive efficiency is increased and the most significant advantages is patient acceptance. Due to these favorable outcomes, in cases of abutments which are periodontally compromised further advocates the implementation of tooth supported telescopic prostheses as an alternative modality.

Conflicts of interests: None

Funding: None

Ethical clearance: Approved by institutional ethical committee.

References

Achondroplasia in an Eleven-Year-Old Male Child

Satya Ranjan Misra
Professor & Head, Department of Oral Medicine & Radiology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

Among the many conditions which manifest as dwarfism, Achondroplasia is one of the most commonly encountered. It is characterized by short stature due to shortening of the limbs which have disproportionate growth in comparison to the rest of the body. Achondroplastic patients often report to the dentist for their dental problems like delayed eruption of teeth or malocclusion, and since they present with pathognomonic cranio-facial features the condition can be first diagnosed by dentist. We present a case of 11-year-old male child with char for documentation with characteristic features.

Keywords: Dwarfism, malocclusion, mid face hypoplasia, rhizomelic shortening of limbs.

Introduction

Achondroplasia is the most commonly occurring skeletal dysplasia, a non-fatal form of chondrodysplasia. [1,2] The limbs are short and the growth of long bones, vertebral column and the skull is affected, resulting in stunted growth and a short stature. It is common and affects about 6% of the population worldwide. It is an autosomal dominant disease, having complete penetrance, but more than 80% cases arise de novo due to genetic mutations. [3] The clinical features of the disease are pathognomonic, with a disproportionately short stature, having frontal bossing, megalencephalic head, hypoplasia of the midface, rhizomelic shortening of the upper and lower extremities with a normal length of the trunk, accentuated lordosis of the lumbar spine, genu varum and a trident shaped hand. [5] The teeth are morphologically normal but may be associated with impeded teeth eruption, retained deciduous teeth and malocclusion, as reported in the present case.

Case Report: An 11-year-old male child reported with a complaint of misaligned teeth. History revealed he has stunted growth and has gait problems. The past medical, personal and family history were non-contributory.

On physical examination, the patient had short stature, hyper-extensibility of upper extremities with increased anterior pelvic tilt, reduced hip extension, increased hip flexion, trident shaped hands and a waddling gait. [Figure 1] There was frontal bossing, hypoplasia of the middle third of the face, anterior cross bite, anterior open bite, retained deciduous molars and a high arched palate. [Figure 2]

Figure 1: Clinical pictures showing short stature, increased anterior pelvic tilt, reduced hip extension, increased hip flexion, trident shaped hands.

Corresponding Author**
Satya Ranjan Misra
Professor & Head, Department of Oral Medicine & Radiology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India
e-mail: satyamisra@soa.ac.in
Owing to the short stature, hyper-extensibility of the joints and the cranio-facial features, the patient was diagnosed with Achondroplasia.

He was then advised for conventional radiologic investigations. Postero-anterior (PA) view of skull, lateral skull view, antero-posterior (AP) views of the vertebral column, chest, extremities, panoramic radiographs of the jaws revealed frontal bossing, midface hypoplasia, anterior cross bite, dislocation of left humerus and accentuated lordosis of the lumbar spine. [Figure 3]. Correlating the clinical and radiologic findings a final diagnosis of Achondroplasia was made, the deciduous teeth were extracted and the patient was kept under regular follow-ups.

**Discussion**

Achondroplasia is a common disorder with autosomal dominance having complete penetrance. There is a mutation in the FGFR3 gene, which causes low endochondral ossification, with inhibition of the proliferation of the chondrocytes in the cartilages of the hypophysis of the long bones, hypocellularity and low cartilage matrix production which manifests as a plethora of clinical manifestations and often in complications. The chromosomal mapping of the FGFR3 gene is on band 4p16.3. Generally, Achondroplasia is considered non-fatal as it is heterozygous, with the patients leading a normal life with normal brain function/intellect. But complications like as cervico-medullary compression, stenosis of the spine, obesity or obstructive sleep apnea.

When the affected individuals are born, they look normal but there is growth retardation with time. It has been reported that men grow to about 130 cm in height and women about 123 cm on an average. Though characteristic clinical features may not be evident at birth, as the child grows the limbs appear shorter in comparison to the trunk which is longer and narrower.
The head is disproportionately large with frontal bossing and mid-face hypoplasia. In the proximal segments the limbs appear the shortest which is called rhizomelic shortening and the fingers show a trident appearance. The joints exhibit hyper-extensibility and the movements are slightly restricted. Most joints are hyperextensible, but extension is restricted at the elbow.

The radiologic features include large calvarium with smaller cranial base and facial bones. Lateral spine radiograph shows short vertebral pedicles and a decrease in the inter-perpendicular distance between the lumbar vertebrae, all typical to the disease. Round and short iliac bones having flat acetabular roofs are seen. Short tubular bones with irregular flared metaphyses are often seen. Compared to the tibia, the fibia is very long and shortening of the metacarpals and phalanges. The iliac bones are short and round and the acetabular roofs are flat. The tubular bones are short with mild irregular and flared metaphyses. The fibula is disproportionately long compared with the tibia. Hand radiographs show shortening of the metacarpals and phalanges with trident configuration.

It has been reported that achondroplastic patients have normal structure and morphology of teeth but the eruption pattern may be affected, presenting as delayed tooth eruption. Malocclusion is a common finding, where the patient can have cross bite, open bite, dental class III malocclusion, high arched palate with a small maxilla, oligodontia and macroglossia. Periodontitis, geographic tongue and trigeminal neuralgia have been rarely reported.

When considering a diagnosis of achondroplasia, different disorders affecting the cartilage presenting as short stature may be considered, which includes thanatophoric dysplasia, hypochondroplasia and chondroectodermal dysplasia.

The dental management of patients with achondroplasia is akin to any normal patient needing dental treatment, though psychosomatic issues due to disproportionate stunted growth affecting the psychologic well-being of the patient. Rarely due to cranio-cervical instability, stenosis of the foramen magnum stenosis or limited neck mobility may be present which could lead to respiratory complications during dental procedures.

**Funding:** None

**Conflict of Interests:** No conflict of Interest

**Ethical permission:** Approved

**References**

An Introduction to Preventive Orthodontics

Snigdha Pattanaik¹, Swati Patnaik²

¹Associate Professor, Department of Orthodontics, Institute of Dental Sciences, ²Assistant Professor, Department of Public Health Dentistry, Institute of Dental Sciences, Siksha ‘O’ Anusandhan, (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

The prevention of the malocclusion and the control of dental spaces are problem areas in the scope of preventive Orthodontics. The supervision of caries control, teeth eruption sequence and the treatment of the local factors which may influence the eruption of the permanent tooth are done during this period. With the recent improvement in diagnostic tools, novel potential therapeutic devices and techniques it is now easier for the orthodontist to adopt several techniques in the clinic to prevent the occurrence of malocclusion. However, the most significant barrier to providing the preventive orthodontic care by the practitioners may be related to the lack of self-confidence relating to the effectiveness of their chosen treatment plan. When preventive dentistry is practiced properly it helps in the proper development of functional occlusion and reduces the chance of the development of malocclusion. This article will focus on various aspects of preventive orthodontics.

Keyword: Preventive Orthodontics, Premature Tooth Loss, Deciduous Dentition, Malocclusion.

Introduction

Preventive orthodontics is the part of orthodontic practice which is concerned with patient’s and parents education, supervision of the growth and development of the dentition and the cranio-facial structures & the diagnostic procedures undertaken to predict the appearance of malocclusion and the treatment procedures instituted to prevent the onset of malocclusion.

According to Graber Preventive orthodontics can be defined as “action taken to preserve the integrity of what appears normal for that age” Preventive procedures are undertaken in anticipation of development of a malocclusion. Patient education literature must be used by all means¹.

The following are some of the procedures undertaken in preventive orthodontics:

Education of Parents: Preventive dentistry should begin much before the birth of child. Expecting mother should be educated on proper nursing and care of the child. In case the child is being bottle-fed, the mother is advised to use physiologic nipple. Conventional nipples are non-physiologic and do not permit sucking by movement of the tongue and the lower jaw. They cause sucking action which might cause orthodontic problems like, increased overjet/overbite and open bite. On the contrary, physiologic nipples are broad and wider, designed in such a way so as to permit sucking which resembles normal functional activity as in breast feeding.

As the child grows, parents should be educated about the need for maintaining good oral hygiene and proper brushing technique. Fluoride application and dental checkup should be done every 6 months.¹,²

Care of Deciduous dentition: Preventive orthodontics includes care of the deciduous dentition by way of prevention and timely restoration of carious teeth. Deciduous teeth act as natural space maintainers until the developing permanent teeth are ready to erupt into oral cavity. All efforts are taken to prevent early loss of deciduous teeth. Simple preventive procedures such as proper and timely application of fluoride topically/ pit and fissure sealant application help in preventing caries.

Corresponding Author**
Snigdha Pattanaik
Associate Professor, Department of Orthodontics, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar 751003, Odisha, India
e-mail: dr.snigdhapattanaik@gmail.com
Complex treatment procedures may also be followed to maintain the deciduous teeth which includes various pulp therapy and stainless-steel crown delivery.

Caries Control: Caries control should be done with proper diet and oral hygiene. Maintenance and regular dental checkup. Regular fluoride application, prophylactic odontotomy, application of pit and fissure sealants and immunization should be done to reduce the incidence of caries. Caries involving proximal surface of deciduous teeth if not restored early may lead to loss of arch length into that space. Caries can be detected by clinical and radiographic examination. Bitewing radiograph proves to be of great help in detecting proximal caries. Once detected, proper restoration of affected teeth should be done to prevent loss of arch length. Restoration should restore the mesio-distal dimension of tooth, but should not be over/under extended allowing drift of contiguous teeth or promote food impaction. Contact size and position should also be correct. Re-establishment of proper inclined plane relationship with proper anatomic carving will be esthetic and will result in normal function and stability of occlusion.

Maintenance of quadrant wise tooth shedding

Time table: There should not be more than 3 months difference between the shedding of deciduous teeth and eruption of permanent teeth in one quadrant as compared to other quadrants. Delay in eruption may be due to any one of following reasons: Presence of over retained deciduous teeth/roots, Supernumerary tooth, Cysts, Overhanging restoration in deciduous teeth, Fibrosis of gingival, Ankylosis of primary teeth, and absence of the permanent tooth bud.

Extraction of supernumerary teeth:

Supernumerary & supplemental teeth can interfere with eruption of nearby normal teeth. They may cause deflection and abnormal eruption of the adjacent teeth. They should be identified and extracted before there is any displacement of adjacent teeth.

Eliminating Occlusal Interference:

Occlusal interferences may lead to deviations in mandibular path of closure and may predispose the child to bruxism. Occlusal interferences can be detected by using articulating paper and should be removed by selective grinding.

Management of ankylosed teeth: “Ankylosis is a condition characterized by absence of periodontal membrane in a small area or the whole of the root surface.” They do not resorb naturally and prevent or deflect the eruption of permanent teeth. Diagnosis of such tooth and surgical removal at an appropriate time is required for normal eruption of permanent tooth.

Management of abnormal frenial attachments:

Thick and fleshy maxillary labial frenum leads midline diastema which can be diagnosed by blanch test and should be treated at an early stage for prevention of malocclusion.

Space Control in Deciduous Dentition:

An important part of preventive orthodontics is the correct handling of spaces created by the untimely loss of deciduous teeth. Commonly people think that deciduous teeth are going to be lost in due course and there is no need for repair. Unfortunately, some dentists also give the same suggestion, probably because the children are comparatively more difficult to manage. Conservation of every millimeter of space in each child’s original dental arch should be the direct treatment goal of the dentist guarding the developing dentition. The failure to correct the position of an ectopically erupting 6-year molar or to guard against the lingual tipping of newly erupted lower permanent incisors by muscular forces could cause a loss of valuable space.

The main causes for decrease in arch length during the stage of mixed dentition period are the loss of space due to carries caused by interproximal carious lesion in primary teeth and early loss of primary teeth by extraction or caries. Premature loss of deciduous teeth is best tackled with space maintainers.

Whenever a deciduous tooth is lost prematurely than it would normally be shed, predisposing the patient to malocclusion a space maintainer should be placed. Primary dentition is essential for growth of jaws, for normal function and eventually for normal position and occlusion of permanent teeth and so premature loss of primary tooth is to be avoided. Early loss of primary teeth may affect the masticatory function if posterior teeth are lost. Before speech develops in a child if there is loss of anterior teeth it affects speech development, which might become difficult to overcome. Premature primary tooth loss leads to excessive eruption of opposing tooth. Undoubtedly, the premature loss of an primary teeth alters appearance of child which in some cases may produce undesirable psychological effects. Parents usually accept loss of anterior teeth after 6 years of age, but when lost at an early age, some parents are concerned by appearance of remaining dentition.
Attitudes of parents and child towards dental health and care are largely influenced by attitude of dentist towards preservation of primary dentition. Any suggestion that the primary dentition is important is reflected as a positive awareness and motivation towards dental care in minds of parent and child. Space closure after premature loss of tooth is most important sequelae. Space closure by drifting of adjacent teeth into the edentulous space may prevent eruption of succedaneous tooth or deflect or may force it to take an abnormal eruption path. Asymmetric loss of primary tooth that is loss of tooth only on one side of arch may lead to drifting of teeth into extraction site and shift of dental midline.

‘Space Control’ refers to a careful supervision of the developing dentition, it reflects an understanding of the dynamic nature of occlusal development. Space maintainers is a mechanical device which is intended to maintain space which was previously occupied by tooth/teeth in order to prevent further dentofacial anomalies and malocclusion. 8

**Conclusion**

Preventive orthodontics, as a discipline encompasses all the necessary steps to provide proper transition of primary to permanent dentition without any problems into proper functional, esthetic and occlusal relationships helping in proper growth and development of the jaws and face. Thus, prevention is better than cure’ is applied to the role of preventive orthodontics in dentistry.

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**Reference**

Minimal Invasive Surgical Approach for Treatment of Excessive Gingival Display: A Case Report

Gatha Mohanty¹, Abhaya Chandra Das², Anurag Satpathy³, Saurav Panda², Rinkee Mohanty⁴

¹Senior Lecturer, ²Reader, ³Professor, ⁴Professor and Head, Department of Periodontics and Oral Implantology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

‘Gummy smile’ often the common term used for excessive gingival display may be a source of embarrassment for patients especially when esthetics is a major concern. To reduce the gingival display, a surgical technique was planned that limits the pull of elevator lip muscles by shallowing the vestibule, thereby reducing the excessive display of gingiva when patient is smiling. The procedure is predictable, safe with minimum risks and side effects. It serves as an alternate modality in esthetic treatment.

Keywords: Excessive gingival display, surgical lip repositioning, facial esthetics, gummy smile.

Introduction

Enrichment of facial beauty is inherent to any dental treatment strategy since the smile impacts an individual’s personality¹, ². Restorative dentistry aims to create a pleasing patient smile. However, patients reporting with skeletal and gingival deformities might require a complex and comprehensive esthetic rehabilitation or a multi-disciplinary approach ³-⁵.

Around 50% of patients exhibit some form of a gingival display. This display between the lower border of upper lip and the gingival margin of the central incisors during a normal smile is 1-2 mm⁶, ⁷. In contrast, a gingival display of 4mm or more is considered unattractive by in general ⁸. There could be several causes of excessive gingival display such as delayed eruption, incompetent upper lips⁹ or maxillary vertical excess ¹⁰. The present report presents a case of management of excessive gingival display through a minimally invasive surgical approach.

Case report: A 20-year-old female patient was referred to our outpatient department with the chief complaint of protruded upper front teeth and gummy smile. The patient was cooperative and had no tissue abuse habits. She was concerned for her compromised esthetics and was seeking a correction of the same. Her family history and medical history was non-contributory. No abnormality was detected on extra-oral examination. Intraoral clinical examination revealed a normal gingiva with stippling and gingival hyperpigmentation. However, the smile line presented by the patient was high revealing with 5-6mm of excessive gingival tissue display which extended from maxillary right first premolar to maxillary left first premolar (Fig1). A diagnosis of severe vertical maxillary excess was made. A treatment plan comprising of orthognathic surgery followed by fixed orthodontic treatment was presented to her as a definitive treatment plan. However, the patient wanted a less invasive procedure that would only reduce the chief complaint of excessive gingival display. Thus, a lip repositioning surgery was decided. Procedure was verbally explained to the patient in the language of her understanding and an informed written consent was obtained.

Procedure: After all haematological investigations and due description of the procedure the patient was administered local anaesthesia with lignocaine hydrochloride and 2% adrenaline at 1:100,000 to anesthetize the upper lips and the area between maxillary premolars. Local infiltration was administered in the...
buccal vestibule and extended to achieve additional hemostasis. Upper lip was retracted and an incision outline was marked with indelible marking pencil after drying the tissues with a sterile gauge (Fig 2). A split thickness incision was made following the mucogingival line using a no 15 Bard Parker blade and handle. A second parallel incision was also made 11-12 mm from first incision. Both these incisions were joined at the mesial line angles of maxillary first premolars on either side creating an elliptical outline (Fig 3). Considering the fact that the amount of tissue excision should be two times of the gingival display to be minimised, 10-12 mm tissue was excised. Epithelium was removed within the incision outlines with exposure of submucosa and released for attached fibres (Fig 4). Bleeding was controlled with finger pressure and use of additional local anaesthesia. Stabilization sutures were placed to approximate the tissues with 5-0 vicryl with proper alignment of the first and second incision lines (Fig 5). Hemostasis was achieved by additional digital pressure.

The patient was cooperative and recovered well. Verbal and written post-operative instructions were given. She was prescribed non-steroidal anti-inflammatory drugs for pain relief. She was advised to apply cold compressions for few hours post-operatively.
and was asked to restrict lip movement for few days. After 48 hrs, she complained of tightness around the upper lip while smiling but it was not associated with any swelling. Healing was uneventful and sutures that became loose were removed over a period of four weeks. The procedure limited the functionality of elevator muscles thus reducing gingival display. Patient was pleased with the esthetic outcome. One month (Fig 6) and three months (Fig 7) follow up also showed stable results with increase in lip competency and decrease in gingival display. Overall results were satisfactory.

Fig 6: One month post-operative comparison at rest

Fig 7: Three months post-operative comparison of smile

Discussion

This case report presents a minimally invasive procedure to minimise the amount of gingival display in patients with vertical maxillary excess. The results showed a stable and satisfactory result up to 1 year. Excessive gingival display can occur due several reasons such as vertical maxillary excess, excessive gingival overgrowth, altered passive eruption, anatomically short upper lip, hypermobile muscles of the upper lip or a combination of any of these factors11, 12.

In cases with vertical maxillary excess, an orthognathic surgery is usually required for the correction. In the current case also, gummy smile was a result of vertical maxillary excess. However, patient was not willing to undergo an orthognathic surgery and opted for lip repositioning procedure, which is a minimally invasive procedure in comparison to orthognathic surgery. Further, orthognathic surgery is requiring hospitalisation and is associated with high morbidity and increased.

Lip repositioning is commonly a plastic surgical procedure. Alloplastic or autogenous separators can also be used to prevent reattachment of smile muscles13. Rhinoplasty along with lip repositioning can be performed where the nasal approach combines both procedures with minimal surgical extension14. The presented procedure is relatively safe and had minimum side effects. Although technique sensitive, it is easy and cost effective. Besides results were immediate. This case was uneventful though few cases have reported mucocele, swelling and discomfort15.

Several case reports9, 10 have documented successful outcome of lip repositioning surgery. In a case series of seven cases16, a mean reduction of excessive gingival display in excess of 6 mm was achieved. Our case deals with vertical maxillary excess which is similar to that reported by Ambrosio et al 17 which reported a stable result till two years. Also, Balasubramaniam et al 18 reported a similar stable result with lip repostion surgery in a patient with vertical maxillary excess up to 1 year.

Conclusion

Surgical lip repositioning is a safe procedure to minimise excessive gingival display by re-positioning upper lips. Although the long-term stability remains questionable, still this procedure remains a viable alternate treatment modality in esthetic rehabilitation.

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References

Unusual Presentation of Dentigerous Cysts Arising from Complex and Compound Odontomas

Shubhangi Pareek¹, Swagatika Panda², Subrat Padhiary³, Sreepreeti Champatyray⁴, Neeta Mohanty⁵

¹Post Graduate Trainee, ²Reader, ³Professor, Department of Oral Surgery, ´Senior Lecturer, ⁵Professor and Head, Department of Oral and Maxillofacial Pathology and Microbiology, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

An Odontoma arises from developing extra-odontogenic epithelial components of the dental lamina giving rise to an extensive group of tissues which are usually arranged in an aberrant manner, comprising of sound enamel, dentin, cementum as well as pulp. A composite odontome on the other hand has well organized dental tissues making the lesion resemble and have more tooth-like structures. Dentigerous cyst may also sometimes arise in association with such odontomas having a more aggressive behaviour as well as recurrence, hence requiring an accurate histopathological diagnosis, treatment modalities and restablishment of its prognostic potential. This article highlights two case reports of dentigerous cyst arising from complex and composite odontomes.

Keywords: Odontoma, Hamartoma, Complex compound odontoma, Dentigerous cyst, Odontome.

Introduction

The word odontoma is any tumor of odontogenic origin with fully differentiated epithelial and mesenchymal components leading to the deposition of bizarre enamel and dentin by the ameloblasts and odontoblasts respectively.¹ This is so because the alignment of odontogenic cells does not reach the typical state of morphodifferentiation. It is a hamartomatous malformation rather than a neoplasm designating 67% of all odontogenic tumors.²

Case 1: A 24-year-old woman presented with pain and discomfort in the left posterior mandibular jaw region since 6 months. There was no associated medical history. On inspection, a single, hard, well defined bony mass was present on occlusal surface of 38, extending from occlusal surface to distal surface of tooth with attachment to soft tissue, measuring about 3mm x 5mm in size, with a rough surface and non tender on palpation. Intraoral radiograph revealed an irregularly shaped radio-opacity surrounded by a well-defined radiolucency attached to the occlusal surface of 38, which extended distally to involve the soft tissue (Figure 1). Based upon these findings a provisional diagnosis of odontome was given. Complete surgical excision was performed and tissue was sent for histopathological examination. The calcified mass (Figure 2) and soft tissue (Figure 3) were separated and processed individually.

Corresponding Author**
Swagatika Panda
Reader, Department of Oral and Maxillofacial Pathology and Microbiology, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India
e-mail: swagatikapanda@soa.ac.in

Figure 1. Intraoral periapical radiograph showing a radio-opaque mass surrounded by a radiolucent rim in association with impacted mandibular 3rd molar.
region of the jaw since 1 year. There was no associated medical history. On inspection, a roughly round shaped swelling extending from 22-25 region, with congenitally missing maxillary left canine along with obliteration of labial vestibule. Panoramic radiograph showed well defined radiolucent area with corticated border and impacted 23 pushed superiorly. An area of focal calcification was present within the radiolucency with deviation of regional teeth (Figure 4). Based upon these findings a provisional diagnosis of adenomatoid odontogenic tumor was given. After proper surgical excision the tissue was sent for histopathological examination. The calcified (Figure 5) and cystic components (Figure 6) were processed individually.

Case 2: A 20-year-old woman presented with slow growing, painless swelling in the left maxillary anterior region of the jaw since 1 year. There was no associated medical history. On inspection, a roughly round shaped swelling extending from 22-25 region, with congenitally missing maxillary left canine along with obliteration of labial vestibule. Panoramic radiograph showed well defined radiolucent area with corticated border and impacted 23 pushed superiorly. An area of focal calcification was present within the radiolucency with deviation of regional teeth (Figure 4). Based upon these findings a provisional diagnosis of adenomatoid odontogenic tumor was given. After proper surgical excision the tissue was sent for histopathological examination. The calcified (Figure 5) and cystic components (Figure 6) were processed individually.

Based upon the histopathological findings, a final diagnosis of ‘dentigerous cyst associated with complex composite odontoma’ was made.

**Figure 2.** Photomicrograph of H&E stained section reveals aberrantly arranged eosinophilic stained material with a dentin-like structure (10x view).

**Figure 3.** Photomicrograph of H&E stained section showing a thin, non-keratinized epithelial lining similar to dentigerous cyst lining (10x view).

**Figure 4.** Panoramic radiograph revealed a well defined radiolucent area with corticated border and impacted 23 pushed superiorly. An area of focal calcification is also present within the radiolucency with deviation of regional teeth.

**Figure 5.** The microscopic picture of decalcified section showed eosinophilic material resembling odontome (4x view).
Based upon these findings, a final diagnosis of 'dentigerous cyst associated with compound odontoma' was made.

Discussion

Dentigerous cyst and complex odontoma are very frequent lesions of the oral cavity but very rarely do they occur concomitantly often leading to improper diagnosis and significant jaw destruction. An odontoma passes through similar stages of tooth development so in the initial stage where there is resorption, it is radiolucent followed by an intermediate stage of incomplete calcification, giving a mixed radiolucent and radiopaque appearance on the radiograph. The most radiopaque stage indicates completion of calcification. Compound odontome contains odontogenic tissues in an orderly fashion with the resulting structure having morphologic similarity to teeth but on the other hand complex odontomes are formed by improper arrangement of tooth components without any resemblance to the normal. Some tumors on the other hand are combination of these two types and are called compound complex odontomes (having not only ample teeth-like structures but also calcified mass of dentin tissues in a bizarre manner) 62% of the compound odontome has a predilection for anterior maxilla, without any gender predominance. 68% of the complex odontomes occur in posterior mandible more so in females.

Classification:

According to World Health Organization (WHO) classification, odontomes are classified as:

- Complex odontome: In this type, calcified tissues are in a disorganized fashion with no resemblance to the normal.
- Compound odontome: The odontogenic tissues are present in a well defined manner, giving rise to various teeth-like structures, bearing no morphologic similarity to normal teeth.
- Ameloblastic fibro-odontome: Different quantities of calcified dental tissue and dental papilla-like tissue present, with the dental papilla resembling an ameloblastic fibroma. It is regarded as an immature forerunner of complex odontoma.

A recent variety known as hybrid odontome is also described by some authors.

Etiology:

The precise etiology of odontome is unknown. Some authors suggest the role of trauma and infection in the formation of these lesions while some authors like Hitchin proposed that they are either inherited or due to mutations, mainly postnatal, during tooth development.

Odontomas are mostly found before the second decade of life. The dentigerous cyst on the other hand originates from the follicle of a tooth germ or unerupted tooth or in rare occasions from an odontome containing the same with in it. It progresses by the cystic degeneration of the epithelial counterpart and eventually by fluid buildup mechanism between the reduced enamel and tooth enamel. Their ability to grow in size and destroy the jaw bones, these cysts cause root resorption of the adjoining teeth with neoplastic transformations like ameloblastoma or carcinoma. Thus they should be completely enucleated and thoroughly examined histopathologically.

Conclusion:

Odontomas are non-aggressive, often remain symptomless and may be accidentally discovered during routine radiography. Dentigerous cyst on rare occasions can arise in relation to an odontome increasing the possibility of the combined lesion to grow large in dimension and display an aggressive behavior. The ability of dentigerous cyst to undergo neoplastic transformation and invasion demands a proper and

Figure 6. The soft tissue section showed thin, non-keratinized epithelial cystic lining resembling reduced enamel epithelium classical of dentigerous cyst (4x view).
total enucleation during surgical procedures and also highlights the significance of a proper histopathological diagnosis

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**References**


Surgical Clinical Crown Lengthening: A Prerequisite for Crown Placement in Fractured Teeth

Abhaya Chandra Das1, Saurav Panda1, Manoj Kumar1, Saumya Kanta Mohanty2

1Reader, Department of Periodontics and Oral Implantology, 2Reader, Department of Conservative and Endodontic, Institute of Dental Sciences, Siksha ‘O’ Anusandhan, (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

Treatment options for a fractured tooth, particularly at the level of gum, are extremely limited. While restoring such fractured tooth, the biologic width must be considered. This can be maintained sometimes by surgical crown lengthening procedure. Here, one patient with fractured 21 and 22 reported. In the case, gingivectomy was carried out to remove gingiva around the neck of the tooth under local anesthesia followed by removal of the circumferential bone in the gingival sulcus. A significantly increased length of clinical crown in all aspect was achieved. Then customized posts with cores were prepared and then teeth were restored and two-unit crowns were placed after 6 weeks post-surgically. The marginal periodontal tissue shows well, healthy conditions during 6 months period of healing. Thus, the fractured teeth were restored by creating biologic width by crown lengthening procedure.

Keywords: Fractured tooth, biological width, endodontic treatment, crown lengthening, gingivectomy, post and core.

Introduction

Periodontal health acts as pivotal role for the success of any dental treatment.1 Prior to initiate any dental procedures such as restorative, esthetic or implant dentistry, active periodontal disease should be managed and controlled to have the long-term success, comfort, good function, treatment prognosis and maintenance care.2 However, in compromised short clinical crown, the retention of crown is difficult. Surgical clinical crown lengthening, extrusion of tooth by orthodontic treatment are the option to increase the clinical crown length.3

Crown-lengthening procedures: Surgical clinical crown-lengthening procedures are carried out to increase retention form, which ultimately allow proper tooth preparation, impression procedures,2 and placement of restorative margins and adjustment of gingival levels for aesthetics.3,4 To preserve the biological width is utmost important while performing the surgical crown lengthening procedure. The biologic width is the summation of the physiologic dimension of the junctional epithelium and connective tissue attachment. This measurement has been found to be relatively constant at approximately 2 mm (±30%).5 It has been suggested that there may be development of gingival inflammation, formation of pocket, and loss of alveolar bone, if violation of biologic width has been done by the placement of restoration within its zone.6,7 Consequently, it is mentioned that there should be a minimum of 3.0 mm distance between the gingival margin of crown and alveolar bone crest.8-11 This permits for adequate biologic width when the restoration is placed 0.5 mm apical to the gingival margin.10,11

Surgical clinical crown lengthening may include either the removal of gingival tissue (gingivectomy or flap technique) or both gingival tissue and alveolar bone (alveolectomy).12 Gingivectomy alone is indicated in case of adequate attached gingiva and presence of more than 3 mm of tissue coronal to the bone crest.12 In case
of inadequate attached gingiva and less than 3 mm of soft tissue; a flap procedure along with bone contouring (alveolectomy / or alveoloplasty) is required. In case of caries or tooth fracture, the surgical clinical crown lengthening should provide a minimum of 4 mm distance from the apical extent of the caries or fracture margin to the alveolar bone crest in order to ensure Ferrule effect and have adequate retention.12

Case report: A 25 years old man reported in the Department of Periodontics, with fractured anterior teeth. On intra oral examination, Ellis class III fracture in 21 and 22 (Figure 1) was found, the distance from the marginal gingiva to alveolar crest was 4 mm and 3 mm in 21 and 22 respectively.

Figure 1. Ellis class III fracture in 21 and 22

Oral prophylaxis and endodontic treatment were carried out. Then, gingivectomy was carried out to remove gingiva around the neck of the teeth (Figure 2) under local anaesthesia (2% lignocaine hydrochloride with 1:80,000 epinephrine) followed by removal of the circumferential alveolar bone (Figure 3) with the help of round diamond bur carefully.

Figure 2 Marking done for gingivectomy

3. Part of alveolar bone removed circumferentially

A significantly increased length of clinical crown in all aspect was achieved (Figure 4). With the help of Gates-Glidden reamer (Mani, INC, Japan) number 4 for 22 and number 5 for 21, post spaces were prepared by removing part of gutta percha in both teeth. At least 4 to 5 mm of the obturating material should be left at the apex in order to have an endodontic seal.13 Then impression was made with rubber base material and model cast was prepared. Then customized posts with cores were prepared in laboratory. Then posts with cores were cemented by using glass ionomer cement inside the teeth. Then teeth were restored (Figure 5) and two-unit crowns were placed after 6 weeks post surgically (Figure 6). Marginal periodontium was observed to be healthy during a 6-month recall period.

Figure 3. Part of alveolar bone removed circumferentially

Figure 4. Increased length of clinical crown

Figure 5. Post and cores placed
Figure 6. Two-unit bridge placed

Conclusion
The constructive interdisciplinary approach with proper diagnosis, comprehensive treatment plan should be carried out to have patient comfort, function, esthetic, longevity, maintenance of the restoration. Surgical clinical crown lengthening, which is one of interdisciplinary approach, may be a prerequisite for crown placement in a fracture tooth. Thus, in this case the fractured teeth were restored by creating biologic width by using surgical crown lengthening procedure.

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References
Immediate Placement of Implants in Fresh Maxillary Anterior Tooth Region: 18 Months Follow Up: A Case Report

Monika Samal1, Sreeprada Dash1, Gunjan Srivastava2, Sitansu Sekhar Das2, Bodhisatta Mukherjee1

1Post-graduate Trainee, 2Professor; Department of Prosthodontics, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

Implant placement in the anterior maxilla poses highest amount of aesthetic challenges concerning with bone loss after extraction of tooth, that is followed by collapse of the buccal gingiva. This leads to a scenario where implant placement becomes difficult and the aesthetic of the surrounding mucosa is compromised. Through the process of immediate implant placement just after the extraction reduces the treatment time and cost, preserves the aesthetic of the surrounding mucosa and increases the comfort of the patient. here in this case report, we have discussed the results of an immediately placed implant in the region of maxillary left and right lateral incisor region with bone regeneration using a non-resorbable membrane and no other graft materials. in the 18 months follow up, the implant placement showed a stable peri implant condition which was confirmed through clinical and radiographic evaluation.

Keywords: Immediate extraction, dental implant, immediate placement, ridge preservation, aesthetics.

Introduction

Tooth loss in the esthetic zone most often results in the loss of bone volume in the vertical and horizontal directions. In order to prevent crestal bone resorption immediate implant placement in the extraction socket was introduced(1). It was first introduced by Schulte, who placed an implant in to the tooth socket immediately after extraction that helped to maintain the periodontal architecture and maintained the gingival contour (2). The indications for immediate implant placement were determined basing upon the ability of the appropriately sized implant to attain primary stability in an ideal restorative position. The timing of implant placement is mainly decided through certain factors those are soft tissue contour and bone quantity and quality of the surrounding bone, the presence of pathological condition and the condition of contralateral teeth(3). To achieve this, there are 5 factors to be considered that can help to prevent blunders which lead to difficult esthetic situations. The following are (I) the presence of a buccal plate of bone, (II) primary implant stability, (III) design, shape and size of the implant (IV) soft tissue and hard tissue grafting between the buccal plate and the implant and (V) gingival biotype (4). The virtues of immediate implant placement in the upper anterior region includes reduction in the treatment time and preservation of the remaining osseous and gingival morphology. This article presents clinical case of immediate implant placement in freshly extracted socket of a left lateral incisor region and right lateral incisor region.

Clinical Report

A male patient, aged 25 years, reported to the Department of Prosthodontics at Institute of Dental Sciences, Bhubaneswar, with the chief complaint of missing teeth in upper anterior region. A clinical evaluation (Figure 1) revealed missing teeth in relation to 12, 11, 21 and slight discoloration with respect to 22. The patient was explained regarding the present state, other treatment options and the planned treatment protocol which included immediate extraction of 22 and implant placement in that region. The patient was very cognizant about his aesthetic and was very keen for the best possible rehabilitation of his teeth and so he opted for proposed procedure.

Corresponding Author**
Gunjan Srivastava
Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India
e-mail: drgunjans22@gmail.com
An CBCT was advised for appropriate treatment planning. The CBCT revealed fractured 22 tooth with unfavourable diagnosis. Immediate extraction of 22 and placement of two root form implants in the region of 12 and 22 was decided as the treatment plan. Equinox myriad plus implants of size 3.8×13mm was chosen for right maxillary lateral incisor region (12) and 3.8×13mm size implant was chosen for left maxillary lateral incisor region (22). The fractured tooth (22) was atraumatically removed after an injection of 2% lignocaine hydrochloride with 1: 100,000 epinephrine local anaesthetics (Figure 2). The extraction socket was debrided and sequential osteotomy was done in the maxillary left lateral incisor region by pilot drill (2.0mm diameter) followed by 2.3mm drill and 3.8mm drill was done up to the length of 13mm mark. The same osteotomy procedure was followed for the maxillary right lateral incisor region and the osteotomy drill was done up to a diameter of 3.8 mm drill & the length of 13mm mark. Parallelism of the osteotomy sites were checked & after confirming the parallelism, Equinox Myriad Plus implants were placed in the maxillary left and right lateral region (3.8×13mm) with the insertion torque of 20Ncm (Figure 3). Radiographic confirmation was done & cover screws were inserted (Figure 4). 3 months later radiographs were taken to check for the Osseo-integration of implants. Cover screws were then removed following which gingival formers were placed respectively and then sutured (Figure 5). Straight or angulated abutment could not improve the angulation issues so a castable abutment (Figure 6) was preferred for the patient in order to enhance the aesthetics in the anterior zone.

After 15 days impression was made in close tray technique. Jig trial was done for the patient to check the appropriate angulation of the abutments and the correctness of the impression made earlier. Cement retained Zirconia crowns were fabricated along with gingival porcelain to mask the gingival defect. After 1 week, the implants were loaded with cement retained zirconia crowns (Figure 6,7). Patient follow up was done after 7 days, 1 month and 6-month, 1 year, and 18 months (Figure 8) subsequently.
Discussion

Immediate implant placement is mostly indicated in cases where extraction of the tooth occurs due to trauma, root fracture, External root resorption, unfavourable crown-root ratio, and intact bone walls of the socket (5). This is most commonly opted treatment plan in the loss of anterior teeth. The success rate of immediately placed implants in maxilla is 66%-95.5% and in mandible 90%-100.(6)

In such cases, the number of surgical visit and time of treatment is reduced as compared to conventional method of tooth extraction and regeneration followed by implant placement at the second surgical visit i.e. after 4 to 6 months of regenerative therapy. An adequate treatment plan was made that comprised of soft tissue treatment protocol that involved a set of well-defined aesthetic goals which included restoring the gingival defect with appropriately shade matched gingival porcelain. In this case report, primary stability was achieved without the use of any bone augmentation procedure as the implant diameter approximates the socket dimension and we are pleased with the gingival aesthetic. Furthermore, in cases with extreme angulation problems where a prefabricated abutment and angulated abutment cannot be used, a customised castable abutment is preferred in order to accommodate proper coping and crown designs. The long-term success of an implant immediately placed in to the extraction socket of a lateral incisor and achieving finest aesthetic in the anterior maxilla is demonstrated in this report. The main objective of our study was achieved thorough proper gingival & anterior aesthetics and optimum patient satisfaction.(8)

Conclusion

Immediate implant placement following extraction of tooth is a feasible and probable solution in case of tooth loss. Minimally invasive surgical procedure, reduced chairside time and treatment procedure along with minimum post extraction complications, preservation of gingival contour and integrity are a benefit not only to the patient but also to the clinician. However appropriate case selection, proper diagnosis and treatment planning, scrupulous post-operative treatment care preceded by an effective surgical and prosthetic protocol forms the necessity in the long term success of the immediate implants.(9) This case report demonstrates that immediate implantation to fresh extraction socket in the upper anterior region is an alternative, predictable surgical
treatment plan in replacement of missing teeth having better prognosis.

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**References**


Recurrent Respiratory Papillomatosis: A Comprehensive Review

Santosh Kumar Swain¹, Priyanka Debta², Smrutipragnya Samal³, Jatindra Nath Mohanty⁴, Fakir Mohan Debta⁵, Anurag Dani⁶

¹Professor, Department of Otorhinolaryngology, IMS and SUM hospital, ²Associate Professor, Department of Oral Pathology and Microbiology, Institute of Dental Sciences, ³Ph.D. Scholar, ⁴Research Associate, Medical Research Laboratory, IMS and SUM hospital, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India, ⁵Associate Professor, Department of Oral Medicine and Radiology, S.C.B. Dental College & Hospital, Cuttack, India, ⁶Professor, Department of Prosthodontics, CDCRI, Rajnandgaon, Chhattisgarh, India

Abstract

Recurrent respiratory papillomatosis (RRP) is a benign lesion found in the respiratory airway due to infection of human papillomavirus (HPV). RRP can affects children to young adults. Most of the pediatric occur at birth which contaminated from birth canals of the mother. In adult patients, the infections transmitted via sexual route. The sores are frequently observed as exophytic knobs, for the most part in the larynx and some of the time at the tracheobronchial trees nasopharynx and lung parenchyma. The disease is frequently random and differ from spontaneous reduction to aggressive importunate or recurrence in nature. Although it is a rare happening, RRP has chance for malignant transformation to squamous cell carcinoma. The diagnosis is confirmed by histopathological examination. Hence, no specific treatment for RRP available till date. Along with several adjuvant therapies, surgery is the eventual treatment option.

Keywords: Recurrent respiratory papillomatosis; Human Papilloma virus; Larynx; Laser, Benign.

Introduction

RRP is a self-constraining disease and benign growth brought about by human papilloma virus (HPV), where the sores found in the aerodigestive tract.¹ Bimodal age dissemination is related with RRP where characteristic kids and youthful adults are frequently influenced.¹ This disease is transmitted by contact with contaminated discharges from birth channel. The histopathological presentations are benign squamous epithelium stratification.² This lesion typically confined to the larynx but sometime observed at the tracheobronchial area, nasopharynx and exceptionally found at the lung’s parenchyma.³ The diagnosis of RRP fluctuate from spontaneous reduction to aggressive importunate or recurrence and transmigrating to lungs. The analysis of RRP depends on clinical presentation medical records and imaging. But the last finding of RRP is constantly relied on histopathological analysis where samples are taken from the sores of the larynx and trachea. It regularly starts at the commissure and anterior piece of the vocal strings and later on includes every one of the pieces of the larynx and even lower aviation route like trachea, bronchi and lung parenchyma in certain patients. The lesions of the laryngeal papillomatosis are usually multiple in numbers and rarely solitary.⁴

Epidemiology: The occurrence of RRP is about 4 per 1lakh in kids and only 2 persons per 1 lakh in adults.⁵ The incidence of RRP varies according to different factors like age and socioeconomic status.⁵ These are higher among low educational and socioeconomic backgrounds.⁶ But again the severity of the diseases cannot be associated with socioeconomic status.⁵ The prevalence of HPV infections is more among females. The prevalence of the disease among female is 26.8% in 14-59 years of age and 45% in 20-24 years of age.⁶ The infantile type found in the patients of having
less than twenty years of age. The juvenile type has aggressive presentations with several papillomatosis lesions and also has found high recurrence rate. After the of 20 years, the adult form of RRP is found and more commonly seen in male. In adult RRP, the papillomatosis lesions are frequently solitary with having high extent of inflammation which do not spread and has less chance of recurrence and less common than juvenile type. HPV infection mostly occur during birth as birth canal acts as source of infection. Sometimes transmission of contamination happens preceding birth by means of the placenta in roughly 12% of cases. Anogenital warts of the mother act as risk factors for juvenile type of RRP. Nearness of maternal anogenital papillomatus sores during pregnancy period or during birth of infant increases the danger of RRP by around 231 multiple times in contrast with the nonappearance of such injuries at the season of birth. In grown-up patients, HPV is transmitted explicitly by means of oral contact with contaminated genitalia. Sexual activity increases the risk for HPV infections in adults.

**Etiopathology:** RRP is caused by a virus called HPV, for the most part by the subtypes 6 and 11 which are likewise found in the genital condylomas. Similarly, the subtypes of HPV 16 and 18 are likewise associated with laryngeal papillomatosis and in uterine cervical carcinoma. HPV is a DNA virus which can parasitizes the upper epithelial cells nuclei. It has inclination for the regions where there is an intersection of squamous and ciliary columnar epithelium. The normal area of the RRP are limen vestibule, mid-zone of the laryngeal surface of the epiglottis, nasopharyngeal surface of the soft palate, lower and upper margins of the laryngeal ventricle, carina, under surface of the vocal cords and bronchial spurs. HPV mostly contaminates the basal epithelial layer of the mucous layer by means of minor abrasion. At that point it stimulates the epidermal development factor receptor pathway and restrains diverse tumor-suppressing proteins, finishing in cell multiplication and epithelial separation. These system lead to cauliflower like exophytic mass sores, regular of RRP. These development frequently found in the transitional regions between the squamous epithelium and the ciliated columnar epithelium. The nodular development of RRP frequently found in the larynx (Figure 1), however, regularly include the ventricles, subglottis, laryngeal surface of the epiglottis and at vocal folds. RRP can also affect any region of the aerodigestive tract and stretch out to the tracheobronchial tree and lung parenchyma. RRP influence distal aviation route in just 2 to 5% of the patients with papilloma of the larynx while the pulmonary parenchyma is influenced in just 1% of cases.

**Clinical Presentations:** Juvenile RRP patients presents with multiple lesions and high chance of recurrence. However, in adult RRP, the papilloma can be aggressive and less prone for recurrence. The common clinical presentations are progressive voice hoarseness, stridor and respiratory distress. Cough, failure to thrive and dysphagia are rare. In kids, the clinical presentations include stridor and breathing difficulty and triad of progressive voice hoarseness. In adult patient, the commonest clinical presentation is voice hoarseness. On examination, patients present with wheezing, tachypnea, stridor and accomplice muscle retraction in respiration. In some severe cases, patients often present with respiratory distress and airway obstruction. Due to several non-specific clinical presentations, RRP may mimic to common laryngeal diseases like laryngitis, bronchial asthma, bronchitis and croup. Peripheral dissemination of the lesions may cause recurrent pneumonia, atelectasis and malignant degeneration with presentations of dyspnea, hemoptysis, fever and cough. RRP is often confused with pulmonary tuberculosis. Sometimes the clinicians classify the RRP into aggressive and non-aggressive based on the severity of the symptoms. Destructive RRP is portrayed by prerequisite of at least ten surgeries with at least three surgical procedure being done inside one-year length or by when the illness spread distally towards the subglottic aviation route. Non-aggressive RRP is described by the necessity of less than ten surgeries with lesser than three surgery procedures are being performed inside the one-year time frame or no distal spread of the ailment coming to the subglottic zone. In comparison to adult RRP, juvenile RRP need more surgical procedures because of recurrences more in juvenile variety and larger area of involvement occur in children. Juvenile RRP has similar involvement in the airway between males and females. The dynamic and extensive development (Figure 2) in the aviation route prompts dyspnea and stridor. In juveniles incessant cough and dysphagia are rare. Kids analyzed as RRP before the age of 3 years are 3.6 times almost certain require 4 medical surgery every year and shows multiple infected anatomical areas.

**Investigations:** There are several investigations modalities available for diagnosis of RRP. The diagnosis of the RRP is less commonly done by imaging like
X-ray. In case of pulmonary, chest X-ray may show solid or cavitated nodules in the lungs. Nodular injuries or pedunculated mass are seen less every now and again in trachea and principle bronchi. Helical CT sweep is the perfect methodology of imaging for appraisal of RRP. It has high level of exactness for distinguishing proof of the injuries in tracheobronchial respiratory sores. The CT output picture are central or diffuse aviation route narrowing because of nodular sores happening at the mucosal surface of the tracheobronchial lumen. CT sweep picture of lungs in RRP are single or numerous multi-lobulated well-depicted strong nodular or polyoidal injuries of various sizes with a centrilobular dispersion, dissipated all through the lungs (Figure 3). Lesions are regularly products seen at the basal and back piece of the lungs. Different discoveries in CT output are atelectasis, combinations, air catching and bronchiectasis. Pleural emanation and lymph hub development are once in a while observed with the exception of if there should be an occurrence of harmful change of RRP. Normal examination ought to be finished with CT sweep to discount threatening change. Virtual bronchoscopy is at some point an elective technique for CT check for surveying the tracheobronchial tree. MRI can demonstrate the aviation route structures like larynx, trachea, bronchi and lungs yet its job in the analysis of RRP is rarely assessed. The sores in the RRP may demonstrate take-up on 18F-fluorodeoxyglucose positron discharge tomography/registered tomography (18F-FDG PET/CT) because of raised cell multiplication. Perceptibly, the laryngeal papillomas seem pedunculated, uneven and nodular with changing in sizes. In histopathological assessment, the papillomas are exceptionally vascularized, frequently keratinized neoplasms made up of connective tissue lined by stratified squamous epithelium and task apparently in finger like fronds.

**Treatment:** The treatment of RRP comprises of resection of papillomas for keeping up aviation route patency, improve voice quality and anticipate complexities. Medical procedure is the treatment of decision in RRP. Cold microsurgery, laser or medical procedure with microdebrider or coblation is utilized which extras sound tissue. The total expulsion the injuries may prompt repeats in numerous patients because of inactive infection. In pediatric patients, roughly five medical procedures a year expected to forestall repeats. Presently, the ongoing careful alternatives in RRP are traditional tweezers, CO₂ laser, coblation and microdebrider. Neodymium-yttrium-aluminum-garnet laser (Nd-YAG) and beat light are at some point utilized in Juvenile RRP. If there should arise an occurrence of broad sickness with a genuine hazard for laryngeal aviation route bargain particularly when a few careful mediations fizzled for getting patent aviation route, tracheostomy is required. Comparing with HPV-6 contamination, HPV-11 disease gives off an impression of being bound to bring about tracheostomy. When tracheostomy is must, decannulation is done when the aviation route is steady and sickness is controlled, as it might prompt fast popular colonization and cause distal spread of the illness. Unfortunately, around half of the patients those experiences tracheal papillomas. Approximately 20% of the patients experiencing RRP require adjuvant medicinal treatment notwithstanding medical procedure for controlling the infection. The present criteria for adjuvant treatment are in excess of four surgeries for every year; repeat of papillomas with traded off aviation route and distal different site spread of the infection. Most of the restorative treatment act in immunomodulation and restraint of HPV replication and expansion of the infection. The drugs utilized are interferon, retinoid, antiviral and inhibitors of the oxygenase-2 cycle. There are diverse adjuvant medications are given if there should arise an occurrence of RRP care. These adjuvant treatments have been recorded in the literary works however none appear to accommodating for the fix of the sickness. The palliative consideration has been given as photodynamic treatment, interferon-alpha, indole-3-carbino, cis-retinoic corrosive, cidofovir, acyclovir, ribavirin, Bevacizumab and tetravalent HPV immunizations. Interferon is one of the adjuvant prescriptions in RRP which give positive outcomes as far as sickness advancement by causing decrease of the sore growth. The impediment of the interferon when given in intravenous course lead to fundamental harmfulness with reversible ascent in serum transaminase level and probability for thrombocytopenia and leucopenia. Common symptoms of interferon are exhaustion, transient fever, queasiness, arthralgia, cerebral pain and spastic diplegia in babies. Directly topical utilization of interferon alpha is attempted however it needs further investigations in patients with RRP. Cidofovir is a cytosine nucleotide simple which specifically restrain viral DNA polymerase during replication of infection. In RRP, it tends to be administrated intravenously or by means of nebulization or by intralesional infusion. Adjuvant intralesional
cidofovir is useful for incomplete or all out relapse of the injuries and decrease the recurrence of careful treatment.²⁹ Intralesional infusion has advantage for keeping up low plasma level so lethality will be limited with no symptoms.³⁰ The quadrivalent immunization is regularly given for counteractive action of cervical and anogenital malignancies and pre-carcinogenetic injuries due to HPV subtypes 6, 11,16 and 18.³¹ Currently, HPV antibodies are not affirmed for the utilization in neonates, so it need further research.⁶ Cidofovir is most generally utilized restorative adjuvant in the treatment of RRP.³² It can be administrated by intravenous course or nebulization or intralesional infusion. Intralesional organization of cidofovir cause inclined toward all out relapse of the sores and abatement the recurrence of surgeries in RRP.³⁰ Intralesional infusion of the cidofovir has practically insignificant symptoms.³³ The long-haul hazards in intralesional infusions isn’t notable while the hypothetical hazard for dangerous change can’t be discounted.³⁰

**Conclusion**

RRP is a benign sore described by papillomatous appearance seen any place in the aero-digestive tract. It causes huge morbidity and in few cases mortality because of repeat and obstructive the aviation route. The disease often restricted to the larynx and sometimes spread to whole airway including bronchioles. The diagnosis is confirmed by histopathology. Clinician must know about the etiology, clinical presentations, laryngoscopic picture and imaging features of the disease for early management of the disease. Unfortunately, there is no restorative cure for RRP available presently & surgery is the ultimate treatment.

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**References**


Laterally Pedicled Flap and Connective Tissue Graft for Management of Orthodontically Inflicted Gingival Recession – A Case Report

Saurav Panda¹, Sital Panda², Anurag Satpathy³, Abhaya Chandra Das⁴

¹Reader, Department of Periodontics and Oral Implantology, Institute of Dental Sciences, Siksha O Anusandhan (Deemed to be University), K-8, Kalinga Nagar, Bhubaneswar, Odisha, India; Department of Biomedical, Surgical and Dental Sciences, University of Milan, Milan, Italy, ²MPH Student, Department of Public Health, Regional Medical Research Centre, Bhubaneswar, Odisha, India, ³Professor, ⁴Reader, Department of Periodontics and Oral Implantology, Institute of Dental Sciences, Siksha O Anusandhan (Deemed to be University), K-8, Kalinga Nagar, Bhubaneswar, Odisha, India

Abstract

Orthodontic therapy induces soft tissue responses thereby resulting in occurrence of localized gingival recession. This case report presents management of orthodontically inflicted Miller’s Class II gingival recession using a laterally pedicled flap as an epithelial cover on connective tissue graft. The positive outcome of the treatment approach is well documented with almost complete root coverage at the end of 1 year follow up. This combined approach could be a promising technique for treating advanced gingival recession cases with significant deep recession defects.

Keywords: Gingival recession, root coverage, pedicle flap, graft.

Introduction

Orthodontic treatment corrects various dental irregularities and contributes to better oral hygiene maintenance at patient level and subsequently delivers improved periodontal status.¹ However, orthodontic appliances often induce localized inflammation in the gingiva. Chronic gingivitis, gingival hypertrophy, irreversible attachment loss, periodontal bone loss and gingival recession could be a result of placement of orthodontic appliances. Most of the reported cases of gingival recession owing to orthodontic treatment have been associated with mandibular anterior teeth.² Gingival recession at the mid-orthodontic treatment stage may be accompanied by dentinal hypersensitivity, plaque deposits and caries. Also, it may result in decreased patient compliance and loss of confidence on the orthodontist.³

Correction of gingival recession can be done by root coverage procedures which may be accomplished by using several techniques, however the most predictable procedure include sub-pedicle connective tissue graft (SCTG) procedure.⁴ SCTG procedures have traditionally been done by sandwiching the harvested connective tissue graft (CTG) between the denuded root surface and the coronally advanced flap (CAF). In addition to CAF, a laterally pedicle flap (LPF) can also serve to provide the epithelial cover. Till date, very few cases have reported combination of LPF + CTG in a SCTG procedure for root coverage.⁵⁻⁷ This combination technique has better predictability and diminishes the chances of gingival recession of the adjacent donor site.⁸ The advantages of the LPF technique are retained, such as flap mobility and accomplishing predictable keratinized gingival width.⁹ The case report presented here describes successful management of orthodontically inflicted gingival recession by using laterally repositioned flap along with connective tissue graft.

Corresponding Author**
Saurav Panda
Reader, Department of Periodontics and Oral Implantology, Institute of Dental Sciences, (Deemed to be University), K-8, Kalinga Nagar, Bhubaneswar, Odisha, India; Department of Biomedical, Surgical and Dental Sciences, University of Milan, Milan, Italy
e-mail: srv_panda@yahoo.co.in
**Case Report:** A 20 years old female patient was referred to the Department of Periodontology from the Department of Orthodontia, Institute of Dental Sciences, Bhubaneswar, India for treatment of dentinal hypersensitivity and gingival recession in lower front tooth region. Patient was apparently alright 7 months back when she reported for correction of mal-alignment of teeth (Figure 1a). On intra-oral clinical examination, an isolated Miller class II gingival recession of 5mm at labial surface of the lower left central incisor (#31) was present (Figure 1b). Root coverage procedure for the denuded root of #31 was contemplated for management of gingival recession and dentinal hypersensitivity. A written consent was obtained from her after explaining the treatment plan.

After proper pre-surgical preparation, 2% lignocaine HCL with 1:200,000 adrenaline was administered to anaesthetize the area of operation. Recipient site was prepared by placing an internal bevel incision with surgical blade no. 15 around the denuded root of #31. Donor site was prepared by extending sulcular incisions from the distal surface of #31 till the mesial surface of #33. Following this, two vertical incisions were made; one at the distal line angle of #31 and other at the mesial line angle of #33. Vertical incisions were made continuous with horizontal incisions and were extended apically beyond the muco-gingival junction into alveolar mucosa, to permit adequate mobility of the donor flap. The donor flap was elevated using a sharp dissection. A cut back releasing incision was made to facilitate adequate rotation and to ensure that the flap is free of tension, allowing movement to the recipient site.

Connective tissue graft was harvested from the hard palate with a trap door approach by stripping it off from the underlying bone after separation from overlying palatal epithelium. The graft procured, was processed and trimmed to obtain an even thickness of 1.5-2.0 mm and was immediately placed directly over the exposed root and secured by a sling suture by 4-0 resorbable vicryl suture. Pressure was applied with a wet gauge piece for about 10-15 seconds. The pedicled flap was then repositioned over the grafted recipient site and secured by means of placing a sling suture and interrupted sutures (Figure 2a-d). Periodontal dressing was placed. The patient was instructed regarding post-operative care of the surgical site along with prescription of suitable analgesics and antimicrobials.

The patient was followed up at regular intervals up to a period of 1 year. Post operative findings showed complete root coverage with excellent color matching. The recession depth was reduced to 1 mm suggesting almost complete root coverage obtained with this dual approach (Figure 3a, b).

**Discussion**

In this case report, LPF with SCTG was used to treat a case of localized severe GR defect inflicted by orthodontic treatment. This technique has the advantages of having good vascularity, adequate keratinized gingiva in adjacent tooth, better color match and possibility of creeping effect after surgery.
The involved tooth had inadequate keratinized gingiva, thus limiting our option for a coronal repositioning of the flap to completely cover the connective tissue graft. Connective tissue graft has also been left exposed at the recipient site. However, the consequences of the same would result in an uneven gingival margin post-operatively. Further, having an exposed portion of connective tissue graft on the avascularized root surface may lead to necrosis due to insufficient blood supply. Thus, LPF appeared to be a better option than CAF in this clinical situation. LPF can provide an advantage that the CTG is covered by a gingival flap, which ensures a sufficient blood supply bilaterally to enhance the plasmatic circulation during initial healing.

As mentioned earlier, orthodontic tooth movement leading to gingival recession is not uncommon especially when the alveolar bone housing the roots is thin. Orthodontic brackets are a natural habitat for dental plaque and it is difficult for patients to maintain adequate oral hygiene. Nevertheless, root coverage with FGG has been reported along with orthodontic treatment previously. However, it was done towards the completion of orthodontic treatment. In our case we opted for root coverage in the mid-orthodontic phase to simultaneously treat dentinal hypersensitivity and restore confidence in the ensuing orthodontic treatment for correction of her malocclusion.

While the root coverage procedure was completed, the orthodontic treatment continued for another year which enabled us to have a long term follow-up. Duration of at least 6 months is after root coverage procedure is considered adequate for soft tissue maturity and stability. We achieved almost complete root coverage and our result was comparable with Langer and Langer who reported increase of 2-6 mm in root coverage by subepithelial connective tissue graft technique in which the CTG was placed over exposed root surface underneath the split-thickness coronally positioned flap without any attempt to completely cover the root surface with the advanced flap. Nelson achieved around 88% root coverage by sub-pedicle connective tissue graft in which connective tissue graft was placed over the exposed root surface covered by an overlying full-thickness laterally positioned flap. Raetzke et al. obtained a root coverage of around 80% by envelope technique in which connective tissue graft was positioned directly over the exposed root but its major part was placed in an envelope previously created by an undermining partial-thickness incision in the tissue surrounding the defect.

A combination of full and partial-thickness flap as used in this case for laterally repositioning the flap is suitable as it helps in avoiding recession at donor site increases the predictability of root coverage at recipient site.

Conclusion

This combination approach including LPF with CTG placement in treatment of orthodontically inflicted localized and severe gingival recession cases would provide a promising result among various other root coverage procedures. However, Controlled Clinical Trials are required to assess the clinical performance and effectiveness of the same and further confirm the present findings.

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Life Threatening Involvement of Bilateral Total Maxilla by a Large Radicular Cyst: A Rare Case Report

Harsh Mohan Pathak¹, Sobhan Mishra², Neeta Mohanty³, Sanchari Sinha Roy⁴, Satchidananda Meher⁴

¹Reader, Department of Oral and Maxillofacial Surgery, ²Professor and Head, Department of Oral and Maxillofacial Surgery, ³Professor and Head, Department of Oral and Maxillofacial Pathology and Microbiology, ⁴Post Graduate Trainee, Department of Oral and Maxillofacial Surgery, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to Be University), Bhubaneswar, Odisha, India

Abstract

The radicular (periapical cyst) is the second most common pulpo-periapical lesion arising from cell rests of malassez. Mainly associated with non-vital teeth with necrotic pulp. A case of large bilateral radicular cyst located in the maxilla of a 35-year-old female patient was reported in the dept. of oral surgery, institute of dental sciences, Bhubaneswar. Patient complained of swelling in upper front tooth region. On radiographic examination a well circumscribed radiolucency was seen. Incisional biopsy was taken previously suggestive of periapical cyst. Bilateral cyst was enucleated under general anesthesia and extraction of all root stumps were done. The enucleated specimen sent of H/P study.

Keywords: Radicular cyst; Periapical cyst; enucleation, total maxilla.

Introduction

The periapical (radicular cyst) is the second most common pulpo-periapical lesion. It represents 6% to 25.9% of all pulpo-periapical lesions. Commonest of all odontogenic cyst. It is described an inflammatory cyst as its inflammatory products initiate the epithelial component. This arises from cell rests of Malassez, which are the remnants of Hertwig’s epithelial root sheath; which is the product of the odontogenic epithelial layers (outer & inner enamel epithelium). [1]

The management of radicular cyst depends on the size & shape of lesion and can be treated with conventional therapy or may require surgical intervention (enucleation & marsupialization).

Case Report: A 35-year-old female patient reported to Department of OMFS, Institute of dental sciences & sum hospital, S ‘O’A (Deemed to be University), Bhubaneswar with complains of swelling in the upper front tooth region in the past 2 months; which gradually increased in size.

Extra-Oral Examination: A single diffused swelling present in middle 1/3rd region of the face, extending from ala of nose from left side to right side superiorly till the inferior border of nasal cavity, obliterating the philtrum and is of size 2*3 cm. there is marked asymmetry of face. Patient had purulent discharge from left nostril and struggled to breath. On palpation, it is firm in consistency & is mild tender.

Figure 1: a. Frontal View; b. Left Lateral View; c. Right lateral view

Intra Oral Examination: Diffuse swelling present of size 5*4 cm in the gingivobuccal sulcus wrt. 11, 12, 13, 14, 21, 22, 23 covering the anterior palate extending to the mid of posterior palate and junction of hard & soft palate. Nasal floor is breached along with absence of palatal bone. On palpation areas of bony depression present palatally i.e., firm in consistency, slightly compressible with non-reducible & mild tender with areas of fluctuation. Eggshell crackling was present. Root stumps present with respect to maxillary and mandibular arch 11, 15, 16,17,18, 21, 25,26,27,28, 34, 35, 36, 37, 44, 45, 46, 47, 48.
Radiological Examination: CT reveals a well-defined radioluency extending from root apex of 11-17 of size 5*4cm, with a homogeneous radio-opacity margin which obliterates the nasal floor, maxillary sinus & crosses the midline. Another radiolucency is present on left side extending from 24-27 region of size 3*2.5 cm also obliterates the left maxillary sinus. The buccal and palatal bone were eroded and there was thinning of palatal bone. There was no evidence of root resorption of involved teeth & the radiographic findings were suggestive of radicular cyst.

Histopathological Findings: Incisional biopsy was done on right side. H/P study reveals the cystic cavities is lined by non-keratinized stratified squamous cell epithelium arranged in arcing pattern with intense inflammatory cells, infiltration consisting mainly of lymphocyte, plasma cells, cholesterol clefts, russel bodies and hyaline cells were also noted. H/P findings confirm diagnosis of radicular cyst. Generally, the lumen is filled with straw color fluid occasionally blood tinged\textsuperscript{[16]}. 

<table>
<thead>
<tr>
<th>Name of cysts</th>
<th>Albumin</th>
<th>Globulin</th>
<th>Total protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odontogenic Keratocyst</td>
<td>2 - 4 g/dl</td>
<td>0.5 - 2.5 g/dl</td>
<td>Less than 5 g/dl</td>
</tr>
<tr>
<td>Dentigerous Cyst</td>
<td>2 -5 g/dl</td>
<td>0.5 -3.5 g/dl</td>
<td>4 - 8 g/dl</td>
</tr>
<tr>
<td>Radicular Cyst</td>
<td>2.5 - 5 g/dl</td>
<td>2 - 5 g/dl</td>
<td>5 - 11 g/dl</td>
</tr>
</tbody>
</table>

Treatment: Surgical enucleation of two cystic cavities was done under general anesthesia after obtaining an informed consent from the patient and her relatives. The operating site was injected with 2% lignocaine containing 1:100000 adrenalin. Vertical releasing and crevicular incision were given bilaterally from 23-28 region on left side & from 11-17 region on right side: then trapezoidal flap was raised; the thin overlying bone was removed using bone rongeur & round bur under saline irrigation to expose the cystic mass. Extraction of all maxillary root stumps were done.
During procedure we found that left side was infected with pus discharge and purulent smell. Both the cyst was enucleated, and thorough curettage was done. The sharp edges were smoothened with valcunite bur and bone file. Gauze pack with white head varnish was given on both sides of cystic cavity. Flap closure was done using 3-0 vicryl suture. Enucleated specimen was sent for H/P study.

**Discussion**

Radicular cyst are the inflammatory cysts of the jaw that appear at root apices of non-vital infected teeth with necrotic pulp. Most periapical cyst originate in pre-existing periapical granuloma where inflammatory reaction start to proliferate & there is increase in size of epithelial nests, degeneration of central cells & it liquefies due to compression of capillaries in tissue around the developing cyst.\(^1\) Gradually there is formation of liquid filled cavity which is lined by epithelium & it continues to grow in size because of like cytokines like interleukin 1 & interleukin 6 synthesized by epithelial cells, which are known to cause inflammatory & osteolytic activity.\(^2\) The internal pressure of the growing cyst in alveolar bone causes osteoclastic activity and bone resorption surrounding the cyst.\(^1\) According to Lalonde if the periapical radiolucency diameter is more than 1.6cm, it is more likely to be radicular cyst.\(^7\)

Most radicular cyst involves the permanent tooth apices, 58% lateral incisors \(^3\) sometimes in deciduous teeth mostly in molars.\(^4\) The untreated cysts may slowly grow in size and enlarge the cortical bones, so that a dome shaped swelling is observed on the alveolar bone at periapical region of associated teeth. It develops on buccal and lingual region of alveolar process which covers the mucosa (appearing normal). Initially when palpated it is hard but gradually crepitus is present as the cortical bone becomes thinned. The swelling may be rubbery or fluctuant due to cystic fluid. Almost 20% of root resorption seen in radicular cyst.\(^8\)

Among all cysts of jaw radicular cyst is most common having male predilection more (1.6:1) \(^5\) and anterior maxilla more than that of mandible due to trauma, caries and poor oral hygiene.\(^6\) A small periapical radiolucency diagnosed with granuloma or cyst can be treated with non-surgical endodontic therapy with follow up for 1-3 months and radiological & clinical examination to ensure the lesion is not enlarging. Studies show the success rate are high on this approach (80-84.4%).\(^9\)\(^10\) In case of large cysts where it destroys more amount of bone various type of approaches is done\(^1\):

1. Enucleation by surgical method.
2. Surgical enucleation & placement of graft (autogenous bone graft).
3. Marsupialization.
4. Decompression.
5. Decompression with delayed enucleation and creating a common chamber with nasal cavity or maxillary sinus (in large maxillary cyst).
Liposky-et-al\cite{11} described a method of decortication and have replacement for large cyst to eliminate dead space. Non-surgical therapy failure can be treated with apicocectomy and biopsy.

Sequential post-surgical radiographs are necessary for status of defect. The avg. healing time for cyst of diameter >10mm is approx. two and half years. In case of incomplete removal of lining of cyst can cause residual cyst or more aggressive pathology.

**Conclusion**

It is common jaw cyst encountered during dental practice\cite{12}. Sometimes squamous cell carcinoma\cite{13},\cite{14} occasionally arises from metaplastic changes in the epithelial lining of the radicular cysts. Long standing cases of radicular cysts have shown histopathological evidence of transition from a cystic lining to epithelial dysplasia and further progressing as infiltrating squamous cell carcinoma. Since there are chances of neoplastic transformation within epithelial lining of a radicular cyst, proper treatment and a long term follow up are recommended\cite{12}.

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**References**

Medical Tourism: Prospects and Challenges

Shakti Rath1, Naushaba Akhtar2, Sangram Panda3

1Assistant Professor (Research), Central Research Laboratory, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India, 2Post Graduate Student, Asian Institute of Public Health, Pahala, Bhubaneswar-Cuttack NH-5, Bhubaneswar, Odisha, India, 3Reader, Department of Prosthodontics, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

The main purpose of this article is to present a review on medical tourism and identifying its interrelationships and existing risk on health and biosafety. This article focuses on identifying the extent of biosafety risk that encourages an individual to purchase cross-border health services and products. Also, it highlights the causes of growth of medical tourism in India along with the major challenges faced by patients and authorities.

Keywords: Medical Tourism; Biosafety; Biosecurity; Health services; Challenges; Prospects.

Introduction

Medical tourism can be defined as migration of people to different countries for treatment of diseases. Earlier, it was referred to those who moved from poor or underdeveloped nations to advanced hospitals in developed countries for treatment. High-end medical procedures such as dental surgery, gender reassignment procedure, stem-cell therapy, joint-resurfacing, organ transplantation, in vitro fertilization, plastic surgery and other services have been identified as a rapidly growing sector of the medical tourism industry.1 Globalization and the incidence of infectious diseases have also escalated the demand of health services worldwide. People are moving to different countries to obtain valuable medical treatments which are either not present in their native countries or may be restricted by the law and society in their nations. Medical tourism apart from treatment and travelling also emphasizes on vacationing and experiencing the attractions of different countries.2,3 Health and wellness tourism also have a great historical value. For example, in ancient times, Middle Eastern and Asian countries had been a major contributor for the development of health and wellness in terms of yoga, meditation, massage and herbal medicines.2,3

In India, medical system and health industry has taken a massive leap in last two decades due to advancement in technologies and education. India is becoming a popular medical tourist destination due to high quality patient services, world class medical infrastructure, cost effectiveness, experienced staffs and exotic locations.4 India’s clinical outcomes is at par with world’s most recognized and highly qualified specialists with competitive costs which are around 1/5th of that in the West. Government of India spends 16.5 of its GDP in health sector. India has taken various initiatives like National Health Policy (2002) for creation of a department of Ayush (which comprises Ayurveda, yoga, unani, sidha and herbal medicine) for the complementary and alternative medicines and treatments.5 They have also initiated promotion of medical tourism, through marketing development schemes for travelling agents, public–private partnership and medical visa (M-Visa) which can be extended further up to one year. Medical tourism in India has now changed the structure of healthcare system in India.4,5

Medical Tourism is divided into different sectors based upon the types of services it provides. Wellness tourism excludes medical treatment and is generally considered to have a more holistic focus on the physical, emotional and spiritual wellbeing of the individual which
includes alternative system, spa, therapies and natural resorts. Alternative system of medicine provides tourists and travelers physical, emotional restoration which is mostly in the form of traditional healing methods derived from nature and viability of holistic treatments like Ayurveda, Yoga etc. The absence of advanced and life changing health services which include treatment for infertility, implantation, cardiac support technology, etc. has also encouraged migration of people for health services.

**Major Problems Which Leads to Medical Tourism:** Socio-economic status, life threatening complications due to absence of treatment, affordability, expenses of treatment which is much cheaper than that of own their own land is the major cause of medical tourism. However, savings amount will vary depending upon the destination country and type of health service the person needs to attain, quality treatment and care. Manpower, physician’s access to advancement of healthcare technologies and world class facilities in most countries have also flocked migrants for treatment purpose.

Customer care services are provided by the tourism industry also play a major role in assisting a person who intends to go for treatment to other countries. Patients who are unaware about precise therapeutic services overseas are coordinating about their treatment through medical travel agencies, customer care services which provide excellent support such as physician options, guiding throughout communication, and further retention of the patients which is provided online or over call which may not be easily available in their native land. Indian health services provide an opportunity to the medical tourists who visits on medical visas to visit some of the most exotic and historical places by providing them a tourist trip.

**Major Challenges with Medical Tourism:** Despite of being a developing nation, India provides excellent medical services and care with the aid of latest technologies. Indian medical tourism has also raised demand of additional resources in terms of manpower, money, and equipment. However, there is still shortage of trained healthcare and pharmaceutical marketing staffs and sales executives, medical representatives, managers, quality check officers for hospital services; service professionals for biomedical equipment, diagnostics laboratories, pharmacy, and R&D professionals. The major challenge faced since ancient times by nations like Africa, Asia, China, etc. about biosecurity risks as humans are acting as active vectors for disease transmission during their migration to receive healthcare service across country. Medical tourists are highly exposed to different pathogens present in the health care center and so are the people in the healthcare center. Sometimes such patients also act as index cases. India has large number of hospitals with specialization in certain health areas and such hospitals are run by corporate entities that attract only a small crowd those are capable to pay. These private or corporate sectors does not revert revenues to the public sector once earned by them. There can be serious consequences of equity as unequal treatments based upon charges which vary from general citizens of the nations to that of tourists which are generally hiked are problematic for the society and could give rise to further consequences. Other challenges include lack of transportation facilities for patients, power supply issues, lack of drinking water supply, long waiting list, poor hygiene awareness among health care personals, and unavailability of correct guiding principles.

**Biosafety and Biosecurity Issues:** Biosecurity or biosafety means to provide protection of the mankind against genetically modified life threatening and harmful organism. The microbial world is the most complex, dynamic as they readily spread across one person to another. This results in emergence or re-emergence of infectious diseases in the region. This type of technique of spreading infections had also been used during war e.g. *Anthrax vivax* which was used as biological weapon during wars for increasing the mortality rates. The epidemic spread of SARS in southeast Asia and Ebola virus in Africa were prime threat to medical tourism as patients from those area was acting as carrier of the diseases. The World Health Organization (WHO) is continuously monitoring changes in the epidemics and in the context of the outbreak still now to guarantee that support is provided in response to the evolving adverse situations. They travel to nearby countries during periods of heightened insecurity which leads to compound the risks. SARS, HIV, Ebola is prone to spread through human-to-human transmission via direct contacts such as through the blood or body fluids of a sick person or has recently died from Ebola. Bio-risk reduction requires combined expertise and proper advice on high-consequences of pathogens with proper guidance and training on safe handling and on control of disease agents that poses several significant health risks for
the concerned population. These events acknowledged at the time, an infectious disease outbreak happening anywhere is a threat everywhere. It has been observed that over the past years a much greater awareness has been evolved regarding the importance of biosafety and biosecurity regarding pathogens, especially like anthrax, which has already been used to spread bioterrorism previously as a weapon.\textsuperscript{15, 16}

**Current Trends:** Change in demography, especially among ageing population requires medical services with increased epidemiological change, the rising incidences of chronic conditions have also increased demand for more and better health services which are catalyzed by poor medical facilities. This has led to the globalization of health care services which is illustrated by increase persons opting for medical tourism.\textsuperscript{17} Due to various positive impacts of healthcare tourism, many developing nations today are emerging as hot healthcare tourism destinations. Indian health services include innovative along with some critical health care services like organ transplants, cancer treatment, cardiac surgery, and many more. Also, other aspects like leisure, adventures and relaxation, healthcare traveling/wellness-tourism can be enjoyed on such medical tours.\textsuperscript{18} Many national and international agencies, private healthcare providers and medical practitioners see it as a great means of economic development for the country. The related benefits and risks that are attached to medical tourism both for individual and together public health are the areas of interest for future research.\textsuperscript{19}

**Health tourism in India:** India has been the major healthcare center for countries like Afghanistan, Bangladesh, Bhutan, Nepal, Maldives, Pakistan and Middle East. The expansion of medical tourism in India was due to the combination of various factors like well-trained doctors and specialists, abundance of ground level medical staffs, good exposure to contemporary and alternative systems of medicines, availability of centers with super specialty, use of modified technology and advanced diagnostic equipment, and more importantly, premium services availability at an effective but competitive cost.\textsuperscript{4, 5}


**Figure 1. Number of medical and medical attendant visas granted by India in 2013-15**

The above figure (Figure 1) shows that the number of tourists on medical visa and medical attendant visa is highest from Bangladesh. Besides Bangladesh, Afghanistan also shares a major part along with Nigeria, Maldives, Oman, Yamen and Tanzania. In terms of income and employment India’s Healthcare sector is one of the largest sectors which are expanding rapidly. During the 1990s, the Indian health care sector had a massive growth which has compounded to annual rate of 16%. A major share of this progress has been due
to the growth in the medical tourism business in India, because of which India is estimated to be one of the rapidly growing markets owing to improving healthcare infrastructure and system, increasing investment and overseas promotion. Financial assistance is provided as per the provisions of Marketing Development Assistance (MDA) scheme. The Incredible India brand is one of the most recognized brands internationally the logo of which is symbol in wellness and medical tourism events and promotional activities with the permission of Ministry of Tourism which has been decided according to the Indian government. The most important factor behind popularizing medical tourism in India is financial aspects. In India people have been getting “First World Treatment at Third World Prices”. It is quite evident if we compare the price of various medical interventions in India with Western countries, some of them are listed below. According to some industrial estimates the medical tourism market in India has valued over $310 million in 2005-06 with about 1 million foreign medical tourists visiting the country each year.\textsuperscript{20-22}

**Conclusion**

India being one of the fastest growing medical destinations around the world is predicted to drive higher with time. Medical tourism industry has become a multi-billion-dollar industry which is promoted by government, hospitals and tourism industries. Global competition is emerging in the health care industry. Patients with good economic status from developing nations have long traveled to developed countries for high quality medical care and the economic investment of the country has a great influence on the Healthcare services. At the same time occupational health, Biosafety and biosecurity are implemented and enforced in all active bioscience research and clinical laboratories. The weakened public health system, procedure, equipment/infrastructure, increasing population, civil disturbance, human behavior and displacement of the country that arises from misconception and perceptions about the serious and risk, use of anti-infective drugs intake of the people, which basically seen in poverty condition less resourced nations of the country because of which they cross border to get healthcare service and by the time they are incubating unknowingly. Though the level of international trade and travel between African urban have been expanding, national governments and international community have attempted to improve recognition capacity and response capabilities for future outbreaks, there are still much to be done.

The concept of medical tourism provides innovative solutions to healthcare problems rising because of lower GDP investment by the Indian Government. This also improves international standards of healthcare system, but at the same time gives rise to inequity in terms of providing healthcare service, quality, increased in treatment charges for general public, growth in the numbers of unethical practices and unlawfulness. The concept of medical tourism serves the population that can pay their rates charged by the corporate or high end private medical sectors which finally promotes growth of private sectors. The Government of India should take initiatives to provide better services to medical tourist while maintaining international relation and improve retention. A specific infection control system or measure is needed for India, as healthcare services abroad is associated with diverse financial, legal, ethical, disease based and health related problems. So, a better and broad system is needed to ensure high quality healthcare and surveillance when there are complications.

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**References**


Multiple Major Aphthous Ulcers: An Uncommon Presentation

Satya Ranjan Misra

Professor & Head, Department of Oral Medicine & Radiology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

Aphthous ulcers or Recurrent aphthous stomatitis (RAS) are the most common ulcers encountered in the oral cavity and also the most painful ones. They characteristically recur at frequent intervals hence referred to as RAS. The aetiology of RAS is unknown however a number of predisposing factors including genetic predisposition, stress, nutritional deficiencies, diet, trauma, hormonal disturbances and immunological disorders have been proposed. As the cause remains uncertain, a definitive cure for the disease has not been found and all treatments are aimed at ameliorating the disease symptoms. They are of 3 sub-types: Minor, Major and Herpetiform. Major aphthous ulcers occur less commonly and are usually more than 10mm in size, fewer in number, healing with scarring. We present a case of multiple major aphthous ulcers in an immune-competent patient successfully treated with topical glucocorticoids and amlexanox with systemically administered Levamisole.

Keywords: Aphthous ulcer, immune competent, immunomodulators, unknown etiology.

Introduction

Recurrent aphthous ulcerations (RAU) are frequently encountered in the oral cavity and about ten to twenty percent of the population is affected by the disease. Major aphthous ulcers are the less common type of RAU and cause severe discomfort to the patient due to their large size and associated symptoms of pain and burning sensation. They take long time to heal and cause scarring of the mucosa. The selection of therapeutic agent depends on the severity of the disorder, which is evaluated by the frequency, number, location and duration of the ulcers as well the intensity of associated pain. Patients with major RAU generally have severe pain, malaise, fever, and odynophagia associated with recurrent disease generally need systemic therapy. The case of a 26-year-old man with multiple (about 9 in number) major aphthous ulcers, none occurring in the common site i.e. the soft palate, without any associated systemic disease, treated successfully in the dental hospital is presented for documentation.

Case Report: A 26-year-old male came to the dental hospital with multiple painful ulcers in his mouth since 3 days. This was the first time he had oral ulcers and the ulceration was preceded by burning sensation in the oral cavity. The pain increased on chewing or talking. The medical history was non-contributory.
Figure 1a: Two irregular ulcers present on the lower left labial mucosa about 1cm in size, with yellowish-white floor and erythematous irregular borders. 

1b: An irregular ulcer seen on the right buccal mucosa in relation maxillary molars, about 1cm in size, with yellowish-white floor and erythematous irregular borders.

1c: An irregular ulcer present on the ventral surface of the tongue, with yellowish white floor, erythematous borders.

1d: Two irregular ulcers present on the right ventro-lateral surface of the tongue, with yellowish white floor, erythematous irregular borders.

1e: Three irregular ulcers present on the left ventro-lateral surface of the tongue, with yellowish white floor, erythematous irregular borders.

On clinical examination multiple oral ulcers were seen. Well circumscribed irregular ulcers measuring more than 1cm in size, yellowish white in colour with erythematous, raised irregular borders were seen in the left lower labial mucosa, right buccal mucosa, ventral surface and lateral borders of the tongue. The ulcers were soft in consistency, tender and there was no discharge on palpation. Based on the clinical appearance a provisional diagnosis of multiple major aphthous ulcers was made.

Figure 2a: Healing of ulcers on the lower left labial mucosa. 

2b: Healing ulcer seen on the right buccal mucosa. 

2c: Healing ulcer on the ventral surface of the tongue. 

2d: Healing ulcers on the right ventro-lateral surface of the tongue. 

2e: Healing ulcers on the left ventro-lateral surface of the tongue.
A complete blood cell count, serum ferritin, folate and vitamin B12 estimation, test for anti-endomysial antibodies and colonoscopy were performed and the results were normal. The patient was treated local application of Triamcinolone acetonide 0.1% oral paste with Amlexanox 5% oral paste applied thrice daily. 0.15% Benzydamine mouthrinse to be gargled and Benzocaine 20% topical gel to be applied thrice daily for symptomatic relief. Levamisole hydrochloride 150mg tablet was to be taken after dinner thrice a week. The patient was followed up after 2 weeks and the ulcers were healing with reduction in symptoms. [Figures 2a-e] The same treatment was continued for 2 months and the patient was examined after 2 months showed healing of ulcers with scarring. [Figures 3a-e] All topical medications were discontinued. Levamisole was continued for six months then stopped. The patient was followed up for a year without any recurrence.

Discussion

“Aphthous” is derived from “aphtha” a Greek word which means ulcer. Recurrent aphthous ulcers (RAU) are most frequent painful oral mucosal lesions and appear first in childhood or adolescence as multiple, recurrent, ovoid ulcers with yellowish floor and well circumscribed erythematous borders.2 Stanley in 1972 had classified Aphthous ulcers into 3 clinical variants: Minor, Major and Herpetiform.3

1. Minor aphthous ulcers (MiAU) (Miculiz’s aphthae) are the most common variant, constituting 80% of RAS. They are less than 1cm in size and commonly involve the non-keratinized oral mucosa like the labial mucosa, buccal mucosa and the floor of the mouth. These are painful but self-limiting, healing occurs within 10-14 days without scarring.

2. Major aphthous ulcers (MAU) (Sutton’s disease or periadenitis mucosa necrotica recurrens or Sutton’s disease) occurs only in 10-15% of patients. They are more than 1cm in size, about 2-3 in number and can occur in any oral mucosal site, but the most common site is the soft palate, persist for about 4-6 weeks and heal with scar.

3. Herpetiform ulcers (HU) are rare, about 2-3mm in size and occur in large numbers. Like in herpes simplex infection these ulcers coalesce to form larger irregular ulcers but are not preceded by vesicles. HU are seen in an elderly age group.

The aetio-pathogenesis of RAU is yet to be proven but there are some contributing factors have been considered. Family history of RAU with a genetic predisposition, chronic micro-trauma, psychological stress, drugs like Captopril, Nicorandil, gold salts, Phenobarbital, Phenindione, deficiency of cyanocobalamine and folic acid, inflammatory bowel disease, gluten sensitive enteropathy, hypersensitivity to detergent in dentrifices-
sodium lauryl sulphate, hormonal changes in women, micro-organisms like Helicobacter pylori, pro-inflammatory cytokines like TNF-α have been proposed. Smoking has been identified as a negative risk factor and smokers who stop the habit develop RAU, probably the hyper-keratotic mucosal changes due to chronic irritation protect the mucosa from RAU.4 A number of systemic disorders also manifest with RAU in the oral cavity and therefore they need to be excluded before diagnosis. Bechet’s syndrome, PFAFA syndrome, MAGIC syndrome, Sweet’s syndrome, agranulocytosis, cyclic neutropaenia and HIV/AIDS are associated with Aphthous like ulcers besides other systemic manifestations.2,3 The condition is totally detected based on the patient’s history and examination. Complete blood picture, assays for haematinic deficiency, investigations for gastro-intestinal disorders and causes of micro-trauma to be excluded prior to diagnosis.

The treatment is mostly symptomatic and is aimed towards amelioration of symptoms. Topical analgesic-anaesthetic gels and topical glucocorticoids to be applied with antihistaminic mouth rinses to be used as needed.5 5% topical amlexanox gel and 0.1% topical triamcinolone acetonide gels are used to decrease the time period of the ulceration, prevent recurrences and lessen the pain.6 In severe cases immunomodulators like Levamisole, Pentoxifylline, Colchicine, Dapsone and in recalcitrant cases Thalidomide may be used.7 Systemic steroids like Prednisolone may also be used in refractory cases.

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**Ethical permission:** Approved

**References**

Antiplaque Efficacy of a Dentifrice Containing Low Concentration of Chlorhexidine: A Randomized Controlled Clinical Trial

Adrita Purkayastha¹, Rinkee Mohanty², Anurag Satpathy³, Rashmita Nayak³, Rajdeep Beura¹, Utkalika Das⁴

¹Post Graduate Trainee, ²Professor and Head, ³Professor, ⁴Lecturer, Department of Periodontics and Oral Implantology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

Aim: To assess the anti-plaque efficacy of a dentifrice containing low concentration (0.004%) chlorhexidine.

Methodology: Plaque score was assessed in 28 participants in a randomized, double-blind prospective cross-over study. The study participants either used 0.004% chlorhexidine containing dentifrice (test group) or a commercially available fluoridated dentifrice (control group). Clinical parameters were recorded at the baseline and again after 4 days.

Results: Plaque scores were found to be significantly lesser in the test group (p = 0.02). Also, significantly greater additional plaque (16.06%) was formed in the control group in comparison to the test group (p = 0.01). No statistically significant difference was detected between the test and the control groups at baseline with regard to plaque score. Conclusion: The reduction of plaque scores with a dentifrice containing low 0.004% chlorhexidine was significantly greater as compare to control.

Keywords: Chlorhexidine containing dentifrice, anti-plaque, toothpaste, chlorhexidine, dentifrice, plaque re-growth.

Introduction

Effective daily mechanical plaque control is the mainstay of maintenance of periodontal health and prevention of caries.¹² Dental plaque begins to form shortly after brushing and re-establishes itself in 24-48 hours.³ Dental plaque exists as a tenacious bacterial biofilm with an organized carbohydrate matrix, making it resistant to antibacterial agents.⁴ Since there is no substitution to mechanical cleansing of dental plaque biofilm, much of research has been focused on improving the dentifrices.⁵⁶ A dentifrice can be a carrier medium for antiplaque and antimicrobial chemical agents to offer a potential adjunctive advantage in plaque control.⁷⁸ Currently, a number of dentifrices are available with various active ingredients in it such as fluoride, triclosan, etc.⁹ Among all the antiplaque agents currently used, chlorhexidine gluconate (CHX) stands out in terms of its efficacy. Due to its antibacterial action at low and high concentration and superior substantivity it is considered as the gold standard in antiplaque agents, but a major drawback lies in the taste alteration and stain-producing problems.¹⁰

CHX containing dentifrices were not formulated because of its possible interaction with other components of the dentifrices such as, anionic detergents sodium lauryl sulfate (SLS), abrasives, calcium ions and sodium monofluorophosphate and thereby reducing the availability of CHX.¹¹ Previously reported studies on CHX containing dentifrices and gels mostly have been in the concentration range of 0.2 – 2% with report of mixed results on its efficacy.

Corresponding Author**

Anurag Satpathy
Professor, Department of Periodontics and Oral Implantology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India.
e-mail: drasatpathy@gmail.com
Plaque inhibitory effect of CHX is now known to be due to its adsorption on the tooth surface rather than being slowly released from a reservoir in the oral cavity. Therefore, small doses of CHX applied directly to the teeth inhibit plaque similar to that by large doses in mouthwashes. Hardly any investigation has been carried out to assess the anti-plaque efficacy of low CHX concentration-based dentifrices. Therefore, the aim of this study was to assess the anti-plaque efficacy of a dentifrice containing low concentration (0.004%) of chlorhexidine.

Materials and methods

Experimental design and study population: A double-blind, randomized controlled, cross-over study comparing a placebo control-dentifrice to a dentifrice formulation containing a low concentration (0.004%) of chlorhexidine was conducted. All participants were aged between 18 to 25 years of age and were systemically healthy. They had at least twenty erupted teeth without any detectable evidence of unattended dental caries and inflammatory periodontal disease, without any dental prosthesis or orthodontic appliances. A detailed systemic history was explored to exclude participants currently on medications or with medical conditions bearing any influence on the outcome of the study. The study protocol was discussed and approved by the Institutional Review Board. A prior written informed consent was procured from all study participants.

Materials: The test dentifrice used in the study was a commercially available dentifrice containing 0.004% chlorhexidine (Elgydium®, Win-Medicare, New Delhi, India). The placebo control dentifrice was commercially available fluoridated dentifrice.

Randomization, Concealment and Blinding: The concealed allocation of test and placebo control products was randomized by a simple coin toss method to one of the two groups by an independent examiner who was unaware about the details of the study. Test Group (N=15): 0.004% Chlorhexidine containing dentifrice. Placebo-Control Group (N=15): Commercially available fluoride dentifrice containing. All clinical recordings were done by a solitary examiner (AP), blinded to the allocation of groups. In order to validate reproducibility of the outcome measure (plaque scores), an intra-examiner reliability assessment (Kappa Statistics) yielded good agreements (>0.8).

Procedure: Scaling and polishing for removal of all visible dental plaque was done. Plaque was disclosed using plaque disclosing agent (PLAKSEE MD, ICPA, Ankleswar, India) for all participants. Following the oral prophylaxis, prior to the start of the study, all the participants were recommended to use a regular fluoridated dentifrice for one week. At baseline, plaque scores were recorded for all participants on day zero using a plaque index. Participants were randomly allocated with measured quantity [20gm (dentifrice) / 80ml (distilled water)] dentifrice slurry which was to be used by them for four days. All dentifrices were supplied to the participants in a coded and amber colored bottle. All participants were asked to use only the allocated dentifrice slurry twice daily for 30 seconds and refrain from any other forms of oral hygiene practices for four days. Plaque scores were recorded again on day four. A wash over period of one week was given before the same procedure was repeated after switching the group with one another.

Statistical analysis: Obtained data was analyzed using Statistical Package for Social Statistics Version 20.0 (SPSS Inc, Chicago Illinois, USA). Clinical outcomes were tested for significant differences within the baseline and post-treatment groups and between the two groups with the Student’s paired and unpaired t-tests respectively. A value of P ≤ 0.05 was considered statistically significant for all analyses.

Results

A priori analysis of 5% significance level, power value of 0.8 and effect size of 0.8 estimated the total sample size to be 52. Since there were two groups and it was a crossover study 13 participants were required in each group. We enrolled 15 participants in each group in our study taking in account the possible drop outs during follow up. A total of 28 (males =11; females 17) participants aged 22.39±1.64 years completed the study successfully. 1 participant dropped out in each group owing to non-compliance (Figure 1). None of the participants reported any adverse effects or any minor side effects during the study period.

There was no statistically significant difference (p= 0.25) in the plaque scores, between the groups at baseline. However, plaque scores were significantly lesser in the test group (p = 0.02). Also, significantly greater additional plaque (16.06%) was formed in the placebo control group in comparison to the test group (p = 0.01). Further, plaque scores significantly increased at day 4 in comparison to day 0 in both the placebo control (p < 0.001) and the test (p < 0.001) groups.
Table 1: Intergroup comparison of plaque scores of placebo control and CHX containing dentifrice at Baseline and Day 4

<table>
<thead>
<tr>
<th>Time Interval</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>95% CI</th>
<th>P*</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Placebo</td>
<td>28</td>
<td>1.01</td>
<td>0.25</td>
<td>-0.20 - 0.05</td>
<td>0.25</td>
</tr>
<tr>
<td>Baseline</td>
<td>Test</td>
<td>28</td>
<td>1.08</td>
<td>0.22</td>
<td></td>
<td></td>
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<tr>
<td>F=0.01; df=54</td>
<td>Day 4</td>
<td>28</td>
<td>3.54</td>
<td>0.40</td>
<td>0.04 - 0.51</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td>28</td>
<td>3.27</td>
<td>0.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F=1.20; df=54</td>
<td>Difference</td>
<td>28</td>
<td>2.53</td>
<td>0.48</td>
<td>0.08 - 0.61</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td>28</td>
<td>2.18</td>
<td>0.51</td>
<td></td>
<td></td>
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<tr>
<td>F=1.51; df=54</td>
<td></td>
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</tbody>
</table>

Unpaired t test; N= No. of Subjects; SD = Standard Deviation; CI = Confidence Interval; *P – Probability value, P<0.001 – highly significant; P<0.01 – very significant; P<0.05 – significant; P>0.05 – not significant

Table 2: Intragroup comparison of Baseline – Day 4 plaque scores for placebo control and CHX containing dentifrice

<table>
<thead>
<tr>
<th></th>
<th>Mean Difference</th>
<th>SD</th>
<th>Std. Error Mean</th>
<th>95% CI</th>
<th>t</th>
<th>df</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo</td>
<td>-2.53</td>
<td>0.48</td>
<td>0.09</td>
<td>-2.72 - 2.34</td>
<td>-27.86</td>
<td>27.00</td>
<td>&lt; 0.001</td>
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<tr>
<td>Test</td>
<td>-2.18</td>
<td>0.51</td>
<td>0.10</td>
<td>-2.38 - 1.99</td>
<td>-22.59</td>
<td>27.00</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Paired t test; N= No. of Subjects; SD = Standard Deviation; CI = Confidence Interval; t= Test statistics; df= Degree of freedom; *P – Probability value, P<0.001 – highly significant; P<0.01 – very significant; P<0.05 – significant; P>0.05 – not significant
Discussion

The study was carried out to determine the plaque inhibiting efficacy a dentifrice containing low concentration (0.004%) of chlorhexidine in comparison to regular fluoridated dentifrices. To the best of our knowledge, this is the first study evaluating the antiplaque efficacy of a dentifrice containing such a low concentration of chlorhexidine. The outcomes of the present study which is based on 4-day plaque re-growth model revealed a statistically significant reduction in the plaque score in the CHX containing dentifrice group as compared to placebo control group. As any antimicrobial containing dentifrice product would prove to be efficacious when it is used with a toothbrush, mechanical cleansing by use of tooth brushes was not allowed and a dentifrice slurry was used for the plaque re-growth study. Further, it was also beneficial in lowering the Hawthorne effect which often influences such studies.

Our study revealed significant reduction in dental plaque score in the test group which is in accordance with CHX based dentifrice study by Sanz et al (0.4% CHX), Gjermo et al (0.6% CHX) and Saxton et al (0.8% CHX) but in contrast to that of Johanssen et al (1% CHX) and Jenkins et al (1% CHX).

In a study where the participants were asked to use CHX based dentifrice at home for six months, it was observed that CHX and CHX added with fluoride were more efficacious than the placebo-control dentifrice in reducing dental plaque. It has been believed that the co-formulation of CHX along with other ingredients of a dentifrice would lead to its inactivation. However, a systematic review by Kolahi et al underlines that non-compatibility is mostly known to occur in aqueous solutions and it would not be true to conclude its generalization. Subsequently, it was demonstrated that dentifrice containing CHX reduced anaerobic bacterial counts in supragingival plaque.

Interestingly, Smith et al assessed the antiplaque efficacy of 0.12 % CHX and 0.2 % CHX and observed minimal plaque accumulation as compared to the control, but among them, levels were essentially similar in their effect. Also, Addy et al compared 0.12 % and 0.1 % CHX mouthrinse with regard to their effect on plaque re-growth they observed that the mean plaque scores were mostly lower with 0.12% rinse and the levels were after two weeks, during the 4-week study period. Antiplaque and antimicrobial efficacy was also reported by Escribano et al who carried out a study with 0.05% CHX containing mouthrinse. CHX is a dicationic (at pH levels above 3.5) membrane active substance and acts on the inner cytoplasmic membrane of microorganisms. It is rapidly adsorbed by bacterial cells causing changes in cellular permeability and loss of cytoplasmic components such as pentoses, even at low concentrations.

CHX formulations are the most commonly used oral hygiene products and have been proven to be effective in their antiplaque activity, nevertheless their use in daily practice is marred owing to several side effects. Tooth staining is one of the major concerns in long term use of CHX based oral formulations. However, less staining has been reported in the study by Sanz et al which may be due either inactivation of CHX by the ingredients of the dentifrice or abrasive action of the dentifrice.

Although there was a statistically significant reduction in the plaque scores in the test group, the difference was small and may need further studies to comment on clinical significance and its endorsement over commercially available dentifrices. Therefore, while considering the limitations of the study, we may draw a conclusion that dentifrice containing low concentration of CHX (0.004%) had a better efficacy as compared with the placebo dentifrice. Further studies with a longitudinal study design with varied conditions are needed for conclusive information, in particular with other active substance.

Funding: Nil

Conflicts of interest: None

Ethical Approval: Approved

References


Temporomandibular Joint Disorders: Etiological Factors, Diagnosis and Treatment

K.L. Sushmita

Post Graduate Trainee, Department of Oral Medicine and Radiology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract
Temporomandibular joint is pivotal for normal functioning of jaws and any disarray in the joint may cause discomfort in chewing, speaking, opening and closing of the jaws. Temporomandibular disorders have vast etiologies including the psychological factors, hereditary factors, trauma being the common cause and no definite treatment protocol has still been researched. This article gives recapitulation of various articles describing the key etiology, research diagnosis criteria and effective treatment protocol.

Keywords: Ginglymoarthrodial, Whiplash Injury, Depression, Bio-Behavioural Therapy.

Introduction
Temporomandibular joint where both translatory and circumvolution movements are feasible and the two edges of the bone articulate at the same level, this makes the joint so unique. Since it has a sliding movement additionally to the hinge movement analogues to the diarthrodial joint it is also known as ginglymoarthrodial type of joint1. Temporomandibular joint disorders is not a term attributed to any single dysfunction and cause, it is a colossal term which includes a number of clinical disorders in the temporomandibular joint region, muscles of mastication, clicking or popping sounds, deviation of mouth opening, locking of jaws. temporomandibular disorders have a statistical distribution in general population. There is no gender predilection. This article presents an outline of the aetiology, diagnosis and management of temporomandibular joint disorders.

Etiology: Temporomandibular disorders have multifactorial etiology. The number of studies that were conducted showed poor correlation between single factor being responsible for the signs and symptoms2. An elaborated understanding of the anatomy, physiology, vascular, neurological unit of the temporomandibular joint and masticatory complex is required for the lucid treatment plan of the temporomandibular disorders.

Occlusion: For many years the relation between occlusion being one of the factors contributing to temporomandibular disorders was debatable. For example, asymmetric muscular function3 occurs due to reverse articulation however the connection between this and temporomandibular disorders is not established till now45. Mediotrusion can also be a predisposing factor according to some authors67. Since the topic is widely debatable and still under research it will cause hindrance in standardizing any treatment protocol for the patient. Recently as more and more research are focusing on the multifactorial aetiology of temporomandibular disorders the emphasis on occlusion to be one of the factors is reduced.

Trauma: Trauma can be micro-trauma or macro-trauma. The micro-trauma seen in bruxism and macro-trauma when there is straight hit to the temporal region that affect the temporalis and masseter muscle by the uninhibited movement of the mandible8. Bruxism can be an initiating factor for temporomandibular disorders. Previous study indicates that around 87% of patients having both myofascial pain and disk displacement and around 69% of MFP patients clench their teeth9. This bring about the conjecture that bruxism may
contribute as a possibility for tenderness of myofascial pain, pain in the masticatory muscles and pain from the temporomandibular joint\textsuperscript{10,11,12,13,14}. A study was conducted to assess the consequence of bruxism. It included the effects of clenching, grinding and clenching combined with grinding. The authors came to the conclusion that there was an association between chronic MFP and clenching-grinding, not with just grinding\textsuperscript{15}. The amalgamation between bruxism and temporomandibular disorders signs reinforces the theory that repeated disadvantageous loading of the masticatory system may cause functional disturbances\textsuperscript{16}. Whiplash injury was previously suggested to be an etiology of temporomandibular disorders but later studies were conducted that assessed temporomandibular disorders-related pain in acute whiplash patients in contrast with a matched control group. Temporomandibular disorders affliction following whiplash injury is uncommon, suggesting that whiplash injury solely is insignificant risk factor for accentuation of temporomandibular disorders problems\textsuperscript{16...20}. Endotracheal intubation has also been suggested as a risk factor for temporomandibular joint disorder in a finite number of published case reports and systematic studies.

**Posture:** A relation between head and neck posture to that of temporomandibular disorders is quite inconclusive. Very few studies have been conducted and all of them have insignificant results. A study was conducted to check any relation connecting the head and cervical posture of the patient with temporomandibular disorders, the evidence in that particular systematic review is still unclear and controversial\textsuperscript{21}. Also, there is no relation between the cranio-cervical dysfunction and disk displacement as concluded by other studies conducted which includes the cranio-cervical angles and disc displacement\textsuperscript{22}.

**Psychological Factors:** Psychological studies exhibited that temporomandibular disorders have indistinguishable psychological profiles and dysfunctions as other chronic musculoskeletal disorders. Tension, apprehension and other psychological components instigate muscle hyperactivity and muscle fatigue with the appearance of muscle spasms and the subsequent repercussion: contracture, occlusal disharmony, internal disturbances and degenerative arthritis. These characteristics can change the occlusal scheme of the masticatory system, so that these changes are a result of temporomandibular disorders and not a precipitating factor. On contrary there are studies that have established a deep connection between the myofascial pain and advanced stages of depression\textsuperscript{23} and somatization than those diagnosed with disc displacement.

**Diagnosis:** There is a research diagnostic criteria for temporomandibular disorder which eases the work of diagnosis for the dentist. Since the AD’s president’s conference on temporomandibular disorders in 1983, every major forum on this topic has spotlighted the need for a dependable and plausible diagnostic classification system to recognise temporomandibular disorders cases, including certain subtypes. The study was classified into various axis which helps in differentiating the temporomandibular disorders from orofacial pain thereby helping the dentist providing differential diagnosis. In this article, we have attached the tabulated form which includes all the three groups conforming to the customary factors among conditions.

**Research diagnostic criteria for temporomandibular disorders as given by DWORm IN 1992 is summarised as following:**

**I. Muscle Disorders**

a. **Myofascial pain**-patient will give symptoms like pain in masseter, temporalis, lateral pterygoid and medial pterygoid. There is pain on palpation in at least three regions, one of them on the ipsilateral side of the actual pain experienced.

b. **Myofascial pain with restricted mouth opening:** painless unaccompanied opening less than 40 mm and static stretch more than or equal to 5mm.

**II. Disk derangements**

1. **Disc derangement with reduction:**

   a. Asymptomatic Temporomandibular joint clicking.

   b. Repeated clicking sound on function with either opening or closing of mouth.

   c. Clicking sound while opening mouth occurs when the inter-incisal distance is more than or equal to 5mm rather than on closing the mouth. While the patient protrusive opening the clicking sound disappears.

2. **Disc derangement without reduction with restricted opening:**

   a. Patient gives a history of locking of jaws that would interfere in performing normal functions.
b. Asymptomatic TMJ clicking sounds

c. Independent opening of mouth even painful less than or equal to 35mm and static stretch on more than or equal to 4mm mouth opening.

d. Contralateral excursion less than 7mm or incorrect same side deviation on opening.

3. Disc derangement without reduction without restricted opening:

a. Patient gives a history of locking of jaws that would interfere in performing normal functions.

b. Temporomandibular joint clicking sounds without DDR clicking.

c. Independent painful or painless opening when patient opens his/her more than 35mm and static stretch of more than 4mm.

d. Opposite side excursion more than or equal to 7mm.

e. Additional imaging just to confirm the differential diagnosis.

III. Additional joint diseases.

1. Arthralgia

a. Palpation either laterally or intra-aурicular will lead to pain on temporomandibular joint.

b. Joint pain with or without jaw movement.

c. No crepitus and clicking sound.

2. Osteoarthritis

a. Pain similar to arthralgia

b. Crepitus can be seen on any motion or roentgenographic proof of TMJ changes.

3. Osteoarthrosis

a. Crepitus can be seen on any motion or roentgenographic proof of TMJ changes.

b. No evidence of joint pain nor pain on any motion.

In daily clinical practice, attentive history and clinical exam with imaging, ionising play restricted role in diagnosis of temporomandibular disorders. Electronic devices such as jaw tracking, vibrato-
radiating to the joint. In these cases, a comprehensive dental examination and treatment is needed.

When should a dentist refer the patient to physical therapist

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical</td>
<td>Neck pain including pain in TEMPOROMANDIBULAR JOINT region. Cervicogenic headache and these headaches are reproduced when neck is palpated</td>
</tr>
<tr>
<td>Postural</td>
<td>TEMPOROMANDIBULAR DISORDERS symptoms aggravate when patient changes his/ her posture.</td>
</tr>
<tr>
<td>Outcome oriented</td>
<td>Initial therapies excluding physical therapy. Patient who would undergo TEMPOROMANDIBULAR JOINT surgery is advised to go to a physical therapy preceding to surgery in order that they may learn about post-surgical exercises.</td>
</tr>
</tbody>
</table>

Different therapies can be given to the patient who show different time on onset of pain. Even though these treatments are not routinely followed by dentists as there is no significant evidence within the literature to support it.

For a patient who wakes up with temporomandibular disorders symptoms

1. Medicative- NSAIDs and/or steroids.
2. Passive approach-Performing physical therapy modalities, and advising jaw-stretching exercises.
3. Active approach- advising head and neck posture improvement exercises.
4. Indirect approach- conducting cervical therapies.

For a patient who wakes up without any symptoms which will develop later in the day-

1. Relaxation/stress management.
2. Orthotic appliance
3. Medicative-prescribing a tricyclic antidepressant.

For patients who awakes with symptoms and continue to have the symptom whole day can follow both the above-mentioned treatment.

It is always advocated that only non-invasive procedure should be applied in the beginning and if this rectify the issue then no other treatment is needed. In addition, always look for non-temporomandibular disorders that may overshadow the deep cause such as neck pain, rheumatic disorder, sinus pain, improper sleep and depression. Inability to correctly treat the non-temporomandibular disorders will lead to unsatisfactory temporomandibular disorders symptom improvement.

Seldom surgery is required for TEMPOROMANDIBULAR DISORDERS patients. Other than for salient features like carcinoma, fractures, infections. There are principally three TEMPOROMANDIBULAR DISORDERS for which a patient should be advised to visit a surgeon:

1. Temporomandibular joint inflammation
2. Acute temporomandibular joint disc displacement without reduction
3. Temporomandibular joint ankylosis.

**Conclusion**

Temporomandibular disorder is of varied clinical features that have to been distinguished precisely from non-temporomandibular disorders, multifactorial etiology and treatment should always be non-invasive. Temporomandibular disorders are analogues to musculoskeletal dysfunction in any different part of body, and identical treatment procedures can be followed. Temporomandibular disorders are heterogenous condition of yet unknown focalisation. It is relevant to investigate the etiological patterns, and precise diagnosis in order to provide a better management of patients. Hence, it is decisive to adopt an integrative approach for the well-being of temporomandibular disorders patients.

**Conflict of Interest:** None

**Funding:** None

**Ethical Approval:** Not Required

**References**


Potentially Malignant Oral Lesions: A Clinical Perspective

Suryasnata Nayak¹, Shashirekha Govind², Amit Jena³

¹Post Graduate Trainee, ²Professor and Head, ³Professor, Department of Conservative Dentistry and Endodontics, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

In India, the occurrence of precancerous oral disorders is increasing through decades. These conditions should be diagnosed by the dentists at an early stage during regular clinical practice for which, brief knowledge regarding the clinical features and management is necessary. This article will give knowledge about the commonly occurring precancerous oral lesions/ conditions which will be helpful during regular clinical practice.

Keywords: Epithelial dysplasia, erythroplakia, leukoplakia, oral premalignant lesions, oral submucous fibrosis, potentially malignant disorders.

Introduction

During regular dental check-up or operative procedure, dentists encounter various premalignant lesions of oral cavity; however due to lack of sufficient knowledge regarding the clinical features and management aspect, they often remain undiagnosed and untreated. In this article a brief knowledge regarding the commonly seen precancerous oral lesions/ conditions is given which will help the dental professionals for chair side diagnosis and management of such lesions/ conditions.

WHO defined premalignant lesion in 1978 as, “a morphologically altered tissue in which cancer is more likely to occur than in its apparently normal counterpart”. In 2005, WHO recommended the use of the term “Potentially malignant disorder” instead of precancerous or premalignant lesion. In 2005, ‘potentially malignant disorder’ was defined by WHO as, “the risk of malignancy being present in a lesion or condition either at time of initial diagnosis or at a future date”. No such classification exists for precancerous oral lesions/conditions.

The potentially malignant disorders are ¹

A. Premalignant lesions:
   1. Erythroplakia
   2. Proliferative verrucous leukoplakia
   3. Viadent leukoplakia
   4. Candida leukoplakia
   5. Reverse smokings’ palate
   6. Dyskeratosis congenita
   7. Actinic cheilosis

B. Premalignant conditions:
   1. Lichen planus
   2. Oral submucous fibrosis
   3. Discoid lupus erythematosus
   4. Epidermolysis bullosa
   5. Verruciform xanthoma
   6. Graft versus host disease
   7. Cheilitis glandularis
   8. Xeroderma pigmentosum
   9. Third stage syphilis
   10. Plummer Vinson syndrome

Epithelial Dysplasia: The term “dysplasia” was given by Reagon in 1958 which means atypical, abnormal proliferation. “Epithelial dysplasia is an architectural
disturbance accompanied by cytological atypia (variations in the size and shape of the keratinocytes)”

Dysplastic changes are the signs of premalignant lesions which can be observed in histopathologic view especially in epithelium. “The severity of epithelial dysplasia is not related to the risk of malignant transformation, which suggests that the current grading system is not useful in predicting patient outcomes or to determine management strategies. The diagnosis and grading are based on a combination of cytological and architectural changes (Table 1).”

Table 1: Grading of epithelial dysplasia based on cytological and architectural changes

<table>
<thead>
<tr>
<th>Grades</th>
<th>Level Involved</th>
<th>Cellular Changes</th>
<th>Architectural Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperplasia</td>
<td></td>
<td>• Thickening of epithelium</td>
<td>• Normal maturation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hyperkeratosis</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>Lower third</td>
<td>• Cellular and nuclear pleomorphism</td>
<td>• Basal cell hyperplasia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hyperchromatic nuclei</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Up to middle third</td>
<td>• Cellular and nuclear polymorphism</td>
<td>• Loss of polarity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Anisonucleosis and Anisocytosis</td>
<td>• Disordered maturation from basal to squamous cells</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hyperchromatic nuclei</td>
<td>• Drop shaped rete pegs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increased and abnormal mitotic figures</td>
<td>• Basal cell hyperplasia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Enlarged cells and nuclei</td>
<td>• Increased density of cells</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increased number and size of nucleoli</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>Upto upper third</td>
<td>• Cellular and nuclear polymorphism</td>
<td>• Improper maturation from basal to squamous cells</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Anisonucleosis and Anisocytosis</td>
<td>• Increased density of cells</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hyperchromatic nuclei</td>
<td>• Basal cell hyperplasia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increased and abnormal mitotic figures</td>
<td>• Dyskeratosis (premature keratinization, presence of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Enlarged cells and nuclei</td>
<td>• keratin pearls in epithelium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increased number and size of nucleoli</td>
<td>• Drop shaped rete pegs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Acantholysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Secondary extensions on rete pegs</td>
</tr>
<tr>
<td>Carcinoma</td>
<td>Full thickness</td>
<td>• All changes may be present</td>
<td>• Top to bottom change</td>
</tr>
<tr>
<td>in situ</td>
<td></td>
<td></td>
<td>• Loss of stratification</td>
</tr>
</tbody>
</table>

Oral Leukoplakia: Schwimmer used the term “Leukoplakia” in 1877, to describe a white plaque on the tongue. Leukoplakia has been defined by WHO in 1978 as, “a predominantly white patch or plaque that cannot be characterized clinically or histopathologically as any other definable lesion”. Leukoplakia is a clinical terminology which is reported as epithelial dysplasia histopathologically. The etiology is multifactorial, but tobacco and smoking are considered to be important causative factors for oral leukoplakia.

Clinical Features: (Figure 1, 2)

- Homogeneous leukoplakia: uniform, thin white area altering or not with normal mucosa
- Speckled type: white and red lesion with predominant white surface
- Verrucous leukoplakia: surface is elevated, proliferative or corrugated
- Nodular type: small polypoid outgrowth, predominantly white

Figure 1: Oral Leukoplakia
Figure 2: Oral Leukoplakia

Management: 5

- Cessation of habit
- Medications [local and systemic chemo-preventive agents (vitamin A and retinoids), systemic β-carotene, lycopene (α-carotenoid), ketorolac (mouthwash), local bleomycin]
- Surgical excision/ laser ablation/ electro cauterization/ cryosurgery
- Follow up

Erythroplakia: It is defined as “a red patch that cannot be clinically and pathologically diagnosed as any other lesion” 3. Erythroplakia is “A fiery red patch that cannot be characterized clinically or pathologically as any other definable disease” 1. Exact etiology and pathogenesis are unknown; however, use of tobacco and alcohol are involved in most cases 6. Only the true, velvety, red homogeneous OE has been clearly defined while the terminology for mixed red and white lesions is complex, ill-defined and confusing. A recent case control study of OE from India reported a prevalence of 0.2%. A range of prevalences between 0.02% and 0.83% from different geographical areas has been documented. OE is predominantly seen in the middle aged and elderly. One study from India showed a female:male ratio of 1:1.04. The soft palate, the floor of the mouth and the buccal mucosa is commonly affected. A specific type of OE occurs in chutta smokers in India. Lesions of OE are typically less than 1.5 cm in diameter. The etiology of OE reveals a strong association with tobacco consumption and the use of alcohol. Histopathologically, it has been documented that in OE of the homogenous type, 51% showed invasive carcinoma, 40% carcinoma in situ and 9% mild or moderate dysplasia. Recently, genomic aberrations with DNA aneuploidy has been demonstrated. p53 mutations with different degrees of dysplasia may play a role in some cases of OE. Transformation rates are considered to be the highest among all precancerous oral lesions and conditions. Surgical excision is the treatment of choice. Data on laser excision are not available. Recurrence rates seem to be high, reliable data are, however, missing. More studies on OE are strongly needed to evaluate a number of so far unanswered questions. The natural history of OE is unknown. Do OEs develop de novo or are they developing from oral leukoplakia through several intermediate stages of white/red lesions? The possible role of fungal infection (Candida micro-organisms).

Clinical features: 6 (Figure 3)

- Flat or depressed red lesion.
- Sometimes occurs with leukoplakia (erythroleukopakia).
- Some are smooth and others are nodular or granular.

Management:

- Surgical excision and regular follow up

Figure 3: Erythroplakia

Oral Submucous Fibrosis: Oral submucous fibrosis was first described by Schwartz in 1952. Pindborg defined OSMF in 1966 as, “an insidious, chronic disease affecting any part of the oral cavity and sometimes the pharynx”. It is associated with juxta-epithelial inflammatory reaction, followed by fibro elastic change of lamina propria and epithelial atrophy which leads to reduced opening of mouth. The prevalence is increasing in South Asia due to frequent chewing of betel nut. It is considered as a disease in India that has the highest
malignant transformation rate among all the potentially malignant disorders. It is also known as, “diffuse oral submucous fibrosis”, “idiopathic scleroderma of mouth”, “idiopathic palatal fibrosis”, “sclerosing stomatitis” or “juxtaepithelial fibrosis”. Etiological factors include arecanut chewing. Oral submucous fibrosis can be categorized into four stages with some specific characteristic features (Table 2).

### Table 2. Stages of oral submucous fibrosis

<table>
<thead>
<tr>
<th>Stage I</th>
<th>Stage II</th>
<th>Stage III</th>
<th>Stage IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Very Early]</td>
<td>[Early]</td>
<td>[Moderately Advanced]</td>
<td>[Advanced]</td>
</tr>
<tr>
<td>Fine fibrillar collagen dispersed with marked oedema</td>
<td>Early hyalinization in juxta-epithelial area</td>
<td>Moderately hyalinized collagen</td>
<td>Completely hyalinized collagen</td>
</tr>
<tr>
<td>Strong fibroblastic response</td>
<td>Moderate number of plump young fibroblasts present</td>
<td>Decreased fibroblastic response (mostly adult fibrocytes)</td>
<td>Fibroblasts absent in the hyalinized area</td>
</tr>
<tr>
<td>Blood vessels are more often dilated and congested</td>
<td>Dilated and congested blood vessels</td>
<td>Normal and constricted blood vessels</td>
<td>Completely obliterated or narrow blood vessels</td>
</tr>
<tr>
<td>Inflammatory cells (polymorphonuclear leukocytes with occasional eosinophils) present</td>
<td>Inflammatory cells (mononuclear lymphocytes, eosinophils with occasional plasma cells) present</td>
<td>Inflammatory exudates contains lymphocytes, plasma cells and eosinophils occasionally</td>
<td>Inflammatory cells include lymphocytes and plasma cells</td>
</tr>
</tbody>
</table>

### Clinical Features:
- Burning sensation in the mouth
- Pain and ulceration
- Depapillation and reduced movement of tongue
- Blanching of oral mucosa with leathery texture
- Loss of oral pigmentation
- Reduced mouth opening (Figure 4)
- Fibrosis of nasopharynx leads to nasal twang and stenosis of Eustachian tube may cause hearing defect in advanced stage
- Vesicle formation may be present
- Juxta-epithelial inflammatory reaction, followed by fibroelastic change of lamina propria and epithelial atrophy which leads to reduced opening of mouth

### Management:
- Cessation of the habit
- Nutritional support
- Hyaluronidase
- Placental extract
- Steroids
- Anti-inflammatory
- Oxygen radical scavenging
- Antifibrotic
- Chymotrypsin
- Interferon-gamma
- Immuno modulatory drugs
- Oral physiotherapy
- Combined therapy
- Diathermy
- Ultrasound
- Surgical treatment
- Cryotherapy

**Oral Lichen Planus:** Lichen planus is “a chronic inflammatory disease that affects the skin and the mucous membrane”. It is an immunologically mediated mucocutaneous disease. Lichen planus (LP) is a “chronic inflammatory condition that may affect the skin,
scalp, nails, mucous membrane (especially mouth) and the genitalia” ¹¹. It is “a chronic mucocutaneous disorder of the stratified squamous epithelium that affects oral and genital mucous membranes, skin, nails and scalp” ¹², ¹³. The word comes from Greek word “leichen” which means tree moss and Latin word “planus” which means flat. Lichen planus (LP) is “a chronic, inflammatory, mucocutaneous disease that belongs to the group of autoimmune diseases mediated by T cells” ¹⁴. The oral mucosa of patients with OLP exhibits significant cytomorphic changes; however, malignancy is absent ¹⁵. It is common in middle age that affects females more than males, in a ratio of 3:1 ¹⁶, ¹⁷. An overall age-standardised global prevalence of OLP is 1.27% (0.96% in men, 1.57% in women) among general population ¹⁸. It is commonly seen between 5th to 6th decades of life and is twice as common in females than in males ¹⁹, ²⁰, ²¹. Lichen planus occurrence is 76% of conditions in India. The sex ratio in India (male: female) is 3:2. It affects 0.1% to 4.0% of the population ¹⁰, ²². 0.4% to 1.5% malignant transformation to squamous cell carcinoma is associated with lichen planus ¹⁰.

**Clinical Features:** (Figure 5)

- Pinkish- purple polygonal papules which are flat, pearly, pruritic, present with fine white lace like pattern (reticular) in the periphery, known as “Wickham’s Straiae”.

**Figure 5: Oral Lichen Planus**

Modified World Health Organisation diagnostic clinical criteria for Oral Lichen Planus: ¹¹

- Bilateral symmetrical lesions
- Reticular pattern: lace like network of white/ grey lines which are slightly raised
- Subtypes in presence of reticular lesions are: erosive, atrophic, bullous and plaque type
- The term “clinically compatible with” is used for the lesions those resemble oral lichen planus but do not fulfil the above criteria

**Management** ⁹

- Corticosteroids
- Other immunosuppressants: “Calcineurin inhibitors, cyclosporine, tacrolimus, pimecrolimus, retinoids, Dapsone, mycophenolates, low-dose low molecular weight heparin (enoxaparin), efalizumab”
- Other modalities: PUVA therapy, photodynamic therapy, laser therapy

“Apart from, the above-mentioned malignant disorders, clinical features and management of other potentially malignant disorders are summarized in Table 3,”
Table 3: Clinical features and management of other potentially malignant disorders

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Potentially malignant disorders</th>
<th>Clinical features</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Actinic keratosis</td>
<td>• Often multiple, appearing either as flat macules or raised papules with a yellow or brown-colored crust overlying an erythematous base. The scale can be picked off with difficulty, revealing a red base with bleeding points \textsuperscript{23}</td>
<td>• Cryotherapy, Chemotherapeutic measures (5-Fluorouracil), Diclofenac sodium, Imiquimod, Ingenol mebutate, Photodynamic therapy, Laser therapy, Dermabrasion, Curettage and Shave Excision, Chemical peeling, Radiotherapy, Systemic retinoids \textsuperscript{24}</td>
</tr>
<tr>
<td>2.</td>
<td>Discoid lupus erythematosus</td>
<td>• Erythematous macules, papules and plaques with telangiectasia, scale and follicular plugs result in scarring with atrophy and dyspigmentation. Involvement of hairy area will end with scarring alopecia \textsuperscript{25}</td>
<td>• Topical corticosteroids • Intraleosional steroids • Antimalarials • Other drugs: methotrexate, cyclosporine A, Tacrolimus, mycophenolate mofetil, azathioprine \textsuperscript{26}</td>
</tr>
<tr>
<td>3.</td>
<td>Syderopenic dysphagia</td>
<td>• Chronic iron deficiency anemia, dysphagia and spasm of upper oesophagus without anatomic stenosis</td>
<td>• Iron supplementation • Mechanical dilation • Follow up</td>
</tr>
<tr>
<td>4.</td>
<td>Palatal lesions associated with reverse smoking</td>
<td>• Diffused white palate with numerous excrescences having central red dots. In the early stage, smoker’s palate may consist of a greyish palatal mucosa, either with a few or without any excrescences. \textsuperscript{27}</td>
<td>• Protection of the palate against the smoke, or discontinuance of smoking</td>
</tr>
<tr>
<td>5.</td>
<td>Dyskeratosis congenita</td>
<td>• Poor growth or abnormal shape of finger and toe nails (nail dystrophy) • Skin colour change (pigmentation) especially on neck and chest in a “lacy” pattern • Presence of white patches in mouth (oral leukoplakia)</td>
<td>• Allogeneic hematopoietic stem cell transplantation</td>
</tr>
<tr>
<td>7.</td>
<td>Verruciform xanthoma</td>
<td>• Solitary, sessile or pedunculated lesion with rough or pebbly surface</td>
<td>• Surgical excision</td>
</tr>
<tr>
<td>8.</td>
<td>Cheilitis glandularis</td>
<td>• Simple: Lesions are multiple, painless, with openings and ducts are dilated • Superficial suppurative (Baelz disease): Swelling, painless crusting, induration, superficial ulceration on lip • Deep suppurative: Infection (deep seated) with abscess formation and fistulous tracts</td>
<td>• Elimination or reduction of predisposing factors • Conservative treatment includes: steroids (topical, intraleosional), anticholinergics, anti-histaminics, antibiotics, emollients, topical corticosteroids and chemotherapeutic agents • Surgical excision, vermilionectomy, cryosurgery, labial mucosal stripping</td>
</tr>
<tr>
<td>9.</td>
<td>Xeroderma pigmentosum</td>
<td>• Sensitivity to sunlight, sunburn • Unusually increased number of lentigines (freckle-like pigmentation) in sun exposed areas • Photophobia</td>
<td>• Protection from sunlight • Psychological problems can be addressed.</td>
</tr>
</tbody>
</table>

**Conclusion**

Potentially malignant disorders are frequently undiagnosed due to lack of awareness and knowledge among dental professionals. It is important to know the details regarding the various potentially malignant disorders for its early and correct diagnosis during any other dental procedures. Prognosis depends on the grade and stage during initial diagnosis. In country like India, premalignant lesions are common due to frequent use of tobacco and/or alcohol; however, people have less knowledge regarding this and people do not want to be treated until the disorder becomes symptomatic. It is the duty of dental professionals to make the people aware about such disorders. Brief knowledge regarding the management of such disorders will be helpful in regular clinical practice.

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Prosthetic Rehabilitation of Ocular Defect: A Case Report

M. Krishna1, Abhijita Mohapatra2, Gopal Krishna Choudhury3

1Postgraduate Trainee, Department of Prosthodontics, Crown Bridge and Implantology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), 2Professor, Department of Prosthodontics, Siksha ‘O’ Anusandhan (Deemed to be University), Crown Bridge and Implantology, Institute of Dental Sciences, 3Professor & Head, Department of Prosthodontics, Crown Bridge and Implantology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India.

Abstract

The kind of disfigurement caused due to loss of eye results in significant physical, psychological and social distress for which they require immediate management and functional rehabilitation. The aim of such rehabilitation is to re-establish back the patient’s dignity and self-confidence. The disfigurement can be concealed to an extent to give an acceptable aesthetic appearance. This clinical case report represents the rehabilitation of an ocular defect of a 58 year old patient caused due to a traumatic injury; fabrication of customized prosthesis was done by polymethylmethacrylate ocular intraorbital prosthesis.

Keywords: Prosthetic rehabilitation; Ocular defect; Polymethylmethacrylate ocular intraorbital prosthesis.

Introduction

Ocular defects can be congenital or acquired. Based on the severity of the involvement, the surgical management may comprise one of the approaches: evisceration, enucleation or exenteration.1-3 Enucleation is the surgical removal of the entire globe and a portion of the optic nerve from the orbit. Physiological distress associated with the loss of eye can be considerably enhanced by an ocular prosthesis. The usage of methyl methacrylate resin is considered superior for ocular prosthetic materials in terms of tissue compatibility, light weight, better fracture resistant, translucency, easy fabrication, easy adjustability, and its capability for intrinsic and extrinsic coloring. In this case PMMA material was used for the fabrication. The custom fabricated prosthesis promotes a better fit, & is more contended to use providing better aesthetic results than the stock prosthesis.1

Casereport: A 58-year-old patient reported with a complaint of missing right eye. Examination revealed enucleated right eye socket with no signs of infection. (Figure 1) Patient gives a history of surgical removal of the right eye ball after a traumatic injury experienced 3 months back. After enucleation, the patient was providing with a conformer which had been placed for 4-6 weeks for the reduction of the edema and subsequently maintenance of the socket contours.4 The treatment plan involves replacement of the conformer for the rehabilitation with a custom-made ocular prosthesis. When surgical site ensures adequate healing the fabrication of an ocular prosthesis may be undertaken. Thus, loss of orbital volume and facial asymmetry in an anophthalmic socket can be prevented through early management.4

Corresponding Author**
M. Krishna
Postgraduate Trainee, Department of Prosthodontics, Crown Bridge and Implantology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India
e-mail: krisshnaa4@gmail.com

Figure 1. Preoperative image of anophthalmic defect
The fabrication procedure involves the following:

Impression Making: A custom made impression tray was made from light cure activated polymerizing resin material on the primary cast obtained from putty impression made upon the non-defect eye. (Figure 2a) Perforations were made for the mechanical retention of impression material and a syringe cap was cut appropriately and fixed to the tray. (Figure 2b) Necessary polishing and finishing of custom tray was done to avoid impingement to the soft tissues. Using this custom-made tray impression was made by instructing the patient to tilt the head backward. Vaseline was applied on the eye lashes and light body polyvinyl siloxane impression material (Coltene Affinis A-Silicone impression material) was injected into the right eye socket. The head was moved back to the vertical position and the functional eye movements were made by the patient by moving his eyes up and down. (Figure 2c). This facilitated the proper flow of the impression material to all aspects of the eye socket. The patient was instructed to look and maintain his gaze in a forward direction. The seal was broken by massaging the surrounding tissues, when the material sets.

While retrieving the impression the patient was instructed to gaze upward, the cheek was pulled down and the inferior portion of the impression was removed out of the socket by rotation. The Impression obtained was verified for accuracy, & was invested in type III dental stone (BN STONE Alpha gypsum plaster) in a small medicine cup. (Figure 3a) The space left in the mold was applied with separating media (Coltene separating media) & molten baseplate wax was poured into it to fabricate a scleral wax pattern and the orientation was marked on the cast obtained. (Figure 3b) Finishing and polishing was done in a conventional manner. The wax pattern was placed into the socket and evaluated for proper fit. To achieve satisfactory contours of the eyelids both in open and closed positions, the wax can be added or trimmed from the basic scleral pattern.

Positioning of the Iris: The contra-lateral iris position from the facial midline guides to mark the
expected position of iris on a sclera wax pattern. Prefabricated eye shell matching the patient’s natural left iris in color and size was selected. Iris portion of the shell along with some of the scleral portion was trimmed away with the help of a bur. The iris disc was positioned on the marked area by scooping out wax, followed by blending with the rest of the scleral wax pattern.

**Trial:** After the positioning of iris disc, the wax trail was done in the eye socket followed by polishing of the pattern. The superior border of the pattern was adjusted by removing some wax to engage into the undercut while securing the same eye opening as that of contra-lateral eye and to correct the sagging of upper eyelid (Figure 4a, b). Proper position, gaze and aesthetics of the iris were evaluated by comparing with the contra-lateral natural eye.

**Processing:** Flasking of the iris disc fitted into the wax pattern was done within the stone mold to create a split mold. The iris disc position was secured with the help of a syringe cap fixed with glue. Dewaxing was done and the mold was packed with tooth moulding heat cured acrylic (tooth moulding powder, DPI) of appropriate shade. Short curing cycle was carried out for processing. The split mold was preserved while retrieving the prosthesis from it. About 1mm of the scleral portion was trimmed from the surface, to create space for the incorporation of the nylon fibrils that has been separated from the denture acrylic resin polymer to imitate the veins and effect of sclera vessels (Figure 5a, b). The heat cured clear acrylic resin was used to cover the fibrils on the sclera and was processed in the same mold which had been preserved. This characterization helps to give a life like appearance of the prosthesis. After the prosthesis was recovered, it was finished, polished, disinfected and stored in water for twenty-four hours before insertion into the socket.

**Insertion:** The prosthesis was evaluated for any requisite adjustments during insertion and removal into the socket. Esthetics and comfort of the patient were examined. Patient had been educated regarding the use of the prosthesis. Ophthalmic lubricant was also advised for lubrication of the ocular prosthesis. Patient was instructed to remove the prosthesis while sleeping to relax the muscles and was advised for follow up in every three months.

**Discussion**

Although the effects of enucleation on facial symmetry and orbital volume are still debated. Rehabilitating with a custom-made ocular prosthesis...
can help in building confidence while making them feel more acceptable. Although the ocular prosthesis cannot be able to restore the vision but it has been helpful in reducing the psychological trauma caused due to loss of an eye. This clinical report represents a technique that demonstrates the fabrication of a semi-customized ocular prosthesis with stock iris and a custom-made sclera which is less time consuming and provides functionally and aesthetically acceptable results.  

**Conclusion**

The accomplishment of the custom-made ocular prosthesis relies on the defined laboratory techniques and artistic skill of the operator. It is obvious that an ocular prosthesis is much more necessarily needed to provide utmost comfort while restoring the physiologic function of the eye. Moreover, Fabrication of a custom-made prosthesis allows infinite variations during construction and ensures better fit and patient’s contentment.

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**References**

Accelerated Orthodontics: A Boost to Orthodontic Treatment

Ananya Panda

Post Graduate Trainee, Department of Orthodontics and Dentofacial Orthopedics, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

The molecular mechanisms controlling the behavior of the cells in the alveolar bone and periodontal ligament underlie the remodeling of tissues around the roots which mainly determines the rate of the orthodontic tooth movement under mechanical forces. Hastening of “orthodontic tooth movement” can greatly reduce the treatment period and occurrence of undesirable effects. Also, reduced treatment time results in increased positive and acceptable attitude universally towards the orthodontic treatment. This review synopsizes the contemporary methods to accelerate tooth movement which can be categorized into biological, physical and surgical methods.

Keywords: Orthodontics; Acceleration; Treatment; Orthodontic Tooth Movement.

Introduction

Orthodontic tooth movement is based on the fact that prolonged light forces applied on the tooth results in tooth movement by selective resorption and apposition of bone around the root. Thus, the tooth movement occurs along with its attachment apparatus, as the socket of the tooth migrates. Tooth movement is a PDL phenomenon as the bony response occurs through the periodontal ligament. Acceleration of the movement of the teeth during the orthodontic treatment has its prospects in reducing the duration of the treatment and decreased unwanted effects related to oral hygiene and better post treatment stability.1-3

Methods of Acceleration of tooth movement

The response of the teeth to the sustained force is related to the magnitude of force. heavy forces result in rapid development of pain, cellular necrosis within PDL and the alveolar bone surrounding the affected tooth undergoes undermining resorption. In contrast, Lighter forces are compatible with the tissues in the PDL and remodeling of the bone occurs with relatively painless frontal resorption of the tooth socket. For a tooth movement to occur, osteoclasts are formed at the site of pressure and osteoblasts are formed at the site of tension and thus bone remodeling occurs. Various methods used to accelerate tooth movement can be summarized into:

- Biological
- Physical
- Surgical

Biological Methods: Several Experiments have been done using certain exogenous molecules to hasten the tooth movement both in animal experiments and in humans. These molecules are “Prostaglandin E, Cytokines, Receptor activator of nuclear factor Kappa B ligand (RANKL), Macrophage colony stimulating factor (MCSF)”.

Prostaglandins: In the body, Arachidonic acid that are formed from phospholipids, synthesis Prostaglandins. Prostaglandins causes increase in the number of osteoclasts and thus leads to bone resorption. Several animal experiments have shown that the rate of orthodontic tooth movement is increased by local application of “PGE$_1$, PGE$_2$, or analogs of PGE$_1$, PGE$_2$, or thromboxane A2”. Local Prostaglandin injections at the submucosal region have shown to increase the tooth movements by 1.6 folds.3 However, there are certain drugs that inhibits the PG activity like corticosteroids, NSAIDs and other agents that have mixed agonist and antagonist effects on various PGs such as Tricyclic antidepressants, antimalarial drugs, antiarrhythmic agents and methylxanthines. The drugs taken for control of pain such as the NSAIDs during orthodontic therapy by certain patients may cause interferences with the tooth movement. It is a possibility that there would be decreased response to the treatment in patients on any of the medications, as mentioned above. However certain medications which affect neurotransmitters can show increased response.
Cytokines: High concentration of cytokines like IL-1, IL-2, IL-3, IL-6, IL-8, and tumor necrosis factor alpha (TNF) were found to play a major role in bone remodeling. Also, interleukin-1 (IL-1) stimulates osteoclast function through its receptor on osteoclasts. There was increased production of prostaglandins and IL-1 beta in the PDL due to the mechanical stress caused by the orthodontic treatment. Experiments on animals have shown that the intensity of PGE and IL-1 beta was found to be highest on the tension site when certain amount of force was applied for days on a particular tooth. The bone remodeling process is a balance between RANKL-RANK system and OPG compound. RANKL, a membrane bound protein on osteoblasts, bind to RANK on the osteoclasts and causes osteoclastogenesis and Osteoprotegerin (OPG) competes with RANKL in binding to osteoclast to inhibit osteoclastogenesis.3

Vitamin D: 1,25-dihydroxycholecalciferol [1,25(OH)2D3], an active metabolite of vitamin D, along with parathyroid hormone and calcitonin maintains the calcium homeostasis by regulating the phosphorus and calcium balance in the body. Activation of cells, independent of the cyclic nucleotide cascade, occur due to the activity of 1,25- dihydroxycholecalciferol directly on the nucleus of the circulating monocytes and osteocytes progenitor cells. An extensive increase in tooth movement was seen after a 21-day experimental study following a weekly intraligamentous injection of a 1,25-dihydroxycholecalciferol.4

Parathyroid Hormone (PTH): Earlier studies state that, administration of PTH in a slow and continuous manner in a localized region showed a faster rate of bone resorption than the usual.5 Approximately, 1.6-fold increase in the rate of the tooth movement was seen with 1µg of PTH injected locally in a methylcellulose gel medium. With no systemic bone loss or undesirable side effects, local administration of PTH along with the mechanical orthodontic force seems to be useful in accelerating the tooth movement.

Relaxin: Relaxin hormone is produced by a pregnant female and helps during parturition by relaxing the pubic symphysis and widening the birth canal. Relaxin seems to have the potential to remodel the sutural, gingival and PDL connective tissues resulting in post orthodontic treatment stability, space closure and reduced scar tissue formation following frenectomies.3 The effect of Relaxin on the orthodontic tooth movement is still controversial, as in few studies cites the positive effect on the tooth movement while few cites no significant effect on the tooth movement. According to a study, relaxin reduces the mechanical strength of the tissues around the tooth and increase the tooth mobility. However, few randomized clinical trials conducted on humans showed no major changes in orthodontic tooth movement due to relaxin.

Physical Methods: This approach involves the physical means or the device assisted therapy for hastening the orthodontic treatment. This includes “direct electric currents, pulsed electromagnetic field, static magnetic field, resonance vibration and low level laser therapy”.

Direct electric current: When the mechanical pressure is applied on the tooth, there is some sort of “piezoelectric phenomenon” that occurs in the tissues around the tooth. Many studies have cited that this above mentioned phenomena acts as a signal for the activation of cells and in turn helps in the process of remodeling.6 In an experimental study by ‘Z Davidovitch’, it was shown that local application of electric current to the tissues that is by placing the anode nearer to compression area and cathode nearer to the tension region during orthodontic treatment hastened the tissue remodeling and thus resulted in increase in the tooth movement.

Resonance Vibration: Low magnitude and high frequency vibrations stimulate bone metabolism by enhancing differentiation and maturation of the cells leading in a faster bone remodeling necessary for tooth movement. Few researchers have reported an average rate of 1.16 mm movement of tooth per month with AcceleDent device and 0.79 mm of movement per month without it. Studies have also suggested that, loading a tooth with vibrations for around 1.5 hours in a day for 3 weeks resulted in around 1.3 to 1.4 times higher rate of tooth movement than with a static force. To avoid physical and psychological stress, it is always advised to use this method for a brief period in a clinical set up. The anabolic effect on bone produced by vibratory loading reflects the increased rates of bone resorption and formation, thus raising concern that tooth cementum could be subject to higher level of resorption when exposed to concomitant stresses from orthodontic forces and vibrations. However, root resorption occurs due to the tissue hyalinization caused by the obstruction in blood flow at the region of compression when mechanical force is applied and this might be prevented by the resonance vibration.7
Low level laser therapy: Low level laser therapy (LLLT) plays bio-stimulatory role in healing of wounds, repair, remodeling and regeneration of bone following surgery due to the stimulation of osteoblasts, osteoclasts, fibroblasts via “RANK/RANKL and macrophage colony stimulating factor” expression. The main reason behind the cellular proliferation is the synthesis of DNA following laser light exposure. Kawasaki and Shimizu, in 2000, in their study cited an increase in tooth movement of about 1.3 fold after irradiation with laser and considerably higher bone formation in the tension site and resorption in the compression site. According to few studies on lasers, it can be stated that, the effect of lasers on the tooth movement could be dose dependent and also could depend on certain other factors like the age of the patient and the amount of force applied. The therapy has its own disadvantages in terms of its high cost, long chair time and it also requires efficient and skilled human resources. The effect of laser therapy in boosting the orthodontic treatment is still a controversial issue. Despite its positive effects in various animal and human trials, few studies have also cited its zero or negative effects in orthodontic treatment.

Surgical methods: Hullihan, an American oral surgeon experimented with the moving teeth after making cuts in alveolar bone in the late 19th century and following which many experiments were done till the early 20th century. Due to concerns over infections and bone loss, the approach was not adopted widely earlier. The remodeling of alveolar bone and its turn-over rate is seen to increase after osteotomy, fractures and bone grafting procedures.

Corticotomy: In the mid 20th century, Kole, a German surgeon revived the idea that cuts between teeth led to faster tooth movement. In this procedure, the medullary bone remained intact, while the cuts were made on the cortical bone, thus reducing the resistance offered by the dense cortical bone. The recent surgical technique is further revived and reconsidered by Wilko, as a regional acceleration of the remodeling process of the bone that leads to faster movement of the tooth and not due to the movement of the blocks of bone and a much lighter force is utilized for the movement of teeth and the surgical approach is broadened into “accelerated osteogenic orthodontics (AOO)” by including the decortication of the facial surfaces of alveolar bone. The benefit of AOO lies in the reduction of time for the treatment without any extractions and also there has been reports of post treatment stability as well as retention. The risks attached to this procedure includes the reduction in the height of the alveolar bone if the corticotomy is performed without any replacement with bone grafts. There are chances of bruising and/or any undesirable changes in the gingiva.

Piezocision or Modified Corticotomy: In 2009, Dibart, a periodontist, introduced this technique which he named as “Piezocision”. This technique involves incision on the facial aspects of the gingiva in the incisor region and the cuts on bone is done only in that area using a “vibrating piezoelectric knife”. The Tunnels created beneath the gingiva allows placement of a slurry bone graft. Reports suggest, this technique has increased post treatment esthetic results and it can also be performed in cases with Invisalign.

Micro-osteoperforation: Developed by a commercial company (Propel, Alveologic LLC, Briaciff Manor, NY), this method has an advantage of being performed by an Orthodontist and does not require any periodontal surgery. Special screws supplied by the company are inserted into the gingiva in the area of interproximal alveolar bone, which generates a regional acceleration of bone remodeling leading to faster tooth movement. A recent study by “Tracy Cheung” concluded that Mini Implants help in micro-osteoperforations and hasten tooth movement by 1.86 folds.

Distraction Osteogenesis: Also known as “Inter-septal alveolar surgery” is a method that is divided into “distraction of PDL” where the inter-septal bone lying on the distal aspect of the tooth is undermined by a minor surgery during extraction of premolars with the help of a round bur, and “distraction of alveolar bone”, which includes vestibular dissections and osteotomies along with the above mentioned procedure. This procedure reduces the resistance of bone for the tooth movement and hence there would a faster movement of the tooth.

Conclusion

Although, few techniques have certain downsides, their positive results in creating an environment for boosting the orthodontic treatment should be taken into consideration and eventually used according to the suitable situations. Certain new approaches evolved, have reduced the chances of relapse along with the reduction in the treatment period. Further studies and methods should be encouraged for hastening the orthodontic tooth movement so that new techniques with least side effects and maximum positive effects evolve.
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Diagnostic Features of Oral Ulcers: An Overview

Suvranita Jena¹, Rupsa Das¹

¹Post Graduate Trainee, Department of Oral Medicine and Radiology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract
Diagnosis and management of oral ulcers are often challenging due to their similarity in clinical presentation. While many ulcers are result of chronic trauma or irritation from a particular source or due to underlying systemic conditions may be – immunological, malignancies and some are due to acute or chronic infections. Treatment and management of these ulcers requires deep understanding of the pathogenesis of the ulcers. This overview will address how to diagnose and distinguish varying type of oral ulcers for further successful treatment.

Keywords: Oral Ulcers, Acute, Chronic, Recurrent, Solitary, Multiple.

Introduction
Defects in the covering epithelium and underlying connective tissue or both are characteristic of an ulcer. Ulcers are broadly defined as “any break in the continuity of the epithelium brought about by molecular necrosis”. Due to huge diversity of the contributing aspects and clinical presenting features, diagnosis of numerous oral ulcerations has become quite interesting and challenging for the physician. According to the duration of ulcer. A classification has been formulated. If the ulcerative lesions last for 2 weeks or more, it is classified under “chronic”, otherwise if less than 2 weeks, it is considered as “acute”. If any ulceration presents with a history of analogous occurrences with intermittent healing, this type of ulcerative lesion comes under “recurrent” variant. According to the number of ulcers occurring in the oral cavity, a classification has been devised. The word “solitary” implies occurrence of single ulceration in the oral cavity whereas occurrence of several ulceration is termed as “multiple”. Overall, the oral ulcerative lesions are categorized on the basis of number and duration, into three major groups namely acute, chronic and recurrent ulcerative lesions which are further sub divided into sub groups namely solitary acute, multiple acute, solitary chronic, multiple chronic and lastly solitary/multiple recurrent ulcers.¹-³

Acute Solitary Ulcers: Traumatic ulcers- Commonest of all ulcers in oral cavity, commonly occurs on the lateral borders of the tongue, lips and buccal mucosa. These are caused by accidental biting during mastication, injury from piercing objects, thermal and chemical injury or unusual habitual biting of buccal mucosa mostly in stress. These persist for few weeks, generally single ulceration occurs and on the tongue the ulcers become recurrent if the etiologic factors have not been eradicated such as- sharp cusps of any tooth, fractured crown or restorative materials. Clinically the borders of the ulcer are usually raised slightly, can be well circumscribed, floor is covered with whitish yellow necrotic pseudomembranous slough having erythematous in appearance, scrapable and non-tender when palpated. Treatment includes removal of the etiologic factors. The healing will take place within 7 – 10 days. Prescription of any anesthetic gel can be recommended for symptomatic relief to the patient.¹,²

Corresponding Author**
Suvranita Jena
Post Graduate Trainee, Department of Oral Medicine and Radiology Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India
e-mail: suvrnitajena9@gmail.com
Necrotizing Sialometaplasia – First described by “Abrams and Melrose in 1973”. This is defined as “a benign, non-neoplastic inflammatory disease of the minor salivary gland mainly the mucouserous gland of the hard palate”. With a gender predilection towards middle aged men. Most common site for the involvement is palate followed by lower lips, sublingual region, retromolar area and tongue region. The etiology for the disease is still unclear, but trauma from ill-fitting denture, provoked vomiting (bulimia), upper respiratory tract infection, prolonged use of non-steroidal anti-inflammator drugs can be considered as few predisposing factors. These are diagnosed by a crater like lesion which are initially not ulcerated swelling mostly accompanied with pain having an indurated and well delineated border. This a self-limiting disease and does not require surgery but histopathological confirmation is a necessity as it can resemble many diseases particularly malignant neoplasms.

Acute Multiple Ulcer: Primary Herpetic Gingivostomatitis: Presents as oral manifestation of the symptomatic herpes simplex virus (HSV). HSV-1 presentation occurs above the waist and HSV-2 affects the lower body below the waist. Peak incidence is around 3 years with a range from 6 months to 5 years. Disease presents as numerous pin point vesicles on palate, attached gingiva and tongue that ruptures readily upon trauma or frequent irritation. These becomes painful after rupturing and the floor is covered with yellowish sluggish pseudo membrane and the most distinguishing characteristic features of this lesion is the coalescing scalloped borders where small ulcers merge to form larger one frequently circumscribed by thin erythematus halo. Attached gingiva of maxillary and mandibular arch appears fiery red colour. These heal spontaneously after 5-7 days with no scarring. Anesthetic ointments and mouthwashes can be advised for reducing pain while eating and swallowing.

Herpes Zoster Infection (shingles)- Usually affects in second decade of life and is less common viral infection. Begin with mild fever, malaise, development of “pruritic maculopapular rash and dew drop like vesicles”. Severe tender state, occurrence of multiple clustered ulceration on hard palate and gingiva in a unique unilateral design. These are self-healing lesions within 10-14 day. Management of patient can be done by pain control, supportive care and sufficient hydration.

Herpangina- Occurrence of irregular numerous vesicular erythematos ulcers on the oro pharynx, soft palate and tonsillar pillar with peak incidence usually under 10 years of age. It requires no specific treatment.

Erythema Multiforme – First described by “von hebra in 1866”. Defined as “an inflammatory mucocutaneous disorder that affects skin, mucous membrane or both”. This has been categorized and classified as “Erythema minor, major, Steven Johnson syndrome and Toxic epidermal necrolysis (TEN)”. Former is the mildest of all followed by later is the severe one. Contrary drug reaction and HSV infection can be the triggering factors for the ailment. Single mucosal ulceration and typical target lesions on skin are considered as characteristic to E. minor. Blood encrusted lesions are reported on lips. Management depends on the extent of severity of the clinical symptoms of the patient. In milder forms, resolution of the lesions takes place in 10-20 days.
Necrotizing Ulcerative Gingivitis - Acute infectious disease affecting the gingiva, with “punched out ulcerations and necrosis of the papillary and marginal gingiva” is often encountered. Machine-driven calculus elimination with local or systemic delivery of antibiotics can be preferred as treatment. Plasma cell stomatitis-In late 1960s was described as “hypersensitivity reaction” and likely a contact stomatitis to any allergic component of the product. Numerous irregular ulcerations with epithelial sloughing seen in the gingiva commonly with associated angular cheilitis in some patients. As these ulcers heal by itself, only anti-inflammatory is recommended for pain control. Chemotherapy induced ulcers- “Kolbinson et al. demonstrated that early changes in the oral mucosa such as erythema and ulceration appear between 5 and 7 days after onset of chemotherapy”. Post chemo sessions, these multiple ulcerations resolve on its own, however anti-inflammatory drugs may be prescribed to the patient. Chronic Solitary Ulcers: Eosinophilic Ulcer - also called “traumatic ulcerative granuloma with stromal eosinophilia (TUGSE)” [1]. Presents as chronic isolated ulcer of the oral mucosa and is most frequently seen in patient between 40-60 years of age. This manifests as “slow healing ulcer with rolled or elevated borders mimicking squamous cell carcinoma”. Healing period may vary from one week to one year. Surgical excision is considered as mainstay treatment for this followed by rare recurrence rate. Ulcerative Squamous Cell Carcinoma-accounts about 95% of all oral malignancies. Major distinguishing features is elaborated as “crater like lesion having rolled, indurated margins and presence of velvety base”. “According to Wood and Goaz, a lesion is most likely a SCC if the patient is male, older than 40 years, smokes or drinks heavily, no evidence of trauma or systemic disease exists, serologic findings are negative, and the lesion is not located on the posterolateral region of the hard palate”. Treatment comprises combination of surgery, radiotherapy and chemotherapy. Cytomegalovirus associated ulcers- rarely presents with any clinical symptoms. Characterized by “isolated, painful, large and necrotic ulcerations with minimally rolled borders which affects both keratinized and non-keratinized mucosa”. Superficial anesthetic ointment may be helpful for symptomatic discomfort reduction. Tuberculous ulcer rarely affects oral mucosa, “roughly 1.4% of all the TB cases with man: woman ratio of 4:1 according to WHO”. Presents as solitary ulcer usually an “undermined edges on the tongue most commonly followed by gingiva, floor of the mouth, palate, lip and buccal mucosa” with ragged and indurated margins associated with pale floor. Syphilitic ulcer as a consequence of “oro-genital and oro-anal contact” with an infectious lesion, primary syphilitic ulceration grows. A chancre appears on the upper lip of males and lower lips of female in greatest frequency. Typically seen as red purple or brown base having ragged borders, often cervical lymphadenopathy is associated with this. Tertiary syphilitic ulceration is “punched out lesion” usually on tongue which often undergo necrosis parting behind a deep painless crater. Deep fungal ulceration (histoplasmosis / blastomycosis/mucormycosis)- histoplasmosis related oral lesion is often secondary to pulmonary engrossment where erythematous area alters to granulomatous one. The blastomycosis lesion is nonspecific type verrucous ulcer. In mucormycosis deep palatal ulceration has been reported resulting from necrosis because of palatal invasion. Multiple Chronic Ulcers: Vesiculobullous disease- In pemphigus vulgaris, bulla disrupts to form shallow ulcers. “A thin layer of epithelium peels away leaving a denuded base referred as Nikolsky’s sign named after Pyotr Nikolsky (1858– 1940), a Russian physician”. These lesions are irregular multiple occurring along the line of occlusion in buccal mucosa, palate and gingiva.
In mucous membrane pemphigoid, gingiva appears edematous associated with mild inflammation and desquamation along with multiple vesicles formation. These are less painful than pemphigus ulceration.

Linear IgA Disease defined as “autoimmune subepithelial mucocutaneous disease”. In oral cavity, disease presents as vesicles, painful ulcerative erosions along with cheilitis. Usually use of topical steroids is advised but for severe cases, dapsone therapy is suggested.14, 15

Recurrent ulcers(solitary/multiple): Recurrent aphthous stomatitis- most frequently occurring “recurrent inflammatory disease” with prevalence of 0.5%-75% with female predominance. Commonly occurs on non-keratinized mucosa. These occurs as symmetrically round fibrin covered mucosal defects surrounded with erythematous border. Three clinical types have been categorized into “minor type, major type and herpetiform ulcers”. Minor variety is smaller than 1 cm in diameter and these are self-healing and often not accompanied with scarring. Major variety also called as “Sutton ulcer” usually 1-3 cm in size and herpetiform ulcer seems as minute multiple extremely tender. RAS is self-limiting but in extreme cases topical corticosteroids are advised.16

Lichen Planus- described as “chronic, autoimmune, mucocutaneous disease”. Buccal mucosa is most commonly affected followed by tongue, gingiva and vermilion border. “Reticular, popular and plaque like lesions” are usually asymptomatic where as “bullous, erosive and ulcerative forms” are associated with pain. Topical corticosteroids are prescribed in management of oral lichen planus.

Cyclic neutropenia- defined as “immunodeficiency syndrome considered by regular periodic fluctuations in the circulating neutrophil count from normal to neutropenic levels every 21 days and lasting for 3-6 days”. Incidence of regular episodes of less neutrophils often manifested. Aphthous like ulcerations are encountered with no specific treatment modalities.

Bechet’s Disease- relatively rare disease. the syndrome is comprised of “presence of recurrent oral aphthous-like ulcers (minor, major, or herpetiform ulcers, which recur at least three times within a period of 12 months) along with two of the following: genital ulcers, ocular lesions (anterior uveitis, posterior uveitis, vitreous cellularity, or retinal vasculitis), and skin lesions (erythema nodosum, pseudo folliculitis or papulopustular lesions, or acniform papulae in post adolescent patients.”[1] Infliximab treatment resolves the recurrent oral ulcers completely.

Ulcers in Other Systemic Diseases: Uremic stomatitis- Elevated levels of ammonia complexes and stomatitis appear when “blood urea levels are higher than 300 mg/ml”. Common sites of involvement are tongue and floor of the mouth. Major four types of ulceration are reported namely- “ulcerative, haemorrhagic, non-ulcerative pseudomembranous and hyperkeratotic forms” [1]. Uriniferous breath is normally accounted in such patients. After dialysis, such ulceration resolves on its own and recovery of taste sensation occurs following the treatment.

Crohn’s disease along with ulcerative colitis, Crohn’s disease is considered major entities of “inflammatory bowel disease (IBD)”. Oral findings are reported first than intestinal manifestations of the disease. Patients reports with persistent long-standing lip swelling along with “cobble stone appearance of oral mucous membrane, deep linear or serpiginous ulceration surrounded by epithelial hyperplasia and tissue tags or polyps”. Perioral dermatitis is not frequently accounted.

Diabetes mellitus- patients diagnosed with type 2 diabetes mellitus shows prevalence of both traumatic and aphthous ulcerations, multiple periodontal abscess with mild symptoms of glossodynia, stomatopyrosis and dysgeusia are seen.17

Conclusion

Ulcers are common to oral cavity, so its prime responsibility of dentist to diagnose and render treatment accordingly for patient wellbeing. Proper history taking and thorough clinical examination of the patient will be helpful in proper diagnosis.

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References
Conventional Over Denture-A Successful Clinical Protocol to Treat Edentulous State: A Case Report

Sangram Panda¹, Gopal Krishna Choudhury², Sumita Mishra³

¹Reader, Department of Prosthodontics, Institute of Dental Sciences, ²Professor, Department of Prosthodontics, Institute of Dental Sciences, ³Reader, Department of Orthodontics, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

The following case report describes an easy technique of restoring a lower resorbed edentulous mandible, where implants has been ruled out as a Prosthetic option because of financial reasons. Retention of the tissue supported prosthesis in a resorbed mandible is a difficult proposition owing to the reduced surface area. Patient’s refusal to go for an implant-oriented treatment further complicates the treatment protocol. Thereby going for a conventional overdenture by employing the primary & secondary coping technique helps in solving the retention issues while at the same time providing patient with a financially acceptable treatment protocol.

Keywords: Primary copings, Secondary copings.

Introduction

In the age of implants, where implant-oriented treatments have become a norm, conventional treatment protocols are slowly being forgotten¹,². Conventional treatment protocols like conventional tooth supported overdentures are becoming second option of treatment. It is also not disputed that clinical predictability of implant-oriented treatment has been excellent and results phenomenal, but this does not undermine the importance of conventional treatment order. Conventional treatment is still capable of delivering the goods without the burden of increased finances or undergoing trauma of implant surgery. This treatment protocol also holds in good stead for the patients who are afraid of undergoing any surgery. This article describes a treatment protocol of rehabilitation of a patient with primary and secondary coping technique and conventional overdentures in order to restore partially edentulous lower ridge.⁴-⁶

Figure 1: Preoperative picture of the patient

Clinical report: A 66-year-old female (fig 1) reported to the prosthodontic clinic with a complaint of inability to chew food. On clinical examination it was found that patient was partially edentulous with missing 15,17 and 24,25,26 in the upper arch and 33,34 and 37 present in the lower arch. Implant assisted overdentures were suggested to the patient as treatment of choice. However, patient refused any surgical intervention because of financial problems and fear of surgery. Also, patient was not interested in rehabilitation of the upper arch and therefore it was decided that conventional tooth
supported overdenture will be given in the lower arch not including the last abutments after assessment of sufficient VDR and VDO (7.5mm & 7.0mm respectively.

Single sitting root canal treatment of the 2 canines were therefore initiated with rotary system (xsmart, dentsply). Working length was established at 23mm for both the canines. After preparing the canal to the size of f-3(protaper dentsply rotary file system), obturation was done with f-3 size gutta percha cones (Dentsply protaper G.P cones). After access cavity was filled with composite filling material (LUXACORE-Z Dual core composite) reduction of the concerned teeth that is 33 & 43 was done to dome shape with chamfer finish line (Figure 2) for the primary copings.

Figure 2. Root canal treated 33 and 43 with preparation done for primary copings

Upper impression was taken with alginate (3M ESPE) while Lower impression was taken with elastomeric impression material (Aquasil, Dentsply) using dual impression technique (Figure 3a, 3b) for the purpose of fabricating primary coping. Primary copings were then cemented onto prepared teeth that is 33 & 43 with GIC cement (Fugi 2, 3M ESPE). Alginate impression was taken in the lower arch for the purpose of fabricating a special tray.

Figure 3a. Upper and lower impression taken for preparing special tray for the lower ridge; 3b. Master impression taken on the special tray

Figure 4a. Primary copings cemented in patients' mouth; 4b. Secondary copings tried over the primary copings to check the fitting

After fabrication of the special tray border moulding was done in the lower arch. Master impression (Figure 4a) was then taken with light body elastomeric impression material (Aquasil, Dentsply). Secondary copings which would be inserted into the denture were then fabricated on the master cast & tried on to the primary copings to check the fitting (Figure 4b). Pick-up impression (Figure 5a) was then taken with the heavy body elastomeric impression material (Aquasil, Dentsply) with secondary copings in place.

Figure 5a. Pickup impression taken with secondary copings in place; 5b. Jaw relation done in the patients' mouth; 5c. Jaw relation transferred to the articulator and teeth setting done; 5d. Conventional over denture placed in the patients mouth

Figure 6. Final intra oral view of the prosthesis in place
Jaw relation was then carried out for the patient (Figure 5b). Teeth setting was then carried out on 3-point mean value articulator (Figure 5c). Wax trial was then done (Figure 5d) and the denture was subsequently acrylized and delivered to the patient (Figure 6).

**Discussion**

Patient satisfaction is of paramount importance when treating a edentulous patient. Different methods including the use of primary and secondary copings as has been discussed in the case report have been used to gain the additional retention & stability for complete denture in order to achieve patient satisfaction1-5. Dental implants have been used for retention and stability to the overdentures especially in compromised ridges6-8. High success rate of implant has prompted the dentists to recommend implant-supported fixed or removable treatment 9-11 plan to the patient which are costly & require surgical intervention12-15. There are only few studies that have compared the implant-supported overdentures to the conventional overdentures16-17 in which also it is unsubstantiated that one is better than the other. The patient in consideration refused to undergo implant-oriented treatment because of added cost & fear of surgery. Therefore, given the clinical situation and economic & psychological factors involved it was decided that a conventional overdenture will be given to the patient. After extraction of the hopeless teeth root canal treatment of the upper &lower premolar was carried out. Primary copings were given to protect the root canal treated teeth while secondary copings were incorporated to provide increased retention & stability to the overdenture. The final delivery of the denture to the patient & patient satisfaction thereof is evidence enough that conventional overdenture is still an efficient & economical protocol to treat edentulousness.13-17

**Conclusion**

This case report primarily discusses one of the alternatives of treating edentulous patient in detail successfully, were considerations other then implants can be applied to achieve optimum results.

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**References**


Modified Coronally Advanced Flap Procedure Using Orthodontic Buttons: A Case Report

Saurav Panda1, Sital Panda2, Abhaya Chandra Das1, Rinkee Mohanty3

1Associate Professor, Department of Periodontics and Oral Implantology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India, 2MPH Student, Department of Public Health, Regional Medical Research Centre, Chandrasekhar, Bhubaneswar, India, 3Professor and Head, Department of Periodontics and Oral Implantology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

The management of multiple adjacent gingival recessions often requires use of surgical procedures for covering the exposed root surfaces. The main requisite of such procedures requires the benefit of ease, avoiding second surgical site, and reduced post-operative complications. Coronally advanced flap is the treatment of choice to achieve complete root coverage in multiple adjacent recession type defects. This procedure takes in to account all patient related considerations and allows correction of all recession defects simultaneously with the soft tissues available adjacent to such defects. This case report describes a modified approach of flap advancement using orthodontic buttons as anchorage for suspending sutures to facilitate coronal placement of gingival margin above the level of cemento-enamel junction during the early healing period for better outcome and root coverage.

Keywords: Coronally advanced flap; Gingival recession; Orthodontic buttons; Root coverage.

Introduction

The root surface exposure due to apical displacement of the marginal gingiva (MG) below the cement-enamel junction, exposing the tooth to oral environment, is termed as Gingival recession. The treatment for the same aims at diminishing root hypersensitivity and improvement of gingival aesthetics.1,2 One of the most reliable and accepted techniques that results in the best long-term clinical outcome is the coronally advanced flap (CAF) procedure,3-5 provided there is adequate attached gingiva and multiple adjacent recession-type defects (MARTD). This procedure may be solely used and also been advocated in combination with connective tissue graft (CTG), barrier membrane, acellular dermal matrices and platelet concentrates in various proposed literatures. Nowadays, some periodontal plastic surgical techniques such as modified CAF technique,6 modified CAF in adjunct with an subepithelial connective tissue graft (CAF + SCTG), CAF in adjunct with CTG, or the tunnel SCTG, or CAF with enamel matrix derivative (CAF + EMD) [7] and CAF with or without releasing incisions, have been proposed for the surgical treatment of MARTD8, 9.

There exist various differences in the management of MARTD when compared with treatment of single tooth recessions. Literature suggests that the treatment choice for MARTD with involvement of two or more adjacent teeth is based on multiple factors, such as anatomic structures (recession defect size, width of keratinized tissue (WKT), amount of donor site connective tissue, vestibular depth and gingival phenotype), number of involved teeth, post-operative discomfort during healing, cost benefit ratio, donor site morbidity and need for multiple surgical procedures to manage and cover the multiple recession site.10
MARTD involves multiple adjacent involved teeth, making the area of surgical operation lengthy involving the entire sextant, hence, demanding a surgical procedure which is to be carried out at ease and does not require any second surgical site for donor tissue. The surgical procedure should allow simultaneous correction of multiple recession sites with adjacent available attached gingiva. Keeping this in mind, it is requisite to follow a modified approach of surgical technique which reduces intra-oral second surgical sites and number of surgeries, together with the need to benefit in satisfying patient’s esthetic demand and alleviating post-operative discomfort. Coronally advanced flaps (CAF) are best suited surgical root coverage procedures in successful management of MARTD.5

The main outcome assessment of root coverage procedures is in achieving complete root coverage (CRC). The CRC is always a predictable outcome and is dependant on flap thickness, tension of flap prior to placement of sutures and most importantly, the displaced placement of gingival margin post-surgically. A study concluded that the post-surgical placement of marginal gingiva affected the probability of CRC, stating if the location of gingival margin was kept at 2mm above the cement-enamel junction, the probability of achieving CRC was almost 100% in coronally advanced flap techniques.11 In a recent study, it was reported that a new technique, employing composite stops for sutures at the inter-dental contacts of the teeth, evidence CRC in MARTD, by not allowing the suspended sutures to collapse.7

As the placement the gingival margin coronal to cemento-enamel junction during early wound healing phase is an important and difficult criterion in achieving CRC in CAFs, orthodontic buttons were bonded to the teeth in this case report to improve the stabilization of the postoperative flap location during healing. However, in a clinical trial on use of CAF with orthodontic buttons for treating maxillary multiple recession defects and found the procedure to be better than CAF alone.12 In this case report, CAF with orthodontic button application was used in a clinical case with mandibular multiple recession defect.

**Case Description:** A patient aged 32 year, reported to Department of Periodontics, Faculty of Dental Sciences, Bhubaneswar, Odisha, complaining of receded gums and sensitivity on taking extremely hot and cold food in his lower front tooth region of the jaw from past 4 months. On clinical examination, multiple Miller class I gingival recessions were present in relation to 34-44 with just adequate keratinized gingiva (Figure 1). Patient presented with thick biotype of gingiva in the area of recession. Thorough oral prophylaxis procedure was carried out one week before the surgery. CAF with bilateral vertical releasing incision and orthodontic buttons was planned in relation to 33-43 for gingival augmentation coronal to the recession defect.
aspect with recession defect for both left and right side (Figure 2c). Vertical incisions were placed on both sides distal to 34 and 44 respectively. The split-full-split approach was employed in the coronal–apical direction, in order to elevate the flap. The full-thickness flap was elevated till 2–3mm of intact bone was exposed apical to the dehiscence. A split thickness flap was raised in the apical portion of the elevated flap and was periosteally scored, in order to facilitate coronal advancement. A partial-thickness dissection was carried out into the vestibular mucosa using a blunt instrument; this incision was made to sever the muscular attachments, in order to relieve flap tension. The flap mobilization allowed the margin of the elevated flap to be passively placed at a coronal position, preferably coronal to cemento-enamel junction and the surgically created papillae overlapped the corresponding anatomic inter-dental papillae, during coronal advancement (Figure 2d).

The advanced flap was secured using 4–0 resorbable vicryl sutures and the sutures were allowed to anchor the central portion of the surgical created papillae on the orthodontic buttons (Figure 3). Post-operatively, the flap margins were assured to be placed preferably at 2–3mm coronal to the CEJ. Careful periodontal dressing with aluminum foil was placed in order to prevent the site from any undue physical or mechanical injuries.

![Figure 3. Sutures suspended on to orthodontic buttons for anchorage](image)

Post-operative instructions with proper oral hygiene instructions were given and the patients were advised not to brush and floss in the surgical site during the first week of surgery. Amoxicillin 500mg TID and Ketorolac 20mg BD for 1 week were prescribed. 0.2% chlorhexidine mouthwash was prescribed 4 times daily for the first 15 days. The sutures along with the buttons were removed after 2 weeks. Healing was satisfactory without any infection or inflammation. The follow-up was carried out till 6 months. Width of keratinized gingiva and clinical attachment gain was observed in relation to 34-44 at the end of follow up of 6 months (Figure 4).

![Figure 4. Post-operative photograph showing root coverage](image)

**Discussion**

CAF with orthodontic buttons technique is proposed to ensure the proper anchorage of the displaced flap in the most coronal position during the initial healing period. The suspended sutures provided coronally positioning of the displaced flap to maximum along with flap stabilization in the post-operative displaced coronal position during the first 2 weeks of wound healing. The literature suggests the positive correlation between post-operative gingival margin placement and achieving CRC. Coronal positioning of the flap margin is directly proportional to the CRC. In our study, the coronal placement and stabilization of the displaced flap margin with the use of suspended sutures on orthodontic buttons, would have been the success criteria for achieving complete root coverage. This result is in accordance with one of the previous studies, which reported that the greater postoperative coronal displacement of the gingival margin may cause greater root coverage. Orthodontic buttons are used by the orthodontists routinely as an anchor component which remains inactive, to provide attachment of elastics. The similar buttons were used in our study to stabilize the flap margin by suspending the sutures onto them.

The partial thickness split approach to elevate the flap from base of surgically created papillae, ensures improved anchorage and maintenance of vascular supply in the inter-proximal region. The full thickness portion of the flap ensured increased gingival thickness, and subsequent formation of new attached gingival with adequate gingival thickness, due to its stability...
in adaptation over the previously denuded avascular root surface without any displacement. Therefore, the treated area achieved optimum root coverage results, with good color blending in respect to adjacent mucosa and gingival suggesting restoration of the original (presurgical) soft tissue marginal morphology.

Fixation of orthodontic buttons on the labial portion of the teeth is not at all technique sensitive, relatively easy, inexpensive with high patient acceptability. The elongation in the chair-side time to fix the buttons, in addition to the surgery, may have displeased the patient perception to the entire treatment. However, the benefit of button placement overcome such issue of lengthy chair time procedure.

**Conclusion**

The amalgamation of using the orthodontic buttons along with CAF was found to be an effective method in treating MARTDs. The ease of post-operative placement of the marginal gingiva coronal to the CEJ with this technique, looks promising, thereby making itself a reliable method for achieving complete root coverage in case of MARTDs.

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**References**


Pindborg Tumor: A Report of Two Cases

Basanta Kumar Choudhury1, Shayari Niyogi2, Pinali Das2

1Assistant Professor, 2Post Graduate Trainee, Department of Oral Medicine and Radiology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract
Calcifying epithelial odontogenic tumor (CEOT) being an odontogenic tumor of epithelial origin developed in the jaws especially in the mandible than maxilla originating from odontogenic tissues such as hertwig epithelial root sheath, dental lamina and enamel organ. It is characterized as a rare, aggressive, slow growing tumor and asymptomatic in nature often associated with an impacted tooth. CEOT also known as Pindborg’s tumor represents only 1% of all the odontogenic tumors. Here we report 2 cases of Pindborg’s tumor located in the posterior aspect of mandible and both the cases were seen in female of young adult age group. Partial mandibulectomy was performed in both the cases and was on regular follow-up. Both the cases were without any recurrence of the disease; one at 3 months and another one at 12 months of follow-up.

Keywords: Calcifying epithelial; odontogenic tumor; mandible; partial mandibulectomy.

Introduction
Calcifying epithelial odontogenic tumor (CEOT), is a benign neoplasm of odontogenic origin, which is a rare tumor accounting for less than 1% of all odontogenic tumors. Although benign, it is occasionally locally invasive, but slow growing neoplasm. The tumor is associated with impacted teeth in approximately 52% of the cases and is twice more prevalent in the mandible than in the maxilla. Here we present two cases of CEOT occurring in the mandibular posterior teeth region in female patient reported in our department with complaint of a painless swelling.

Case Report: A 24 years old female patient reported to the Department of Oral Medicine and Radiology, Institute of Dental Sciences, Bhubaneswar with chief complaint of swelling in the left side of face for 7 months. The swelling on the left side gradually increased in size to attain its present size and was not associated with pain or discharges from the swelling.

On Clinical Examination: A diffuse swelling was present on the lower third region of the face, extending from mid symphysis region anteriorly to posteriorly till 3cm below the ala tragus line on left side and commissure of lip on left side superiorly to 3cm beyond the inferior border of mandible inferiorly and, measuring 5 6cm in size in greatest diameter of normal skin color with no secondary changes evident. On palpation, swelling was hard in consistency, non-tender, non-compressible, non-reducible, on-fluctuant, with skin over the swelling is loose and pinchable. Mouth opening was restricted with interincisal distance being 35mm. Intraorally, a diffuse swelling was present in respect to 34 35 36, obliterating the gingivobuccal sulcus with buccal cortical expansion in respect to 34 35 and lingual cortical expansion in respect to 36 with elevation present in the floor of mouth. There was missing tooth in respect to 36 with supra-erupted 26 present. On palpation swelling was hard in consistency, non-reducible, non-compressible, non-fluctuant and non-tender. Owing to the nature of swelling, on clinical examination and palpation a provisional clinical diagnosis of benign bony odontogenic neoplasm was made. Ameloblastoma, CEOT and ossifying fibroma were considered in clinical differential diagnosis (Figure 1-3).

Corresponding Author**
Basanta Kumar Choudhury
Assistant Professor, Department of Oral Medicine and Radiology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India
e-mail: basantakumarchoudhury@soa.ac.in
Figure 1. (a) pre-operative clinical presentation of the patient with extraoral swelling in the left side lower jaw. (b) intraoral view of the left partially edentulous mandibular arch in 35 36 37 region, with missing 36.

Figure 2. Pre-operative radiographic evaluation of the patient. (a) intraoral periapical radiograph in 34 35 36 showing mixed radiopaque radiolucent lesions involving the periapical regions in 35. (b) Mandibular occlusal radiograph of the left side depicting a localized mixed radiolucency and radiopacity in 34 35 36 region, with buccal and lingual cortical expansion; (c) pre-operative radiographic evaluation of the patient. Panoramic radiographic reveals localised mixed radiolucency and radiopacity surrounded by corticated border in left side body of the mandible in relation to 34 35 36 37 showing Driven-snow appearance.

Figure 3. H & E stain shows sheets of polyhedral epitheloid cells in background of scanty collagenous CT stroma. Few epitheloid cells show pleomorphism and hyperchromatism. Areas of dystrophic calcification and leisegang rings are present.
Radiological Features: IOPAR in respect to 34 35 36 showed mixed radiopaque radiolucent lesions involving the periapical regions in respect to 34 35 and loss of lamina dura and altered bony trabeculae.

Case 2: A 24 years old female patient reported to the department of oral medicine and radiology with chief complaint of swelling in the left lower jaw for 4-5 months. The swelling gradually increased in size and was not associated with pain or any discharges.

Clinical examination: On clinical examination, extra orally, a diffused ovoid swelling was present on right side extending mediolaterally from the line joining the inner canthus of the eye till the outer canthus, and superior-inferiorly from ala-tragus line till 1cm below the lower border of mandible, measuring 4×4 cm in size, on palpation, the swelling was hard in consistency and non-tender on palpation.

Intraorally, diffused swelling present extending from 43 till 46 regions, ovoid in shape and involving the alveolobuccal sulcus measuring 2×1 cm in size, with no secondary changes present. On palpation, the swelling was hard in consistency, non-compressible, non-reducible, and non-tender. Expansion of the buccal cortical plates was felt, the lingual plates being intact. There was retained deciduous teeth in respect to 85 and 45 was missing. Owing to these features, a provisional diagnosis of cystic lesion was given. The differential diagnosis was dentigerous cyst, odontogenic keratocyst.

Radiographic features: Intraoral Periapical Radiograph reveals well-defined mixed radiopaque-radiolucent lesion involving the periapical region in relation to 43 44 85 46, measuring .5×.5 cm in size, having well-defined radiopaque corticated borders, and streaks of radiopacity present within the radiolucency with root resorption in 85 46.

“OPG revealed a well-circumscribed mixed radiopaque-radiolucent lesion involving the right mandibular ramus in relation to 44 85 46, measuring 3×4 cm in size, having well-defined radiopaque corticated borders, with presence of radiopaque mass in the centre of the lesion, with radiopaque streaks from the periphery, suggestive of Driven-snow appearance. There is apical displacement of teeth in relation to 45 with involvement of inferior border of mandible and root resorption in 85 46. Mandibular occlusal radiograph reveals expansion of the buccal cortical plates in relation to 43 44 85 46, with mild lingual plate expansion in relation to 46 seen.”

“CT image revealed oval expansile lytic lesion involving the right mandibular ramus having internal course clumped calcifications and isoattenuating soft tissue compartment measuring 3×2.7cm. Outer scalloped well-corticated rim maintained except a small defect anteriorly (4mm), suggestive of a lytic expansile mandibular lesion with smooth corticated border. Both the patients had undergone partial hemimandibulectomy after incisional biopsy confirmed the tumor to be CEOT, and they were under regular follow-up with no recurrence reported (Figure 4-6).”

Figure 4 (a) pre-operative clinical presentation of the patient with extraoral swelling in the right-side lower jaw. (b) intraoral view of the left partially edentulous mandibular arch int 45 46 47 region.
Discussion

In India with the rampant abuse of tobacco and areca nut, jaw tumors are most commonly seen. It is not surprising to consider a patient presenting with a jaw lesion as malignancy as oral cancers accounts for 30% of cancer burden in India.\(^5\)-\(^7\) CEOT or Pindborg tumour is considered as a rare and benign tumour having odontogenic epithelial origin. It accounts for less than 1% of odontogenic tumours and was first described by Pindborg in 1955.\(^1\)

“As suggested by various authors that the epithelial cells of the Pindborg tumor are found to be reminiscent of the sequestered cells from the stratum intermedium layer of the enamel organ.\(^3\) This idea has been achieved as per the morphological similarity of the tumor cells to the normal cells of stratum intermedium and also there is a high activity of alkaline phosphatase and adenosine triphosphate observed.\(^6\) Due to immunologic response to this stratum intermedium, there is amyloid deposition within the cells in CEOT.” Others insist that it arises
from remnants of the primitive dental lamina found in the initial stage of odontogenesis, and these epithelial rests are the more likely true progenitor cell.6

“However, the exact etiology is unknown. It is classified as intraosseous and extraosseous, 94% of the lesions are central and intraosseous and 6% are extraosseous. Intraosseous CEOT has twice occurrence in the mandible as compared to maxilla and is mainly located in the premolar/molar region and half of the cases have shown association with an impacted tooth. In other studies, fifty-two percent cases have been associated with unerupted or embedded tooth, which is reported in both of our cases. Clinically, CEOT may lead to tooth tipping, rotation, migration, and/or mobility secondary to root resorption. This lesion is often symptomless due to painless swelling and discovered on routine radiography. Alternatively, it may present symptomatically as a slow-growing, painless, expansile, bony swelling with cortical bone resorption and finally perforation.” Our present case has shown cortical bone resorption without perforation of bone.6, 8-10. The radiographic appearance of CEOT may vary depending on the stage of development of the lesion. The stages may be a well-defined radiolucency, mixed radiolucent radiopaque or completely radiopaque mass. In the initial stage, it may appear as dentigerous cyst because of its relationship with impacted tooth and is completely radiolucent.” In the second phase, small intratumoral calcification starts appearing, which is characteristic of CEOT but not diagnostic.10

The lesion often presents as mixed radiolucent radiopaque having many small irregular trabeculae passing through the radiolucent area. There may be presence of flecks of calcification within the radiolucency giving CEOT its characteristic “driven-snow” appearance.4 The margins are usually well defined or sclerotic as is present in our present cases.1 Similar appearing lesions are odontomas, which have an amorphus appearance with multiple discrete foci of calcification, ossifying fibromas, which have more calcification, while fibrous dysplasias are mainly homogenous and expanded lesions.5.

When large polyhedral cells predominate, they give squamoid appearance with amyloid-like stroma, and calcification like keratin arousing suspicion of squamous carcinoma (Case 2). When basal cells predominate, the differential diagnosis includes minor salivary gland tumor. When CEOT is predominantly composed of stellate cells and basal cells, the differentials include ameloblastoma and minor salivary gland tumor.5 “Small, intrabony mandibular lesions with well-defined borders are treated by simple enucleation or curettage followed by judicious removal of a thin layer of bone adjacent to the tumor.2,6 Large tumors require aggressive approach by segmental resection, hemimandibulectomy and hemimaxillectomy, which causes bone discontinuity requiring reconstruction procedures such as grafting or distraction osteogenesis.”10

“The lesions treated with enucleation and curettage procedures show a high recurrence rate ranging from 15% to 30% after just 2-4 years.4 Therefore, CEOT is best treated with a resection using 1.0cm-1.5cm margins in bone. In the current case resection was performed with 1.5cm tumour free margins. Malignant transformation of CEOT is extremely rare and very few cases have been reported.1 The highly vascular nature of the lesion as evidenced by USG prompted the use of sclerotherapy in the current case prior to resection. Sclerotherapy is a conventional method well accepted in the treatment of vascular lesions.” In our 2 cases, both the females have tumor in mandibular posterior teeth region, which was locally aggressive and asymptomatic, and associated with impacted teeth. The radiographic findings in both the cases showed classical “driven-snow” appearance on panoramic radiograph. There was also presence of “leisegang ring” reported in histopathological section of one case and presence of amyloid materials in another, confirming both the cases to be CEOT.

Conclusion

Presently, two cases of CEOT have been discussed with emphasis on radiological appearances in both the cases. However, studies need to be carried out regarding the histopathological features and variants of CEOT. This is to emphasize the need to correlate radiographic, clinical and histopathological findings to arrive at the correct diagnosis and treatment planning.

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References


Hypohidrotic Ectodermal Dysplasia in a Young Male Patient

Satya Ranjan Misra

Professor & Head, Department of Oral Medicine & Radiology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

Ectodermal dysplasia represents a heterogeneous group of disorders in which ectodermal derivatives are affected. It is an X-linked recessive condition hence females are commonly affected by this condition. There is aberrant morphogenesis of skin and embryonic ectodermal structures of the oral cavity. Generally, it is manifested by a triad of hypodontia, hypohydrosis and hypotrichosis. These patients have lustrous, thin and dry skin, fine and scanty kinky hair. Intra-orally partial anodontia, with an underdeveloped alveolar process is seen. We present a rare case of ectodermal dysplasia in a 17-year-old male patient with only a single tooth for documentation.

Keywords: Ectodermal dysplasia; X-linked recessive condition; aberrant morphogenesis; hypodontia; Intra-orally partial anodontia.

Introduction

Ectodermal dysplasia is also known as Christ-Siemens-Touraine Syndrome. It presents with a multitude of clinical manifestations and affects 1 in every 100,000 live births. It may occur as a hereditary disease and more than hundred types of this disorder has been reported with various types of inheritance. However, two principal forms of this group of disorders have been identified, on the basis of the affliction of the sweat glands. They are X-linked hyperhidrotic/anhidrotic disease with reduced or absence of sweat glands and autosomal dominant hidrotic type where sweat glands are unaffected[1].

There are few syndromes associated with this condition, like Strandberg-Ronchese’s Syndrome, Rapp-Hodgkin Syndrome and Rosseli-Gulienetti Syndrome[2]. The anhidrotic or hypohidrotic type is common in females but they do not exhibit features of this disorder and on the contrary the males though rarely affected show all the features like scanty hair, missing teeth and reduced sweating as seen in the present case.

Case Report: A 17-year-old male patient reported with missing teeth since childhood. History revealed that he had only 2 deciduous teeth and afterwards only a single permanent tooth erupted in the anterior maxilla. He also had reduced sweating and could not tolerate heat, had reduced salivation and scanty body hair. The medical history was non-contributory but he reported that his parents had a consanguineous marriage.

On physical examination, sparse hair on the head, reduced density of eyebrows and eyelashes were seen. [Figure 1] There was midface hypoplasia with protuberant lips. The lips appeared dry and cracked. [Figure 2] Intraoral examination revealed the presence of a single conical tooth in the anterior maxilla with hypoplastic maxillary and mandibular alveolar ridges. [Figure 3] There was hyposalivation and due to dryness of mouth the mouth mirror sticks to the tongue and buccal mucosa.

Corresponding Author**
Satya Ranjan Misra
Professor & Head, Department of Oral Medicine & Radiology, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India
e-mail: satyamisra@soa.ac.in
Figure 1: Frontal and profile pictures of the patient showing sparse hair on the head, reduced density of eyebrows and eyelashes.

Figure 2: Dry, scaly protuberant lips.

Figure 3: Intra-oral picture showing a single conical tooth in the anterior maxilla with hypoplastic maxillary and mandibular alveolar ridges.

In view of the missing teeth, hyposalivation, decreased sweating, heat intolerance and sparse body and scalp hair from childhood, hence a provisional diagnosis of Ectodermal Dysplasia was made. A dental panoramic radiograph was taken, which hypoplastic maxillary and mandibular alveolar ridges, with the presence of a single tooth in the anterior maxilla, possibly 21 which had irregular conical shape. [Figure 4]. The patient then underwent extraction of the single tooth followed by the fabrication of a complete denture prosthesis.

Figure 4: Dental panoramic radiograph showing hypoplastic maxillary and mandibular alveolar ridges, with the presence of a single conical tooth in the anterior maxilla.

Discussion

The first documented case of ectodermal dysplasia was reported in 1848 by Thurnam but the term was coined much later by Weech in 1929. Ectodermal dysplasia belongs to a group of hereditary disorders manifesting with developmental anomalies having abnormal structures emerging from the embryonic ectoderm like the sweat glands, nails, hair and teeth.[3] Broadly it can be divided into two types: hydrotic and anhidrotic or hypohidrotic types.

Clinically, the disease is characterized by scanty hair (hypotrichosis), multiple missing teeth (oligodontia), teeth present may have abnormal conical morphology
as seen in the present case and decreased sweating (hypohidrosis).[4] The tooth present may be the anterior ones, with the incisors or canines appearing pointed incisally with a bulbous conical base at the cervical region, bearing no resemblance to the normal complement of teeth. [5] As the patients do not sweat normally, they have a tendency to have a raised temperature in warm weather and even hyperthermia can develop on physical exertion. Babies may be frequently febrile. The hair on the scalp may be typically sparse, eyelashes and eyebrows may be missing and scanty body hair with pigmentation. Nail abnormalities, scaly wrinkled skin with eczema and loss of vertical dimension due to missing teeth can lead to everted protuberant lips, pseudoraphides and frontal bossing, saddle like nose as well as mucous secretions from the nose and respiratory tract infections have been reported. [6, 7]

The dental management of the condition involves replacement of the missing teeth using different types of prostheses ranging from conventional complete denture to implant supported prosthesis.[8] However, patients having the anhidrotic type of disease, tend to have heat intolerance and need to be careful in warm weather and wear adequate cool apparel.

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References
Management of Mandibular Resorbed Ridges by Combining Two Impression Techniques: A Literature Review and Case Report

Sreeprada Dash¹, Gunjan Srivastava², Gopal Krishna Choudhury³, Debashish Sahoo¹, Monika Samal¹

¹Post-graduate Trainee, ²Professor, ³Professor and Head, Department of Prosthodontics, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

Most common problem faced by a prosthodontist in cases of severely resorbed ridge is the loose dentures which occurs due to the lack of stability and retention of the denture prosthesis. The atrophied ridges are more commonly found in the mandibular arches. Major problem is faced while recording the denture bearing mucosa and using it for obtaining the stability and support. Though various other factors play role in obtaining a well-balanced and stable complete denture prosthesis in such patients but the impression employed is of utmost importance. And to record the atrophied residual alveolar ridges, an adequate impression technique should be followed. This article describes using of two such techniques, combining which we obtain both functional and anatomic impression of the ridge over which a stable denture prosthesis can be fabricated.

Keywords: Resorbed ridges, functional impression, impression technique, retention, stability.

Introduction

Residual ridge resorption is a complex process which starts just after tooth extraction in the residual alveolar ridges. The resorption rate is accelerated during the first initial years after tooth removal, thereafter the rate slows down gradually. Extreme resorption of ridges is generally seen in the mandibular arch than the maxillary arch¹, ² There are different reasons contributing to the ridge resorption process¹, ³–⁸. They are:

1. Anatomic factors
   • Amount of bone loss in a broad round ridge is less than that of a small flat ridge vertically
   • in dense bone the resorption rate is slow as compared to the cancellous bone.

2. Metabolic factors – bone metabolism is reliant on cell metabolism (especially, osteoblasts and osteoclasts formation and resorption)
   • imbalance in PTH
   • osteoporosis occurring in post-menopausal women
   • Production of local prostaglandins continuously
   • Hypervitaminosis A and D
   • Hypovitaminosis C

3. Mechanical factors: this comprises of the
   a. Functional factors
      • amount and direction of force applied on to the bone
      • Bruxism
   b. Prosthetic factors
      • Type and fit of final denture prosthesis
      • Time interval while the prosthodontic treatment occurs for the patient
      • Maximum amount of time the is patient wearing prosthesis everyday
      • Occlusal imbalance or premature contacts
      • Disuse atrophy

The prime importance in patients with atrophied mandibular ridges is to gain maximum stability
and retention in the prosthesis delivered. (9) So, the impression technique used plays a substantial role in the treatment of these patients where there is scarce tissues and ridge area to fulfill the criteria of retention, stability and support.(10)

An accurate impression governs the efficiency of the definitive prosthesis which not only controls the retention and stability of the denture but also the comfort of the patient. The scenario becomes more challenging in such cases due to the availability of minimal bone height, unfavourable morphology of residual ridge, and/or muscle attachments makes impression making and the retention of the prosthesis difficult. (11) Over the years, tremendous progress has been made to develop impression procedures has been developed in order to manage the cases with residual ridge resorption such as:

**Flange Technique by Lott and Levin** (12): To increase retention, function, comfort and appearance of final denture prosthesis, Frank Lott and Bernard Levin proposed an anatomic and physiologic impression technique. According to this technique, attention should be given to impression making in order to obtain competent bases for dentures as well as on complete denture occlusion. The buccal, lingual and palatal surfaces of dentures, however, have been completely ignored. Generally, these surfaces are carved into an ‘ideal’ form without considering the presence of cheeks, tongue and lip’s position and function.

**Roberto Von Krammede et al** (12): Modelling Compound is used for impression making to record the extended surface without interfering the normal function of mastication and deglutition. The tongue movement are also recorded while helps to stabilize the denture.

**Modified Fournet Tuller Technique** (13): Here the maximal peripheral seal, retention and stability if the denture is achieved through the minimal pressure impression technique, where minimum amount of pressure is applied on to crest of the ridge. In this technique, low fusing compound was used to make the secondary impression by extending its overall in the peripheral areas to record it in functional form.

**Winkler Technique** (14): He described Closed Mouth Functional Impression Technique where the tissue conditioners are used to record the intaglio surface of the denture in their functional form and final wash impression is made with a light body elastomeric impression material. Miller modified the technique by using mouth temperature waxes instead of tissue conditioners to make the functional impression.

**McCord & Tyson technique** (19): He described the admixed technique of impression making for flat mandibular ridges using impression compound and low fusing compound in the ratio 3:7 by weight which is manipulated in to a homogeneous mass by placing in to a hot water bath (60°C). Then this material is loaded on to the custom tray and impression is made.

**Neutral Zone Concept** (22): This concept describes that in each patient there is presence of a specific region where the function of the muscles will not displace the denture and the forces produced by the tongue are neutralised by the forces from the lips and cheek. When the residual ridges resorb over the time, then in order to prevent the shift of the denture prosthesis, the denture teeth should be placed in correct position and proper contour should be maintained where the dislodging forces are minimal.

**Shanahan Technique** (15): He said that training the patient to achieve an ideal tongue position helps to attain an effective lingual border seal. He used alginate for making preliminary impression. Resin tray was fabricated and static final impression was done. Patient was asked to wear the trial denture bases and return in 2 days.

**Klein** (16): He proposed the use of mouldable tray material such as putty consistency silicone elastomeric impression material, reinforced by a metallic core internally. The material was spread all over the residual ridge and border moulding was achieved through various functional movements and speech exercise. Then a light body consistency impression material is placed on the impression surface of the tray obtained, that gave us a functional preliminary impression. According to him, the stock tray should not be used because it causes distortion of the surrounding tissues and also impression recorded is always over extended.

This article describes the management of resorbed residual mandibular ridge by combining two different impression techniques i.e. the admixed technique and the functional impression technique. Then, obtaining the patient’s perception on the retention, stability of the denture fabricated through combining both the techniques.
Clinical Report

A female patient aged 65 years (Figure 1) presented to the Department of Prosthodontics, Institute of Dental Sciences, Bhubaneshwar with a chief complaint of loose denture prosthesis with respect to the lower arch and difficulty in chewing. The patient presented in good health with no significant medical history. For 5 years the patient was wearing denture but she was not satisfied with the prosthesis due to poor stability not only during mastication but also during speech. When intraoral examination was done, a highly resorbed mandibular ridge was detected (Figure 2a and 2b). The patient presented with no hypermobile tissue on palpation. After evaluating patient’s chief complaint and dental history, orthopantomogram report and existing clinical conditions of the ridge, the various treatment options were discussed with the patient that included pre-prosthetic surgeries such as vestibulopathy / ridge augmentation procedure followed by conventional complete denture prosthesis, implant supported overdenture / fixed hybrid prosthesis, conventional complete denture prosthesis. However, the patient denied to undergo any surgical procedures and wanted rehabilitation of her arch through the conventional complete denture prosthesis. So, finally it was decided to fabricate a conventional complete denture using two different techniques of impression making i.e. the admixed technique and the functional impression technique.

Impression compound was used to make preliminary impression of the edentulous maxillary and mandibular arch. On the preliminary cast obtained, a full spacer was adapted and additional spacer was given on the incisive papilla and the mid palatine raphe area over which the maxillary custom tray was fabricated. Mandibular custom tray was fabricated to provide a space of 4 mm using two wax spacers wax with full spacer design for the admix impression material.

For the maxillary and mandibular arch, secondary impression was made using an admix impression technique by mixing impression compound and low fusing compound in to a homogenous mass in the ratio of 3:7 by weight in a water bath of 60 degree Celsius temperature and after removing the wax spacer, custom tray was loaded and impression was made (Figure 4).

On the cast obtained, denture base was fabricated using self-cure acrylic resin and over its occlusal rims were fabricated for both upper and lower arch. The maxillomandibular relations were made. Once the jaw relations were done, then the functional impression was made for the upper and lower arch using the temporary soft-liner material/ tissue conditioners. They exhibit a delayed setting over a longer period of time thereby recording all the possible movements of the mandibular
muscle attachments. On to the intaglio surface of mandibular and maxillary denture base, the tissue conditioning material was added, after the patient was instructed to close the mouth in the previously established vertical dimension (Figure 5c) and do various functional movements such as puffing, blowing the air, whistling, and smiling continuously. The functional impression material stays within the oral cavity for a period of 45-60 min (Figure 5a, b). All oral activities of the patient are encouraged. Once the material has achieved a final set, the tray is removed and the impression is poured. The cast obtained is used as a master cast for fabrication of prosthesis which is then articulated and the teeth arrangement is done. Final try-in procedures were completed (Figure 6a, b, c). The final denture is fabricated using the conventional method of flasking, dewaxing and packing using heat polymerising acrylic resin and delivered to the patient (Figure 7 & 8). Patient was recalled after 24 hours, 15 days, 30 days. The patient was relatively content with the new complete denture prosthesis and her major complaint of loose denture with respect to lower arch was no more.

Discussion

In an atrophied mandible, the major concern is the inability of the ridge and the overlying tissues to bear the masticatory loads. This occurs due to the muscle attachments which gradually becomes closer to the ridge due the resorption process. these muscles apply a dislodging force on to the denture prosthesis upon mastication which can reduced by recording the tissues in functional as well as in rest position through a good impression. For this various impression techniques for resorbed mandibular ridge has been proposed in the literature by different authors, and every technique has its own advantage and disadvantage. In these resorbed ridges, functional impression technique is most commonly used according to the results in a study conducted by Bhupender Yadav et al (2014) concluded that mandibular denture fabricated using this technique showed the highest mean value of retention (17). In the year 2003, Drago (18) conducted a study according to which, the denture bases fabricated from the closed mouth impression technique were more retentive than the open mouth impression techniques for the mandibular arch.

The closed mouth Functional impression technique proposed by Winkler (14) is advantageous as it saves time, it eliminates the interference of the tray handling process thereby removing the chances of over and under extension of the impression. As here the various functional movements are made by the patient and so the pressure applied during the impression process is same as that applied during occlusion. However, this technique also poses certain disadvantages such as the dentist has no control over the movements performed by the patient and also tongue movement is restricted to
move only anteriorly which can alter the anatomy of the lingual border of the impression. McCord and Tyson’s admixed impression technique (19) records the functional position of the muscles and also requires less chair side time.

So, on combining these two-impression techniques in order to obtain a complete denture prosthesis that uniformly covers the residual ridge and thereby increasing the surface area of the denture that comes in contact with the residual ridge preventing displacement of denture base in both rest position as well as on application of masticatory load. Thus, the stability and retention of the mandibular complete denture prosthesis is improved and also this patient satisfaction is high.

According to different survey studies impression compound and zinc oxide eugenol impression paste is the most commonly used impression material in fabrication of complete denture prosthesis due to their capability of reproducing finer details in impression, quick setting property, easier handling and having no noteworthy dimensional changes upon setting. (20,21) Although impression compound serves as an ideal impression material but due to its short manipulation time, quick setting property and its inability to stay in a plastic stage till the functional movements of the vestibular and alveololingual sulcular tissues are completed produces certain limitation for its use in impression making for resorbed mandibular ridges. (22, 23)

**Conclusion**

Rehabilitation of a patient with atrophied residual ridge is a challenging task. Certain modification in treatment plan is required in order to achieve the desired functional and aesthetic goals. The ideal requirement in a maxillary and mandibular impression is that it should cover and transfer all the intricate details of the denture bearing mucosa and soft tissues available to the impression in both functional as well as rest position. It is the role of prosthodontist to select a suitable impression technique for the particular ridge form and also fabricate a successful complete denture prosthesis. This article provides an alternative approach in managing a highly resorbed mandibular ridge. The objective was to maximize the supportive aspect of the available denture bearing area in their functional and anatomic form through the combination of the functional impression technique and the admixed technique.

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17. Bhupinder Yadav et al. Comparison of Different Final Impression Techniques for


Evolution of the Begg’s Appliance

Snigdha Pattanaik

Associate Professor, Department of Orthodontics, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

Dr. Begg formed hypotheses which were backed to some extent by his own researches. This article describes about the steps that were taken by Dr. Begg to finally come up with Begg’s appliance and also the concepts behind them. Further, the materials required for making this appliance is discussed. The advantages are many and are listed in this article along with limitations of this appliance. When the concept is used correctly with skill and implemented, this appliance is capable of producing universal tooth movement with light optimum forces causing minimum discomfort to patients, loosening of teeth and injury to tooth investing tissues which requires understanding of principles by the clinician.

Keywords: Orthodontic appliance, Tooth movement, Extraction, Malocclusion.

Introduction

Dr. Begg After graduating from the Melbourne University in 1923, he went to study with Dr. Angle in California. In 1924 Dr. Angle was developing the edgewise mechanism when Dr. Begg arrived in California. Dr. Angle took ribbon archwire which was normally inserted vertically from the incisal and turned it on its edge- “edgewise” to insert it horizontally. In November 1925 Dr. Begg returned back to Australia and started practicing orthodontics in Adelaide in 1926 with edgewise mechanism and non-extraction principle. Dr. Begg sincerely followed Dr. Angle’s teaching of retaining the full complement of teeth for 2 years. However in many of his patients, he was not satisfied with post treatment facial profile and faced with serious relapses of the treatment results. In February 1928 he started to routinely remove teeth and reduce the mesiodistal width by proximal stripping. He knew from experience that the attrition plays an important role in the development of man’s dentition. He thought that reduction was often necessary to permit the proper repositioning of the teeth to enhance proper occlusion.

Function, Stability and Esthetics: Dr. Begg realized that edgewise mechanism was not designed for rapid closure of the extraction spaces and for quick reduction of the deep overbite. To facilitate such changes, he started using .020 inch round platinized gold rather than rectangular archwire in 1929. In 1931/32 he started using .018inch round stainless steel wire bending the vertical loops, intermaxillary circles right into the archwire. However he soon realized that if round archwires were engaged in edgewise brackets, indiscriminate and often undesired root moving forces could be created. This prolonged the anterior bite opening and taxed loss of anchorage. In 1933, about 2 years after switching over to round wire, he began treating some cases with ribbon arch bracket. He realized that these are relatively narrow brackets with vertically facing slots that allowed the teeth to move under very light forces. Dr. Begg described a treatment approach based on the following hypotheses which were backed to some extent by his own researches.

They were: Theory of attritional occlusion, Theory of differential forces, The employment of a modified form of ribbon arch bracket and light gauge round archwire.

The Theory of Attritional Occlusion: Dr. Begg founded the concept of correct occlusion based on his
own studies on the skulls of Australian aboriginals. He found that the dentitions displayed a considerable amount of attrition, both occlusally and interproximally. The dento-alveolar height was maintained by continuous eruption and proximal contact by mesial tooth migration, facilitated by cuspal wear. The incisor relationship became edge to edge thereby reducing the chance of lower incisor imbrication through overbite obstruction. The total reduction in arch length resulting from attrition amounted around one bicuspid width either side of both dental arches by the time an aboriginal was of 20 years old. These findings accord with the studies of Miss Corisande Smyth with her study of Anglo-Saxon skulls. According to Sir Arthur Keith, in bronze-age Britain, skulls showing edge-to-edge incisor relationship was common. But in the present age, due to the refined and pre-cooked food, less dental attrition was observed. The absence of attrition along with the presence of mesial tooth migration does not relieve the dental overcrowding, particularly in the lower incisor region where the modern overbite prevents their escape into edge-to-edge relationship with the upper anteriors. Dr. Begg used the findings from his study of Australian aboriginal occlusions as a justification to extraction. He believes that if in this present era tooth material is not lost through attrition, it would be reasonable to cause an artificial reduction through extraction. However, care should be taken to restrict the employment of extraction within logical limits. Thus the extraction approach in orthodontic treatment came into existence. Surely, there will be exceptions to the extraction approach just as there were to the non-extraction approach.

Theory of Differential Forces: The theory of differential forces in its original form was described by Dr. Begg in an article. His observation was based to a large extent on the work of Storey and Smith. The range of light pressures which would cause the teeth to move at an optimum rate with minimal disturbance of the supporting tissues. Pressures below this range would produce a slow rate of response while those above incurred a reaction within the bone support, referred as “undermining resorption”. Applying these principles to the Begg technique, the force of the intermaxillary elastics used in stage I of treatment, was kept light so that the upper labial segment was retracted while the lower anchor molars has negligible mesial movement. Later, if it was required that the residual extraction spaces should be closed largely by the mesial movement of the posterior teeth, the elastic forces are increased so that the anterior segment with their relatively small root area received an excess of force sufficient to delay their movement, while the posteriors moved forward. A force of less than 150 grams causes no distal bodily movement of canine. A force of 150 - 200 grams is optimum to move canine distally. A force of 300-500 grams causes the molars to move easily. This high force is resisted by the tissues investing the canine root, thus affording anchorage for mesial movement of molars.

Concept Of Undermining Resorption: According to the concept of undermining resorption, excessive orthodontic forces, when exerted on teeth cause the periodontal membrane and tooth-investing bone to be compressed. This causes the occlusion of blood vessels and the blood supply is cut off in these areas. This inadequate blood supply causes necrosis of the compressed parts of the periodontal membrane and bone. This leads to no tooth movement until phagocytic action removes the necrosed tissues and until new living tissues form this excessive force also causes pain and loosens teeth. The effect of this process is that teeth do not move continually but intermittently and much slower than when lighter orthodontic force is used. On the other hand, if lighter and appropriate orthodontic force is applied, the periodontal blood vessels are not occluded so that the bone on the side of pressure is continually and rapidly resorbed and new bone is simultaneously formed on the side of negative pressure without any discomfort and loosening of teeth. Heavy force causes intermittent movement whereas light force causes continual flow of uninterrupted tooth movement.

The Meaning of Differential Orthodontic Force: In physics and mechanics, differential is defined as the difference of two or more motions or pressures. The orthodontic force values used in this technique cause:

1. Minimum discomfort
3. Minimum damage to tooth investing tissues.
4. Rapid tooth movement
5. Easily controllable forces.

The Meaning of Optimum Orthodontic Force

“The optimum orthodontic force means that force which moves the teeth most rapidly with least discomfort to the patient and with least damage to the teeth and other investing tissues.”
The forces that are most favorable for tooth movement on the standpoint of rapidity and tissue tolerance are according to Storey and Smith much lower than that exerted by edgewise archwire. According to Halderson, Johns and Moyers, the force exerted by edgewise archwire is of very high value of over 900 grams which causes a pathogenic tissue response. Hence, they advocated the use of light round wires as it takes as much advantage of tipping movements as is possible. It utilizes forces much lighter than are possible with a standard edgewise wire.6

Materials, Appliances Necessary for the Begg Technique: The spring quality of the first made steel was a great improvement compared to the rectangular gold platinum wire. However, it was either too soft or too brittle. In 1940’s Dr. Begg met Arthur. J. Wilcock who was directing metallurgical research in the University of Melbourne. After many years of research, Mr. Wilcock finally produced a cold drawn heat-treated wire that combined the balance between resilience and hardness with the unique property of zero stress relaxation that Dr. Begg was seeking. This unusual wire permitted Dr. Begg to open anterior deep bite, while controlling arch form and providing stability to the molar. However, Dr. Begg had the same problem controlling the mesiodistal inclination of teeth with ribbon arch brackets that was experienced 30 years back. Dr. Begg attempted to modify the ribbon-arch bracket by soldering horizontal band spurs to the labial and buccal surfaces of the bands. When the tooth required mesiodistal tipping, the archwire was permitted to contact the horizontal band spur. The arch wire was then deflected towards the bracket with a lockpin or steel ligature. The resultant flexing of the archwire provided a degree of mesiodistal axial control or movement7,8.

Advantages of Begg Technique

1. Light continuous force to move teeth over long distance without excessive strain on the anchorage
2. Greater interbracket distance — lighter force generated
3. Both extraction and non-extraction treatment plan applied effectively
4. Highly resilient wires — gentle force over a long period of time
5. Root torqueing and root uprighting is separated from the main arch wire by the use of auxiliaries
6. Less taxing on anchorage
7. Through the application of differential force it is easy to close the space at any location in the arch
8. Can be used in lingual orthodontics
9. Cost effective

Disadvantages of Conventional Begg

1. Unable to give precise control
2. Posterior torque difficult
3. Rotational control was poor with use of under size wires in first & second stages of treatment
4. During bite opening, true intrusion of upper incisors was nil or minimal
5. Overuse of class-ii elastics:
   • Lack of incisor intrusion
   • Undesirable proclination of lower incisors
   • Unfavorable tipping of mandibular & occlusal planes

Conclusion

The development of Dr. Begg’s different way of orthodontic therapy was not the result of a single discovery but rather, the product of a long tedious, well-organized trial and error process. When correctly applied, his light archwire technique can produce universal tooth movement with light optimum forces, least discomfort to patients, minimum loosening of teeth and least injury to tooth investing tissues. Dr. Begg’s theory does not depend upon cephalometrics to establish angulations nor does it require complicated engineering formulae for moving teeth. Because the Begg technique requires shorter time, it does not mean that it is a “snap” method requiring less orthodontic skill or ingenuity. In spite of the fact that Dr. Begg was born to an industrial executive, and that he could have very well made a fortune in business, he chose to bring smiles in people’s lives around the world. The successful use of a given appliance will be based on an understanding of the underlying principles. These can be taught; but the exact practical application requires a measure of the art of the craftsman, or craft of the artist which are qualities of the individual and cannot be taught.

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References

Glycolic Acid Peel for Gingival De-Pigmentation: A Case Report

Rashmita Nayak1, Sheetal Acharya2, Anurag Satpathy1, Rohina Shamim3, Pratiti Datta3, Bikash Kar4

1Professor, 2Senior Lecturer, 3Post Graduate Trainee, Department of Periodontics and Oral Implantology, Institute of Dental Sciences, 4Professor, Department of Dermatology, Institute of Medical Sciences & SUM Hospital, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India.

Abstract

Gingival hyper-pigmentation or black gums is an unesthetic condition requiring correction for a better smile. Hyper-pigmentation of gingiva occurs as a result of excessive deposition of melanin pigment. Several techniques are employed in gingival de-pigmentation procedure with variable results. In this case report, a new non-surgical technique of gingival de-pigmentation by glycolic acid is presented.

Keywords: Gingival pigmentation; black gums; de-pigmentation; acid peel; chemo-exfoliation.

Introduction

Gingival exposure during smiling is one of the important component of an esthetic smile window1, 2. However, visible dark pigmentation of gingiva during smiling and speaking often presents an esthetic challenge3. Gingival pigmentation occurs from the deposition of melanin, a brown pigment deposited by melanocyte below the basal and the suprabasal cell layers of epithelium4. Active melanocytes convert tyrosine to melanin and are stored in the melanosomes or premelanosome from where it is transferred to the keratinocytes 5. Hyperpigmentation of gingiva occur as a result of excessive deposition of melanin. The gingival pigmentation may be physiologic or pathological6. Physiologic pigmentation depends on the race and is genetically determined. Pathologic pigmentation occurs in some systemic diseases such as Addison’s syndrome, Peutz-jegher’s syndrome, von Recklinghausen’s disease and malignant melanomas. Some other factors like smoking, antimalarial therapy and tricyclic antidepressants are also responsible for hyperpigmentation of gingiva7, 7.

Melanin pigmentation of gingiva is not a medical problem and is only of esthetic concern in patients complaining of ‘black gums’8, 9 which can be treated by gingival depigmentation. Gingival depigmentation is a periodontal plastic procedure in which hyperpigmented gingiva is removed or reduced. Historically, several techniques have been used for gingival depigmentation, including surgical scalpel technique10, bur abrasion 11, cryosurgery8, electrosurgery 12, laser therapy 13, free gingival graft14, acellular dermal matrix allograft15, autologus platelet concentrates16, etc. However, each of these techniques have their share of advantages and drawbacks.

Scalpel technique was one of the earliest used method of depigmentation. This method involves simple de-epithelisation by scalpel and is economical however, haemorrhage and exposed wound surface on the gingiva during or after surgery makes it unappealing to the patient in addition to discomfort 17. Also, this is highly technique sensitive procedure and needs a higher level of surgical skill. Gingival abrasion on the other hand is easy to perform and requires no sophisticated instrument. However, this technique is not widely practiced since unwanted abrasion or pitting of the tissue may occur due to lack of control on the speed and pressure 11. Electrosurgery and cryosurgery techniques
are well acceptance due to minimal bleeding and lesser postoperative pain and discomfort although they require special equipments limiting its use though patient\textsuperscript{18, 19}. Laser too is a popular technique for because of good haemostasis, less discomfort and rapid healing. However, re-epithelialization takes longer time with laser. The expensive and sophisticated equipment needed for this procedure limits its use in general dental practices.

In this case report, a new non-surgical technique of gingival depigmentation by Gycolic acid is presented. Glycolic acid (GA) is an alpha-hydroxy acid and is a popular exfoliating agent which is used by the plastic surgeons and dermatologists in the treatment of variety of skin conditions like acne, superficial scarring, photodamage, melasma and skin lightening for esthetic improvement\textsuperscript{20, 21}. They are derived from sugars found in fruit carboxylic acids like sugarcane or sugar-beet hence, also called as fruit peel\textsuperscript{22}. It is not mutagenic or carcinogenic, thus safe to use\textsuperscript{23}.

**Case Report:** A 24-year-old male patient visited to the Department of Periodontics & Oral Implantology, Institute Of Dental Sciences, Bhubaneswar with the chief complain of dark gums. He was concerned about his esthetics and wanted to get treatment for his hyper-pigmented gingiva. He was systemically healthy with no smoking habit. He revealed that his gingival hyperpigmentation was present since childhood depicting physiologic type of pigmentation. Intra oral examination revealed a generalised, diffuse pigmentation of gingiva. The treatment procedure was explained to the patient and a signed consent was obtained. Oral prophylaxis was carried out prior to the depigmentation procedure.

Gingival depigmentation was carried out in the maxillary arch extending from upper right second premolar to upper left second premolar. The pigmented gingiva was first air dried and a topical lignocaine spray was used to anesthetise the area to be de-epithelise. Glycolic acid solution (ASDM Beverley Hill) was applied over the pigmented keratinised gingiva area with the help of a small rounded brush. If during the application patient experienced a tingling, itching or burning sensation, it was minimized by blowing cool air onto the gingiva. After application, it was left there for about 3-5 minutes and subsequently wiped with sterile cotton. Immediately following the peel, the gingiva may appear reddish brown in colour. All the remnants of melanin pigment were carefully removed and then washed with copious water to stop the over-acidification in the applied area. No periodontal pack was placed. Patient experienced no pain during the procedure or postoperatively.

Post-operatively, patient was advised to use 0.12% chlorhexidine mouthwash (Clohex plus, Dr Reddy’s Lab) for 2 weeks. The patient was recalled after one week. Complete epithelisation occurred in about 3-4 weeks. Healing was uneventful without any complication and the gingiva appeared pink and healthy. Patient was re-evaluated at 1 month, 6 months and 1 year. No significant re-pigmentation was observed even after a period of 1 year. (Fig 1-4)

![Fig 1: Pre-operative](image1)

![Fig 2: Immediate Post-operative](image2)

![Fig 3: Post-operative after 1-month](image3)
Discussion

‘Dark gums’ or hyperpigmented gingiva is an esthetic dilemma in many individuals especially if the hyperpigmentation is on the facial or labial aspects of the gingiva along with a high smile line. It is this aesthetic provocation that compels the patient to pay a visit to the dental office. This is the first instance of report of cases of effective use of Glycolic acid as a peeling agent for gingival depigmentation in the management of hyperpigmented gingiva.

Chemical peeling is a procedure where a chemical exfoliating agent is applied to the keratinized epithelium to remove portions of epidermis and/or dermis with subsequent regeneration and rejuvenation of the tissues. Chemical peels are classified as superficial, medium and deep peel according to their depth of action. Superficial peel extends up to the epidermis, medium peel involves epidermis and papillary dermis and deep peel extends to the mid-reticular dermis 24. Various agents such as phenols, salicylic acid, glycolic acid, trichloracetic acid and lactic acid are available for chemical peeling. Glycolic acid peel is most commonly used. It is an alpha-hydroxy acid peel having the smallest molecular weight so they can penetrate easily25. Glycolic acid peels have anti-inflammatory, keratolytic, and antioxidant effects. It reduces sulfate and phosphate groups from the surface of corneocytes, decreasing corneocyte cohesion and hence inducing exfoliation of the epidermis. It also suppresses melanin formation in melanocytes by directly inhibiting tyrosinase activity and can also disperse the basal layer melanin26. They are available in various concentrations ranging from 20-70%. They are not very deep peel and are usually superficial to medium depth peel. The intensity of Glycolic acid peel is determined by the concentration of the acid and the time of application. It has been classified as very superficial peel when its 20-30% concentration is applied for 1-2 minutes, superficial peel in which 50-70% concentration of glycolic acid is applied for 2-5 minutes and medium peel where concentration of glycolic acid is 70% and is applied for 3-15 minutes27. The action of Glycolic acid peel has to be properly neutralized in order to stop acidification of the skin28. Water act as a neutralizer and to further stop the acidification sodium bicarbonate solution can also be used.

Hirschfeld 29 earlier used 90% phenol and 95% alcohol for gingival depigmentation. However, the depth of action was difficult to control and phenol may also induce cardiac arrhythmia as it is rapidly absorbed into the circulation. So it was no longer used for gingival depigmentation. In the present case report Glycolic acid peel was found to be an efficient treatment modality for gingival depigmentation. It is a simple procedure and is superior to other depigmentation techniques. It exhibits good haemostasis, uneventful healing, and no pain during or after the procedure and is also economical. It has good patient compliance. Also, there is no need of anaesthesia and periodontal dressing.

Conclusion

Chemexfoliation by use of Glycolic acid is an efficient technique for gingival depigmentation. It is simple, easy and inexpensive procedure with minimal discomfort to the patient with satisfactory outcome. Further studies are needed to assess the long term effectiveness of this method of depigmentation. More data is required on comparative techniques to ensure the long-term predictability and success.

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References


Laser Assisted Frenotomy with Coronally Positioned Flap for The Treatment of Isolated Mandibular Gingival Recession

Abhaya Chandra Das¹, Saurav Panda¹, Saumya Kanta Mohanty², Nitai Debnath³

¹Reader, Department of Periodontics and Oral Implantology, ²Reader, Department of Conservative and Endodontic, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India, ³Reader, Department of Prosthetic Dentistry, RIMS, Imphal, India

Abstract

Root coverage has turned into an essential part to periodontal plastic surgery. It becomes more challenging when there is no attached gingiva with presence of high frenal pull. This article presents a case report of gingival recession in 44 with high buccal frenal pull with complete absence of attached gingiva, which has been treated with frenotomy and coronally positioned flap with LASER. The main advantage of this technique is that it does not need a separate frenotomy procedure and also no second surgical site. The treated case established root coverage with adequate width of attached gingiva.

Keywords: Gingival Recession, LASER, Muco-gingival surgery, Root coverage.

Introduction

Gingival recession is the denuded of root surface with the apical shift in the position of gingiva.¹ It is commonly found in the general population. It is found that its prevalence increases with age.² The gingival recession can be classified as localised and generalised, which results loss of attachment and root exposure.³ There are various etiological factors, including dental plaque, labially placed tooth, faulty tooth brushing, high frenal attachment, uncontrolled orthodontic tooth movement, defective restorations, viral induced periodontal disease.⁴⁻⁸ It has frequently been observed gingival recession simultaneously with high frenal attachment and shallow vestibule.

Apart from root surface hypersensitivity, there may also be resulted in several clinical problems like cervical abrasions, difficulty in plaque control, root caries, and decreased aesthetic gingival line.⁹ Therefore, it should not be considered as merely a soft tissue defect, but rather as the destruction of both soft and hard tissues.³ Hence, root coverage procedure is indicated in such cases, which is a vital aspect of regenerative periodontal therapy.

Among various root coverage procedure, pedicle soft tissue grafts give more predictable results in such indicated cases. This article outlines a case report of recession coverage with frenectomy and coronally positioned flap with LASER in isolated mandibular class II recession defect. It may be considered a new modified technique of semilunar flap for root coverage was done in mandibular premolar region with LASER. The technique gave predictable formation of adequate of attached gingiva which is essential for a healthy gingiva.

Case History: A male subject aged 28 years reported in Department of Periodontology and oral implantology, Institute of Dental Science, Bhubaneswar, India; with a chief complain of receded gum in lower right posterior tooth region. Clinical examination revealed the presence of high buccal frenal pull with no attached gingiva in relation to #44. There was a Class II recession defect in relation to #44.¹⁰ The recession depth was noted to be 3mm (Figure 1). On radiographic examination in relation to #44, there was adequate bone support in interdental areas. Clinical parameters such as Probing Pocket Depth, Gingival Recession, width of attached
gingiva, and Clinical Attachment Level were recorded at baseline, and post-surgically at 6 months and 9 months. After explaining the surgical procedure in details, the informed consent form was signed. The subject was medically sound and fit, so a surgical procedure was designed for root coverage in #44. Scaling and root planning were performed prior to surgery to reduce inflammation.

Surgical technique: After administration of local anaesthesia (2% lignocaine hydrochloride with 1:80,000 epinephrine), the surgical procedure followed the semilunar coronally displaced flap technique as introduced by Tarnow et al. to cover denuded root surface in maxilla. However, there were some modifications done in this case such as straight-line incision instead of semilunar incision, carried out on oral mucosa instead of attached gingiva and the above said procedure was carried out in isolated mandibular recession defect instead of maxilla (Figure 2). Moreover, the straight-line incision was carried out using soft tissue diode laser to achieve haemostasis.

A straight-line incision was placed in the vestibule at approximately 8 (2 X GR + 2) mm from the gingival margin to incise frenum. A straight-line incision was placed deep into the periosteum and the underlying bone was exposed so that scar formation could occur. A sharp dissection was carried out to perform a split thickness flap in the apico-coronal direction, connecting it from the sulcular incision till the first straight incision (Figure 3). The flap was elevated and repositioned coronally to cover the denuded surface. No vertical incisions were made. Thereafter, root planting was performed to remove all irritant and necrotic Cementum. Root conditioning was done with tetracycline HCl. The repositioned flap was then pressed for 3 minutes to avoid hematoma and independent sling sutures were placed (Figure 4). Periodontal pack was given (Figure 5). The donor region was left open to granulate and healed by secondary intention. Written and verbal post-operative instructions were provided to the subjects and antibiotics were prescribed Amoxicillin 250 mg every 8 hours for 5 days and analgesic (a combination of ibuprofen 400 mg and paracetamol 500 mg twice daily for 3 days). Antibiotics and analgesics were given to control any post-operative infections, pain and swelling. 0.2% chlorhexidine mouth wash was advised to rinse twice daily after 30 minutes of brushing up to 1 month after surgery for controlling the plaque.
Sutures were removed after 10 days postoperatively and subjects were instructed to maintain meticulous oral hygiene. The surgical region was observed for any uneventful healing. The subject was recalled and recorded for post-operative measurement at 6 and 9 months follow up visit. There was complete root coverage achieved with 3mm attached gingiva and 1mm probing pocket depth after 15 days and followed up to 9 months (Figure 6).

Discussion

Gingival recession leads to impairment of dental aesthetics. Various techniques are carried out to obtain root coverage. Adequate amount of attached gingiva width plays vital role before deciding any root coverage procedures. Among all, some provide positive outcomes and some fail to achieve the result. These may be due to various factors such as the gingival contour, tooth anatomy, the relationship of underlying bone to the cement-enamel junction, and subject’s post-surgical oral hygiene maintenance.

The amount of attached gingiva needs to be measured as a part of the assessment in this case report. It has been observed that there should be at least 2 – 3 mm of attached gingiva to maintain healthy periodontium. The technique used in this case, includes two surgical techniques such as frenectomy and the flap covers an exposed root surface, which is supplied by plasmatic circulation from the adjacent portion of gingival capillaries. The plasmatic circulation allows the survival of the graft. The idea of straight-line incision was carried out for frenectomy, and it was carried out in mandible as randomly select the case since it has been not carried out till now. LASER was been chosen to decrease bleeding during surgical procedure. A healthy, functional and aesthetic with resistant to recurrence is obtained by this procedure. As per the literature search, this is the first case report where LASER assisted coronally positioned flap was used for root coverage in isolated recession. The flap covers the denuded root surface and is supplied by plasmatic circulation from capillaries in adjacent gingiva, allowing it to survive. In this case, adequate attached gingiva with complete root coverage as defined by Miller in 1987 was achieved.

Conclusion

To get a successful treatment of gingival recession depends on the selection of periodontal plastic surgery technique. Soft tissue maintenance is the primary line of defence in protecting the tissue from bacterial infection. In this report, LASER assisted modified semilunar coronally positioned flap used for root coverage in isolated recession, was found to have satisfactory results. However, careful preoperative diagnosis, case selection plays important role to determine the prognosis of the surgery. Etiological factors should be identified before the treatment and these factors should be eliminated. In this case, LASER assisted frenectomy with coronally positioned flap may be used for successful management of single tooth gingival recession.
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References


Endoscopic Treatment of Sinonasal Ossifying Fibroma: A Case Report

Santosh Kumar Swain¹, Priyanka Debta², Smrutipragnya Samal¹, Jatindra Nath Mohanty⁴, Fakir Mohan Debta⁵, Anurag Dani⁶

¹Professor, Department of Otorhinolaryngology, IMS and SUM Hospital, ²Associate Professor, Department of Oral Pathology and Microbiology, Institute of Dental Sciences, ³PhD Scholar, ⁴Research Associate, Medical Research Laboratory, IMS and SUM Hospital, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India, ⁵Associate Professor, Department of Oral Medicine and Radiology, S.C.B. Dental College & Hospital, Cuttack, India, ⁶Professor, Department of Prosthodontia, C.D.C.R.I. Rajnandgaon, Chhattisgarh, India

Abstract

Ossifying fibroma is a highly uncommon tumor with fibro-osseous nature which originates within the cranio-facial bones. It is a benign lesion consisting of fibrous tissue, bone or osseous tissue and cementum. It is rarely seen in sinonasal tract. It is often symptomless and sometimes achieve a large size. Complete ENT block excision is needed to relieve from clinical manifestations and prevent recurrence. In this case, endoscopic complete excision of ossifying fibroma was done from nasal cavity, ethmoidal sinus and maxillary sinus. Owing to aggressive nature of this lesion and high chance of recurrence, prompt diagnosis and wide surgical excision of this tumor is essential. Here, we are reporting a case of ossifying fibroma at sinonasal area which is an extremely rare location for this lesion.

Keywords: Ossifying fibroma, sinonasal area, head and neck region, endoscopic sinus surgery.

Introduction

Ossifying fibroma is an extremely uncommon benign lesion consists of fibrous tissue and bone. It is usually seen in mandible whereas it rarely seen in nasal cavity and paranasal sinus. The first case of ossifying fibroma was documented by Menzel in 1872 and subsequently named as ossifying fibroma by Montgomery in year 1927. [¹, ²] It is often seen among female during third to fourth decades of life. [³] It is a non-capsulated tumor but relatively well-demarcated border from surrounding tissue. Ossifying fibroma is an aggressive tumor and invades to surrounding structures and causes various clinical manifestations. It can spread to orbit, skull base and cranium due to its aggressive nature. [⁴] It is often asymptomatic in nature and attends large size and exhibit aggressive behavior. [⁵] The treatment purpose of this tumor is complete resection. There are several open approaches used for removal of this tumor. After use of nasal endoscopy and endoscopic sinus surgery, it was accepted as treatment of choice for ossifying fibroma of the sinonasal area which avoided cosmetic problem due to open approach. Here, we report a case of sinonasal ossifying fibroma treated with endoscopic approach.

Case Report: A 38-year-old lady attended outpatient department of Otorhinolaryngology with complaints of right nasal obstruction and mild facial swelling in the right side for 6 months. Anterior rhinoscopy revealed a polypoidal mass in the right nostril. She had no history of nasal bleeding or no history of trauma to face in the past. She had no headache and visual problem. There was no bulging in the palate and alveolar process during intraoral examination. There were no palpable neck nodes and with normal chest radiograph. Diagnostic nasal endoscopy showed a smooth mucosa covered polypoidal mass with hard in consistency on probing. Computed tomography (CT) scan showed a hyperdense mass at the right-side nasal cavity and same side maxillary sinus (Figure 1). Initially endoscopic surgery was done...
for biopsy and multiple tissues from nasal mass were taken (Figure 2). The tissues were hard in consistency and difficult to cut by scissors. Endoscopically the lesion from the right nasal cavity was completely removed and showed fibro-osseous lesion (Figure 3). This tumor from the maxillary sinus was completely excised with help of microdebrider (Hummer II, Stryker, USA) after a hole made in the anterior wall of the maxillary antrum at canine fossa and inferior meatus. During surgery, the tumor mass was separated with help of the Freer elevator. Histopathological report revealed proliferation of spindle cells, presence with globular cementum and fragments of woven bone. She was discharged from hospital uneventfully without any complications. When she was reviewed after 6 months of the surgery, found to have without any clinical symptoms.

**Discussion**

Ossifying fibroma is a benign tumor found in the bony structures at the head and neck area. It is an uncommon clinical entity, grow slowly and locally aggressive in nature. It is often seen the mandibular bone, accounts around 70% of the patients followed by maxillary sinus and rare in the other paranasal sinuses and nasal cavity. [6] Ossifying fibroma is classified into 3 types and these are Ossifying fibroma, cement-ossifying fibroma (COF), aggressive psammomatoid ossifying fibroma (APOF). [7] These different types have different biological behavior. Histologically these lesions consist of two main components such as fibrous stroma and bone elements. APOF type of ossifying fibroma consists of irregular bony spicules within a cellular fibrous stroma. Typically, it mimics cementum or calcified psammomatoid bodies. COF type of ossifying fibroma has similar histological presentation with cementum like material seen throughout the lesion. Ossifying fibroma is locally destructive benign lesion, most commonly seen in facial bone affecting mandible in 75% cases. [7] Other than mandible, ossifying fibroma affects ethmoid and maxillary sinus. APOF type most commonly ethmoid sinus followed by maxillary sinus, orbit and frontal sinus. OF commonly affect maxillary sinus and ethmoid sinus but rarely affect frontal and sphenoid sinus. [7]

Patients of ossifying fibroma are usually asymptomatic. They are usually incidentally identified during imaging for other indications. Due to mass effects, patients often present with facial swelling, nasal obstruction, headache, proptosis, loss of vision and diplopia. [8] Clinical presentations of sinus infections like rhinorrhea, nasal block, epistaxis, hyposmia can be observed when the lesion invades the nearby nerves, vision problem. [9] Diagnostic endoscopy shows smooth mucosa covered masses in the nasal cavity. The differential diagnoses of the ossifying fibroma are fibrous dysplasia, psammomatous meningioma and osteosarcoma. [10] Fibrous dysplasia is more monotonous and polyostotic than ossifying fibroma. Psammomatous meningioma presents with polypoidal mass and osteosarcoma is more aggressive in comparison to ossifying fibroma. [10]

The diagnosis of ossifying fibroma is usually done by imaging which shows a well-defined lesion. In early stages the tumor is radiolucent and progress to radiopaque and covered by radiolucent/sclerotic mass. Imaging like CT scan of paranasal sinuses and the nose presents with non-homogenous matrix with opacity of ground glass appearance which shows diffuse calcified and fibrous components. There may be remodeling and thickening in the walls of the affected paranasal sinuses. The magnetic resonance imaging (MRI) picture are similar to fibrous dysplasia on T1 weighted image shows with low to intermediate signal whereas in T2 weighted image shows variable intensity. Endoscopic biopsy and histopathological examination is done to establish the diagnosis. MRI is required to rule out orbital or cranial extensions. [11] Biopsy also helps to rule out malignant pathology such as sarcoma. Microscopically this tumor is of without capsule with invasion of surrounding bony parts and new bone formation in periphery. The tumor possesses fibrous tissue with cellular osteoid with absence of osteoblastic rimming along with slender trabeculae of pre-mature bone having coarse lacunae with several osteocytes and lined by osteoblasts. [12]

The treatment of choice for sinonasal ossifying fibroma is complete excision of the lesion. A more conservative approach may be accepted where there is no or little symptom. [13] This tumor is excised by different surgical modalities. Presently endoscopic approach is recommended for this tumor which holds advantages like direct visualization of the lesion, no external scar and deformity. Other surgical approaches like craniofacial resection e.g. trans-oral, trans-facial and craniotomy can be applied for resection of this tumor. Radiation therapy is not useful in ossifying fibroma although it is helpful in another bony tumor. [14] Radiation treatment should not suggest as it can induce malignant transformation. [9] Ossifying fibroma has a good prognosis but the chance of recurrence should be kept in mind when complete excision is difficult to do or not possible or not done.
due to some causes like cosmetic reason. Endoscopic approach for surgical removal of the ossifying fibroma arising from nasal cavity or ethmoid sinus leads to effective outcome. Endoscopic approach using nasal endoscope is a safe, effective and convenient technique than the conventional open method. Use of endoscope can reduce morbidity, hospital stay and provide cosmetically satisfaction to the patients. In extensive disease, it may require a combined approach including craniofacial resection. Ossifying fibroma must be reminded among clinician as a differential diagnosis of sinonasal mass and treated early for preventing invasion to surrounding vital structures.

**Figure 1.** Endoscopic picture of the nasal mass presenting as fibro-osseous lesion.

**Figure 2.** Multiple piece of nasal mass were taken for histopathological examination.

**Figure 3.** Scan showing hyperdense mass at the right maxillary sinus and right side nasal cavity.

**Conclusion**

Ossifying fibroma is an uncommon and fibro-osseous lesion found in the head and neck area. The clinical manifestations of the patient presented here highlights the rare site of this tumor in the nasal cavity and paranasal sinus. Clinicians should keep in mind about clinical features, imaging pictures and histopathological findings of ossifying fibroma in this uncommon site of the head & neck area for early and effective treatment. Endoscopic removal of this tumor is more convenient, effective and safe method than open approach which is cosmetically satisfactory.

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**References**


Management of Medical Emergencies in Dental Office

Ananya Oujwoswini

Intern (B.D.S.), Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

A dentist may encounter an emergency in the dental office during the dental procedures. Therefore, every dental professional should have the knowledge to diagnose and manage the serious condition in dental office. It is important to recognize the patient at risk, so that the treatment plan can be modified and the appropriate measures can be taken. Although the chance of medical emergencies occurring in dental office is rare, the dental office should be well equipped to manage such situation. The essential sequence in managing an emergency is the maintenance of proper position, Airway, Breathing, Circulation and Definitive treatment. The purpose of this article is to provide a vision to the dental professionals about the commonly occurring medical emergencies and complication in dental practice and their management.

Keywords: Anaphylaxis, Dental Office, Medical emergency, Syncope.

Introduction

A medical emergency is an acute illness that creates an immediate risk to a person’s life or long-term health. This condition demands urgent attention and treatment. Dentist must be prepared to manage medical emergencies which may arise in practice. Between 1980 and 1984 a study was conducted in Japan by the committee for prevention of systematic complications during dental treatment by Japanese Dental Society of Anesthesiology. This study stated that about 19% to 44% of dentists had encountered a patient with medical emergency in one year.¹

Medical emergencies cost commonly occurred during and after the delivery of local anaesthesia, primarily during tooth extraction and endodontic. Previous studies have shown that Syncope is the most common medical emergency encountered by the dentists. Other emergencies reported to have occurred in a dental office includes allergic reactions, angina pectoris, cardiac arrest, postural hypotension, seizures, bronchospasm and diabetic emergency.²

During the treatment of the medical emergencies, the dentist requires the knowledge of preparation, prevention and then management as necessary. Prevention can be accomplished by recording a thorough medical history with appropriate alternation to dental treatment required. Nearly all medical emergencies in the dental office can be prevented by providing sufficient oxygenation to brain and heart. Therefore, during the management of all the medical emergencies, it should be ensured that, oxygenated blood is being delivered to the critical organs. The oxygenation should be consistent with basic cardio pulmonary resuscitation with which the dentist must be competent. This provides the skills to manage most medical emergencies, which began with assessment, and if necessary, the treatment of airway, breathing and circulation (the ABCs of CPR). Usually only after the ABCs are addressed properly, the dentist should consider the use of emergency drugs. American society of Anesthesiology (ASA) system of grading the physical status of patient into ASA 1,2,3,4 is a good risk indicator for developing complications, As A grade 3 and 4 patients are at more risk of developing complications. Therefore, a medical review or consultation with treating physician may be required before treating these patients.³

Basic Medical Emergencies and Their Management

Syncope: A transient loss of consciousness due to cerebral ischemia caused by a reduction in blood supply to the brain is known as vasovagal syncope. It is the most commonly encountered medical emergency in dental practice. Vasodilation causes slowing of heart, which causes a dramatic fall in blood pressure. Causes of sudden loss of consciousness and collapse
include hypotension, adrenal crisis, anaphylaxis, cardiac arrest, diabetic collapse etc. The early manifestations include nausea, warmth, light headedness, slow pulse, hypotension, tachycardia. Most of the syncope attacks can be prevented by ensuring that the patient has had their meal before treatment in case of systemic disease like diabetes.4

During the management the patient should be in supine position with legs raised and a cool towel placed on his/her forehead. Recovery is almost instantaneous if the patient has simply fainted. Then airway should be maintained properly, pulse should be checked and CPR should be started immediately. If the pulse is palpable and the patient has not completely lost consciousness, then four sugar lumps may be given orally or intravenous 20ml of 20-50% sterile glucose. A hypoglycemic patient will improve with this regimen. But if there is still no improvement medical assistance should be summoned meantime, hydrocortisone sodium succinate 200mg IV should be given.5

**Hyperventilation:** Some patients because of extreme anxiety and fear may start to breathe rapidly and deeply. This conscious overdrive of ventilation is known as hyperventilation. This can lead to excessive washout of carbon dioxide causing decreased partial pressure of arterial carbon dioxide (below 35mmHg). Hypocapnia cause constriction of cerebral blood vessels can lead to respiratory ankylosis with rise of blood Ph to 7.55. The abnormal feeling coupled with anxiety makes the patient to hyperventilate more, thus making vicious cycle.6

Management: consist of breaking this vicious cycle. The patient should be reassured and asked to breathe slowly and normally. Hyperventilation is the only emergency situation, when oxygen therapy is uncalled for in treatment pain. The most effective method of raising pac02 is to breathe through cupped hands in front of nose and mouth or breathe through detached oxygen mask which has holes for release of excessive carbon dioxide. In most case this will terminate the vicious cycle. In certain refractory cause sedation with diazepam or midazolam may be required.

**Anaphylaxis/Allergic Reaction:** Anaphylactic reactions are a prototype example of a type-1 hypersensitivity immunological reaction which is IgE mediated. The most common allergen that can cause hypersensitivity reaction in the dental setup is latex. Patients become extremely apprehensive, intensive itching occurs and asthmatic breath develops. Urticaria may develop rapidly. Death may occur within a few minutes or several hours later.

Management: Immediate application of a tourniquet above the site of injection. Epinephrine is the drug of choice because of its vasopressor, bronchodilator and antihistamine action. Dose for the adult is 0.3 – 1mg subcutaneously or intramuscularly. If possible, an IV route of drug administration can be started. Oxygen under pressure should be given with assisted respiration. Antihistamines suchas diphenhydramine 50mg are given IV or IM. Corticosteroids such as hydrocortisone 100mg IV or IM are given for peripheral vascular effects.7

**Local Anesthetic Toxicity:** Local anaesthetics and the most commonly used drugs in dentistry. Toxicity is usually either due to the local anaesthetic itself or the vasoconstrictor which can be due to rapid infusion or failure to aspirate before injection. Generally, the reactions are self limiting. Toxicity present with talkativeness, slurred speech, anxiety, confusion, seizure and cardiac arrhythmias in extreme case.

Management: Sessate the administration of injection and monitor vital signs. Administer oxygen and in adverse cases administration of diazepam 5mg slowly is advised.8

**Asthma/Bronchospasm:** Asthma is characterized by increased contractile response of smooth muscles of small airways. In a dental setting, an asthmatic attack may occur in response anxiety, aerosolized particulate matter or certain drugs such as aspirin and NSAIDS. Patient experience coughing, dyspnea and hunger for air.

Management: The patient should be seated upright and oxygen should be administered via mask or nasal cannula. The patient is asked to take puffs from his own inhaler or salbutamol inhaler from emergency kit. Puffs from inhaler are repeated every minute for 5minute or until symptoms improve.In certain cases (status asthmaticus) inhaler medication may not be effective, then one may consider administration of IV salbutamol 100mg IV hydrocortisone may be effective in preventing relapse, 0.3mg of IM epinephrine can be used as last resort or when IV access is not available.

**Angina/Myocardial Infarction:** Angina is feeling of chest pain due to inadequate blood supply to heart. It is because of narrowing or spasm of a coronary
artery. Episode of pain is brief and usually settles within 5 minutes with no permanent damage to heart. Acute myocardial infarction is due to development of clot in one of coronary arteries. There is lack of blood supply to heart muscles with permanent damage. In both cases, the patient complaint of chest pain, heaviness, shortness of breath, the pain may radiate to shoulders, arm, neck, jaw and upper abdomen.

Management: The goals of management of chest pain are to decrease oxygen requirement of heart or increase oxygen supply to heart. This can be done by supplemental oxygen via mask or nasal cannula. Nitroglycerine is single most effective vasodilator to relax smooth vascular wall in case of angina pectoris, can be given sublingually or spray 0.4mg sublingually every 5 minutes with not more than 3 tablet. In case of myocardial infarction, it is recommended that out of hospital, the patient should receive anti-fibrinolytic aspirin in dose of 150-325mg. Therefore, the patient may be asked to chew four tablets of 75mg aspirin and swallow. The patient should be shifted under the care of the cardiologist as early as possible.

Seizure: Patient who convulse in dental office generally have a seizure history and are often characterized as having epilepsy.

Management: If the patient experiencing seizure is unconscious. They should primarily be placed in the supine position and the head tilt chin lift manoeuvre is performed. Dental specialist should remove all the instruments from patient’s mouth and protect the patient. Clear airway, loosen clothing and help patient breath adequately. If seizure continues for long, then the condition is known as status epilepticus. This is a life-threatening emergency and is best managed with IV diazepam 5mg IV/IM or by maintaining BLS till patient is shifted to emergency medical care.

Hypoglycemia/Hyperglycemia: Diabetes mellitus is quite prevalent and these patients are prone to hypoglycaemic and hyperglycaemic events. In dental settings, hypoglycaemic events are more common than hyperglycaemic events. Hypoglycaemic can be sudden and more dangerous, it occurs due to lack of supply of glucose to brain result in confusion. Hyperglycaemic event takes days or weeks to develop clinician should be able to differentiate between the hyperglycaemic events and hypoglycaemic events. Skin of hyperglycaemic patient looks flushed and dry whereas hypoglycemic patients’ skin is cold and wet as the blood pressure is low. Monitoring of blood glucose with glucometer in the dental clinic can also confirm the diagnosis.

Management: If hypoglycaemic is evident, it can be readily corrected by giving glucose or sugar in conscious patient but in an unconscious patient 25-50ml of 50% dextrose should be administered IV. Alternately 1mg of glucagon can be administered IM. Protocol of vital sign monitoring and BLS should be followed as in case of any unconscious patient. Emergency management of hyperglycaemic patient in a dental clinic is supportive in nature and Patient should be shifted to nearby hospital for definitive management.

Hypotension: Low blood pressure (systolic pressure below 90mmHg) can lead to inadequate cerebral perfusion and loss of consciousness. Most common cause in dental setting for hypotensive patient is syncope, it is associated with bradycardia, usually pulse below 50 beats per minute.

Management: Hypotension with bradycardia, atropine is a useful drug dose 0.5mg IM or IV and can be repeated every 5 minutes up to a maximum of 3mg depending on heartbeat or blood pressure. Rapid infusion of normal saline may be warranted to increase the blood pressure. Ephedrine3 can be given 25mg via IM or sublingual injection. When the patient is hypotensive along with tachycardia, phenyl nephrine can be given as 10mg/ml single dose ampoule and should be diluted to make it 0.1mg/ml 0.1-0.2mg increments are given IV slowly.

Hypertension: Hypertension can be encountered with patients in extreme pain or restlessness during lengthy procedure. If the episode is accompanied with symptoms like chest pain, headache or visual disturbances then drug intervention to reduce blood pressure may be required. It is important to note that when stroke is being suspected (aphasia, paresthesia and paralysis are suggestive of stroke) then no attempt should be made to lower the blood pressure.

Management: Esmolol, a selective beta 1 blocker can be used to manage an acute hypertensive event. It is given as 10mg/ml in multi dose vial. Its dose is 0.5mg/kg over 1 minute and can be titrated with 20mg increments (1-2ml) every 1-2 minute.

Recent Advances in Management of Emergencies: The most recent advancement is the revised CPR
guidelines by the American Heart Association (AHA) in 2010. Instead of ABC, now compressions come first only then do the airway and the breathing. Initially, it was believed that the chest compression should be at least 1-1.5 inches deep but now at least 2 inches deep compressions are recommended in adults and in infants its about 1.5 inches but in children it is 2 inches same as adults, and a compression rate of at least 100/min, allowing for complete chest recoil after each compression. Minimising interruption in chest compression. 5-7

**Conclusion**

Emergencies cannot be totally prevented but can be managed appropriately with through knowledge of signs, symptoms and accurate treatment of emergencies. Accomplishing this depends on the combined effort of dental specialist, staff and immediate availability of the critical drugs and equipments for the procedure. However, no drug can replace an efficiently trained health care professional in managing an emergency but an emergency drug kit and equipment does play an integral role in the course and outcome of management of emergencies and complications in interdisciplinary dental practice.

**Conflicts of interest:** There are no conflicts of interest.

**Funding:** None

**Ethical permission:** Approved

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A Rare Case Report of Recurrent Basal Cell Adenoma Involving Minor Salivary Gland of Hard Palate

Harsh Mohan Pathak1, Santosh Kumar Subudhi2, Satya Patnaik1, Swagatika Panda3, Kalyan Sundar Pal4

1Reader, Department of Oral and Maxillofacial Surgery, 2Professor, Department of Oral and Maxillofacial Surgery, 3Reader, Department of Oral Pathology and Microbiology, 4Post Graduate Trainee, Department of Oral and Maxillofacial Surgery, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract
Basal cell adenoma is a very rare monomorphic tumor of salivary gland that mainly involves the major salivary glands. Minor salivary gland involvement is a rare entity. A case of basal cell adenoma of heard palate of a 52-year-old woman was reported in Dept. of OMFS, Institute of Dental Sciences, Siksha ‘O’ Anusandhan (Deemed to be University), Bhubaneswar. The patient complains of swelling and discomfort during taking food and draining of pus from that swelling. On radiographic examination (on contrast enhanced computed tomography). Lesion was excised under local anesthesia and the excised tissue sent for histopathological study which reveals keratinized epithelium lined cystic space surrounded by fibrous capsule.

Keywords: Maxilla, Hard palate; Basal cell adenoma; Salivary Gland; radiographic examination.

Introduction
Basal cell adenoma is benign neoplasm of major and minor salivary gland composed of basaloid cells, a prominent basal cell layer and prominent basement membrane-like material and devoid of myxochondroid stromal component which is seen in pleomorphic adenomas. [1] This type of neoplasm commonly involves the parotid gland than the oral mucosa. And in oral mucosa upper lip is the most common site. They rarely involve palatal mucosa in comparison to pleomorphic adenoma that is common in heard palate but rarely involve the lip. Basal cell adenoma appears as small, slow growing, and painless, well circumscribed swelling. There is slight male predilection. This case is presented for its rarity.

Case Report: A lady who is in her 5th decade of life reported to the Oral and Maxillofacial surgery department of our college complaining asymptomatic swelling of the left upper back teeth region since last 2 year and there is no history of pain in that region. The swelling is gradually increasing in size since last 2 years and there is presence of draining sinus since last 2 months. There was history of swelling on the same region 5years back which was excised.

On extra oral examination: Nothing significant.

On intraoral examination: A well circumscribed swelling, which present on left side of the hard palate in relation to edentulous space of 26 and 27. The swelling measuring about 2 cm in diameter and having smooth erythematous surface. The swelling is hard on palpation and during palpation there was discharge of purulent fluid from the sinus opening. A single draining sinus present on the surface of the swelling (Figure 1).
On radiological examination: CT reveals well circumscribed swelling involving left side of the hard palate without involvement of palatal bone. On the basis of this clinical diagnosis of benign salivary gland tumor was made (pleomorphic adenoma) with a differential diagnosis of monomorphic adenoma and canalicul

adenoma (Figure 2 and 3). The tumor was excised under local anesthesia along with 1 cm of safety margin and palatal periosteum (Figure 4) and resected tissue (Figure 5) sent for histopathological study.

On histopathological study: Histopathological study reveals the tumor mass is encapsulated by fibro collagenous capsule. The tumor mass composed of multiple islands of uniform looking triangular hyperchromatic cells resembling basal cell and occasional squamous cell. Distinct basement membrane like substance is also intermingled with tumor cells. Occasional area show cord and strands of tumor epithelial cells separated by collagenous connective tissue stroma. Areas of cystic degeneration are also found (Figure 6 a, b).
Discussion

Above discussed variety of neoplasm, which is very uncommon, have proliferation of basal cells with devoid of myxochondroid stroma, which is plenty in pleomorphic adenoma (11,12). Previously, BCA was considered as monomorphic form of adenoma, but later the word monomorphic is excluded by WHO in 1991 and renamed as basal cell adenoma (13). According to histopathology there are 4 types: 1. Solid 2. Tubuler 3. Trabecular and 4. Membranous. Among them solid variant is the commonest one. But in most of the cases combination of above said histological types are found. The tumor is frequent in middle aged adults (4th -6th decade of life) with slight female predilection. But it can appear at any age. Malignant transformation of the tumor is rare but few case of malignant transformation is also reported in previous studies (15). The membranous type of basal cell adenoma has higher recurrence rate (nearly 25 - 37%) (1) Involvement surrounding normal tissue during surgical excision is necessary for the prevention of its recurrence.

Conclusion

Even of its rarity basal cell adenoma should be considered in differential diagnosis of palatal swelling.

Conflict of Interest: None

Source of Funding: Funded by self.

Ethical Clearance: Ethically cleared by Institutional Ethics committee, IMS and SUM Hospital, Bhubaneswar, Odisha.

References

The Relationship between Nutrition and Oral Health: A Review

Sourav Chandra Bidyasagar Bal¹, Sukhvinder Singh Oberoi², Radha Prasanna Dalai¹, Avneet Oberoi³

¹Senior Lecturer, Department of Public Health Dentistry, Institute of Dental Sciences, Siksha O Anusandhan (Deemed to University), Bhubaneswar, Odisha, India, ²Reader, Department of Public Health Dentistry, Sudha College of Dental Sciences and Research, Pt. BD Sharma University, Haryana, India, ³Private Practitioner General Dentistry, Oberoi Dental Clinic and Orthodontic Centre, Tagore Garden, New Delhi, India

Abstract
This review is addressing the aspects of nutrition and diet as related to the oral health. Oral health is related to diet and nutrition in many ways, for example through dietary influences on craniofacial development and oral infectious diseases. In the modern diet, soft refined foods tend to cling tenaciously to the teeth and are not removed because of the general lack of roughage. Nutritional status and dietary habits can affect and be affected by all oral conditions. Nutrition interventions may be throughput of in terms of primary prevention, secondary prevention and tertiary precaution. Oral health cannot be exclusively maintained through one approach.

Keywords: Nutrition, Oral Health, Macronutrient, Micronutrients, Deficiency diseases.

Introduction
"Diet as defined by Newbrun refers to the customary allowance of food and drink taken by any person from day to day."¹ Nutrition is defined as the science of how the body utilizes food to meet requirements for development, growth, repair, and maintenance.² Oral health is directly related to diet and nutrition through dietary influences on cranio–facial development and oral infectious diseases.¹ In the modern diet, soft refined foods tend to cling tenaciously to the teeth and are not removed because of the less roughage. Augmenting this collection of debris on the teeth is the reduction of mastication due to the softness of the diet. The detrimental effect of this decreased function on the periodontal apparatus should be obvious.³ The role of fermentable substrate in plaque development, caries and periodontal disease. Nutritional status influence tissue health, immune system function and systemically influences teeth during the pre-eruptive stage including prenatal, perinatal and postnatal periods.⁴ Deficiency of protein energy and vitamins has been associated with enamel hypoplasia and related increases dental caries. Diet more specifically describes foods and foodstuff and the pattern of consumption over a given period of time.⁵ The present review is addressing the aspects of nutrition and diet as related to the oral health.”

Nutrients and their Role in Oral Health
Carbohydrates: “The formation of structural components of the body such as cartilage, nervous tissue and bone is dependent upon carbohydrate.² Carbohydrates are most commonly classified as Simple (Sugars) or Complex (Starches, Fibers). Processed foods, cooked starchy foods, especially when combined with refined sugars can contribute to dental caries and plaque formation, thereby contributing to the development of periodontal diseases. Studies like, Vipeholm Caries study, Hopewood House study, Studies on World War II (among Norwegian children and Takeuchi in Japan) have been conducted to establish the relationship between the diet and dental caries.⁶ ⁷ Vipeholm concluded that the consumption of sugar can increase caries activity. The risk of sugar increasing caries activity is greatest if the
sugar is consumed between meals and in a form in which the tendency to be retained on the surfaces of the teeth is pronounced with a transiently high concentration of sugar on these surfaces. Turku Sugar studies showed almost total substitution of sucrose by xylitol resulted in a substantial reduction in caries incidence.\textsuperscript{8,9} Boyd reported that glucose and other carbohydrates are also used to produce extracellular polysaccharides and, therefore, such diets can increase the plaque mass and facilitate the retention and colonization of the plaque biofilm periodontal infections.”\textsuperscript{10}

**Lipids:** “Dietary lipids can be mainly classified into oils and fats. Lipids or fats contributes to obesity, heart disease and other chronic diseases such as cancer; however, a certain amount of fat is important to maintain adequate health. Lipids oil rich in linoleic acid like safflower, cottonseed and groundnut are good in suppressing the formation of scales on the walls of blood vessels.\textsuperscript{5} Fats are important to oral health from the standpoint that phospholipids are a structural component of cell membranes, tooth enamel and dentin. Fats are involved in the initiation of calcification and mineralization of teeth and bones. In addition, high–fat foods tend to be inhibitory towards dental caries.” Small quantities of nuts and cheeses can be good between meal snack foods or even as ‘dessert’ substitutes for patients concerned with dental caries.\textsuperscript{5} The mechanisms by which fats act to reduce dental caries are probably as follows:\textsuperscript{11}

1. Coating of the tooth food surfaces with an oily substance would mean that food particles will not be so readily retained.

2. A fatty protective layer over plaque would prevent fermentable sugar substrate from being reduced to acids.

3. High concentration of fatty acids may interfere with the growth of cariogenic bacteria.

Chronic swelling of the parotid glands can be the result of the disturbed lipid metabolism that accompanies alcoholism.\textsuperscript{6}

**Proteins:** Protein deficiency during early months of life leads to intellectual dwarfism and it remains lifelong.\textsuperscript{12} Deficiency of protein energy has been associated with enamel hypoplasia and related increases in dental caries.\textsuperscript{5} The caries may be caused either by a quality defect in the matrix of the tooth enamel or equally important by alteration in the salivary gland.\textsuperscript{13} In humans, there is no direct evidence of a correlation between dental caries experience and dietary protein deficiency.\textsuperscript{14} The epithelium of the gingival crevice or pocket adheres to the tooth surface by physiochemical forces mediated by the proteins and glycoproteins in the gingival fluid. The mucoproteins are essential for the maintenance of a regular distribution of water and electrolytes in the tissues. They also have the ability, by cross-linking, to bind collagen fibrils into fibers.\textsuperscript{15} Dietary protein is an important factor in maintaining tooth health – supporting structures. In experimental animals, it has been shown that a dietary protein deficiency negatively affects the activity of fibroblasts, osteoblasts and cementoblasts. The mineralized tissues, bone and cementum, also show similar evidence of breakdown because of size cancellous bone spaces are increased and these are retardation of cementum deposits.\textsuperscript{15}

**Role of Vitamins:** Vitamins are a group of essential nutrients required in trace amounts to regulate chemical reactions within the body. The Vitamins are either water-soluble and fat-soluble vitamins. Water soluble vitamins include Vitamin C and B and Fat soluble include vitamins, A, D, E and K.\textsuperscript{15} Vitamin A is found in the form of retinal and carotene.\textsuperscript{16} Vitamin A is essential for normal development of periodontium, teeth, lip, palate, oral mucous membrane and salivary glands. Vitamin A deficiency produces hyperkeratosis and hyperplasia of gingival tissue. There is a tendency to periodontal pocket formation as a result of proliferation of basal sells of the gingival epithelium and a decreased cellular infiltrate of the lamina propria. When trauma or irritation is superimposed on this conditioned deficiency, severe pocket formation will occur as a result of decreased repairs activity.\textsuperscript{17}

“A deficiency can deaccelerate or stop the growth of the incisor teeth. Accompanying this growth retardation is a disturbance in differentiation and function of ameloblasts; therefore, enamel formation is interfered with. This interference produces hypoplastic and chalky white incisors plus a loss of the usual orange pigment. Also disorders of the labial and lingual odontoblasts occur, producing a thick, regular labial dentin with interglobular spaces and a thin, atubular lingual dentin. There is no absolute correlation between vitamin A deficiency and dental caries or enamel hypoplasia in humans.\textsuperscript{16,17} The atrophy of salivary glands resulting from vitamin A deficiency reduces salivary flow and increases possibility of caries. Vitamin A deficiency is associated with epithelial metaplasia and hyperketerization.” During early development, both deficiency and high
doses of vitamin A have been reported to induce cleft lip and cleft palate. Lack of vitamin D, the enamel calcifies poorly and may in some areas fail to form. The appearance of a calcitroatramatic line in the dentin is the earliest sign of an acute deficiency of vitamin D.16

The relationship between adequate intake of vitamin D and reduced caries incidence has not been clearly proved. Even though a decreased number of enamel cells occur in isolated areas of the enamel surface from vitamin D deficiency, from a chemical standpoint, the enamel is not weakened or more susceptible to caries. However, the physical roughness of the enamel surface from the characteristic pitting of teeth in rickets might dispose to the entrapment and adherence of dental plaque and sugar thus initiate the caries process. Vitamin E is essential for maintaining the integrity of the enamel in incisor teeth as found in the rodents. Iron concentration in incisor enamel was decreased decidedly but no variations in calcium, phosphorous and magnesium concentrations were observed in enamel and dentin that formed during the deficiency.19

Deficiency of vitamin K is rare because of the intestinal synthesis. Vitamin K compounds have been found to be required for the growth of Bacteroides Melaninogenicus, an organism closely associated with periodontal disease.20 It is speculated that a suitable antimetabolite of vitamin K might interfere with the growth of this organism and consequently, prevent the occurrence of periodontal disease.

Vitamin C is an essential nutrient as there is lack of body’s capacity to synthesize. It is also called ascorbic acid because it has antiscorbutic properties. Deficiency of vitamin C results in a disease called Scurvy. The deficiency of ascorbic acid leads to the defective formation of intercellular cement substances. The symptoms of scurvy include hemorrhagic spots on skin, swelling, and infection, bleeding of gums, tenderness and anemia. The characteristic oral signs of scurvy are enlargement of the marginal gingivae that envelopes and almost completely conceals the teeth. The gingivae are bluish red, are soft and hemorrhage spontaneously. The inflamed gums can become secondarily infected by organisms that will result in an acute necrotizing ulcerative gingivitis.6

Thiamine is a water-soluble vitamin which is essential for the utilization of carbohydrates. Severe thiamine deficiency is called beri beri. It affects principally the cardio–vascular, muscular and nervous systems. Beri beri can be separated into three forms 1) Wet, 2) Dry, and 3) Infantile. Deficiency of vitamin B1 increases sensitivity of the oral mucosa, burning tongue, and loss or diminution of taste.6 Riboflavin has a fundamental role in cellular oxidation. It is a co-factor in a number of enzymes involved with energy metabolism. Most common oral lesion associated with riboflavin deficiency is angular stomatitis, which frequently occurs in malnourished children. Other clinical signs include glossitis, cheilosis, inflammation of the conjunctivae, dermatitis.22 Riboflavin deficiency in human beings results in angular stomatitis / cheilosis and glossitis.23

Deficiency of niacin can cause soreness and inflammation of the tongue (glossitis), mouth (stomatitis) and fissured condition of the lips. The tongue is sore, swollen, scarlet in colour and smooth. Acute necrotizing ulcerative gingivitis is common due to secondary infection with fungi or bacteria (eg. fusiform bacilli and spirochetes).13 Eating and swallowing are so painful that food is often refused, which may contribute to worsening of the disease.23

Vitamin B6 deficiency may lead to cheilosis, glossitis and stomatitis. The deficiency has been related to inflammation of the skin and the tongue, loss of appetite and sleep, nausea, muscular pain, increased skin sensitivity and. burning and prickling sensations. The deficiency of biotin causes glossitis.23

Folic acid deficiency results in Megaloblastic anemia, glossitis, cheilosis and gastrointestinal disturbances such as diarrhea, distension and flatulence. The main oral symptoms due to folic acid deficiency are burning sensation in the tongue and oral mucosa. The tongue becomes red, sore and swollen. Angular cheilosis and gingivitis are also present.6

Cyanocobalamin is found as a co-ordination complex with cobalt and cyanide ion. The characteristic symptoms of deficiency include anorexia, dyspnoea, prolonged bleeding time, loss of weight, neurologic disturbances etc. Vitamin B12 deficiency results in atrophic glossitis, which shows bright red, smooth, sore and burning tongue.23

Role of Minerals: Minerals help in growth, repair and regulation of vital body functions. Studies reported that demineralization of the alveolar bone in humans was reversed by daily dietary calcium supplements given for a year.24 These researchers suggested that
periodontal bone loss was a direct result of a calcium-deficient diet leading to secondary hyperparathyroidism and that reversal of this condition by dietary calcium supplements was due to calcitonin production. Others have also suggested that periodontal disease is the result of alveolar bone loss caused by deficiency of calcium and phosphorus.6

Magnesium is present in both enamel and dentin, but its concentration in dentin is about twice that in enamel. If a dietary deficiency in magnesium is induced in rats, the enamel and dentin of the incisor teeth will be hypoplastic because a deficiency produces degenerative changes in ameloblasts and odonto-blasts.25 The oral manifestations of iron deficiency anemia are and fissures at the corners of the mouth. The oral mucous membranes may be atrophied and ashen gray.6 It is believed that oral tissues thus affected are more susceptible to carcinoma. The combination of dysphagia, koilonychias, angular stomatitis, and atrophic glossitis (inflamed smooth surface of the tongue because of reduced size and loss of number of papillae) is called the Plummer-Vinson syndrome. Some study suggests that zinc sulfate supplements will decrease wound-healing time significantly. When zinc peroxide powder was used topically on acute gingival lesions in acute necrotizing gingivitis, the soreness disappeared sooner than expected, and the mouth was quickly restored to normal health.26

Copper concentrations in excess of the normal amounts found in human saliva appear to inhibit acid production. There have been conflicting reports on the ability of dietary supplements of copper to reduce dental caries.27 One of the commonest problems occurring in persons who ingest foods grown in soils that are rich in selenium is a higher than usual dental caries experience. It is speculated that incorporation of selenium during formation of teeth changes the protein components of the enamel and makes it more prone to caries. However, the threshold value of intake below which selenium does not increase caries is not known.27 High molybdenum content of water was responsible for the lower caries incidence among children. Hadjimarkos reviewed the data on this study and commented that the conclusions were questionable because data were incomplete. There have been conflicting reports of the relative caries-inhibiting property of molybdenum when used as a dietary supplement in animal-feeding experiments.21,27 Vanadium resembles phosphorus in chemical behavior. Studies suggests there is an inverse correlation between the vanadium content of water supplies and dental caries.27

**Conclusion**

A basic prerequisite for accomplishing dietary change is the advice that the patient and not the counselor bear the responsibility for making the change. Diet counseling involves giving advice on food selection based on the individual’s likings. Counseling requires obtaining information as to why, where, when, and what specific foods are eaten, how frequently, and what feelings are experienced.28 Nutritional status and dietary habits can affect and be affected by all oral conditions. Nutrition interventions may be throughout of in terms of primary prevention, secondary prevention and tertiary precaution.

**Conflict of interests:** None

**Funding:** None

**Ethical permission:** Approved

**References**

Reproductive Health for Adolescents with Intellectual Disabilities: The Implementation of a Psychoeducation Module for Special Education Teachers in Bandung City, Indonesia

Sela Fasya¹, Evi Martha², Hadi Pratomo², Frieda Mangunsong³

¹Graduate Student, Faculty of Public Health, ²Department of Health Education and Behavioral Science, Faculty of Public Health, ³Faculty of Psychology, Universitas Indonesia, Indonesia

Abstract

Adolescents with intellectual disabilities experience the same physical changes as all teenagers. However, the difference for adolescents with intellectual disabilities is that they require greater guidance and attention. Unfortunately, many teachers lack sufficient knowledge and skill for facing these physical changes in their students. This study used a quantitative analysis method with a quasi-experimental one-group pretest–posttest design and qualitative study to discover teacher attitudes and evaluate the provided training. This study demonstrates that there was an improvement in teacher knowledge and a change in teacher attitude from before and after a training intervention.

Keywords: Psychoeducation, Intellectual Disability, Teachers, Knowledge.

Introduction

People with disabilities are often considered sexually inactive. In fact, they have the same physical and hormonal changes as their peers.¹ Many teenagers with disabilities do not receive even basic information regarding how their body is changing and developing.²³ Individuals with physical, cognitive, or emotional barriers have a right to education on sexuality and reproductive health, and they have the same emotional and physical needs and desires as any other individual. As young children, they need touch and physical contact. As they grow older, they are interested in love and relationships. However, individuals with disabilities are often considered as having no need for sex. This situation makes sexuality education for adolescents with intellectual disabilities even more important both for their companions (supervisors) and for the adolescents themselves.⁴

Dewinter revealed that most boys with intellectual disabilities have tried to masturbate, had orgasms, and watched pornographic films over the internet. This should be a concern for both teachers and parents as it shows the importance of sexuality education, including education that pays attention to social factors, communication, personal needs and desires, and safe sex. Individuals with intellectual disabilities are often assumed to be incompetent and unable to manage conflict, particularly in the area of sexuality. Therefore, they need to develop skills to improve their basic communication and generalization strategies.⁵

Psychoeducation programs can shape a teacher’s empathy.⁶ The provision of knowledge on psychoeducation needs to be integrated into the teaching curriculum.⁷ A teacher’s knowledge of psychoeducation for adolescents with intellectual disabilities can also have a positive impact on teacher interventions in the classroom. In addition, after implementing psychoeducation, teachers are better able to identify student behavioural problems, needs, and select and design appropriate classroom intervention techniques for problems in class.⁸ Thus, the purpose of this study is to improve the knowledge, attitude, and practice of teachers at eight schools for special needs children in Bandung City through the use of psychoeducation.
for teaching reproductive health to adolescents with intellectual disabilities.

**Methods**

The research used quantitative analysis method with Quasi-Experimental One Group Pretest-Posttest design where in this design there was not included control group (comparison). In this draft subjects conducted pretest measurement after it was subjected to treatment in the form of intervention of adolescent reproductive health intellectual disability, then done the final measurement (posttest). Then the results are analyzed for differences or changes.

**Measures: Psychoeducation module for the reproductive health of adolescents with intellectual disabilities.** The respondents received training with a psychoeducation module on the reproductive health of adolescents with intellectual disabilities compiled by the Community Service Team of the Faculty of Public Health and the Faculty of Psychology, Universitas Indonesia.

**Instrument:** The instrument used as a tool for this study was a questionnaire designed by the Community Service Team of the Faculty of Public Health and the Faculty of Psychology, Universitas Indonesia with modifications made by the researchers. The instrument was tested first with 15 respondents from special education school X and 5 respondents from special education school Y for a total of 20 respondents. Out of the 30 questions, there was one question that had a lower value than the $r$ table ($r = 0.444$), which was question number 20. However, since question number 20 was considered as important, it was still included in the question instrument. To test the reliability of instrument test result, it was found that the instrument questions were thus considered as reliable. For the training module on the reproductive health of adolescents with intellectual disabilities for teachers, it was subjected to module testing by the drafting team.

**Participants:** The population of this study was comprised of teachers of special education in Bandung City. The number of subjects was 52 teachers who meet the inclusion criteria. For both parts of the study, the sample was chosen purposively.

**Statistical Analytic:** Data analysis in this study uses frequency distribution to describe the characteristics of the respondents, then uses the dependent t test to see the increase’s teacher knowledge before and after the intervention, and using multiple linear regression analysis to see the relationship of the characteristics of respondents to the increase in knowledge that occurs.

**Result**

**Responden:** Characteristics of respondents in this study is where the average age of respondents is 45 years with a variation of age 12 years. The youngest age is 20 years old and the oldest is 60 years old. Then the average length of work is 18 years with a variation of 10 years. The minimum length of work is 1 year and maximum length of work is 36 years. The number of female respondents is higher (81.3%) than for males (16.8%). In addition from the table can also be seen that respondents with majors PLB higher (91.7%) than Non PLB (8.3%). Furthermore, respondents with higher education S1 (81.3%) than S2 education (12.5%) and education D3 (6.3%).

**Overview of Knowledge Up Before and After Training:** The average knowledge before the test was done was 18.94 and after the test was done it increased to 25.23. The difference between before and after training is given is 6.29 with p value <0.05 (0.0001), meaning there is difference of knowledge before and after training is given.

**Table 1. Improved Knowledge Before and After Training**

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<th>SD</th>
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<tr>
<td>Post Test</td>
<td>25.23</td>
<td>1.61</td>
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</table>

**Improvement of Teacher Knowledge After Being Controlled by Other Variables:** The results of this study after the intervention show that the older the age of the teacher, the lower the teacher knowledge, but this was not significant. Female teachers had lower knowledge improvement than male teachers. In addition, the higher the education level of teacher, the greater the improvement in teacher knowledge, and the more the years of service, the greater the improvement in teacher knowledge.
Table 2. Improvement in Teacher Knowledge Controlled by Other Variables

<table>
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<th>Standardized Coefficient</th>
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<td>3.</td>
<td>Level of Education</td>
<td>0.304</td>
<td>0.431</td>
<td>0.099</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Years of Service</td>
<td>0.135</td>
<td>0.042</td>
<td>0.767</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Knowledge Upgrades Before and After Interventions are Given: The results of this study indicate that there is significant difference of knowledge between before and after given intervention proved by p value <0.05 (0.0001). This is in line with research conducted by Hoseinpour which states that there is an increase in knowledge on teachers with an average difference of 6.23.10 In addition, the study also showed that there were significant differences in teacher knowledge before and after training intervention was proved by p value <0.05. Improvement of knowledge before and after intervention by using module in this research is also in line with research conducted by Olfah stating that there is influence of training by using module to increase knowledge.11

The use of pretest and post test in this study serves to see the improvement of teacher’s knowledge before and after the intervention given as in Thailand in 35 teachers who received training where the researcher found that after the training the teacher got a deeper knowledge and understanding about reproductive health and HIV / AIDS, strengthening the ability of teachers to become a facilitator, improve communication skills, and have better relationships with students. In addition teachers also become more willing to participate and commit to provide education on reproductive health and HIV / AIDS.12

It also happens in this study that after being trained in reproduction health psychotherapy, most teachers are motivated to educate students by trying to insert the content of reproduction health into the curriculum that has been formed one of which is self-building program. In addition, the principal as a key policy holder in the school also showed a positive response to his willingness to support activities related to reproductive health education of adolescent girls.

The main objective of providing teacher training on reproductive health and HIV / AIDS is to improve students’ knowledge, attitudes and behavior on reproductive health and HIV / AIDS. But in fact the first thing that results from an effective training is the self-impact of the teacher where it can help teachers to identify teachers’ attitudes about sexuality and behaviors about HIV prevention, understand the content they will teach, learn the skills to teach, and improve confidence in teachers to discuss sensitive and controversial topics such as sexual matters.13

Improvement in Knowledge Before and After Conducting the Intervention Controlled by Other Variables: This study has statistically proven that there was an increase in teacher knowledge before and after participating in an intervention for the psychoeducation of reproductive health for adolescents with intellectual disabilities. This improvement in knowledge was then controlled by other variables, including age, sex, years of service, level of education, and educational background. The aim of studying these variables was to see whether an improvement in teacher knowledge before and after training would be affected by them.

Based on this study, it could be stated that the older the age of the teacher, the lower the teacher knowledge after the intervention, but this was not significant. Notoatmodjo revealed that age was one of the factors that influence knowledge, showing that the older the people, the more developed their mind and memory have become, and this has a positive impact for better knowledge.14 However, as one moves toward old age, a person’s ability to accept or remember something will decrease.15 According to Kooij et al. (as cited in Pati), most factors related to age can have a negative impact on the motivation for working, in that the older worker has lower motivation. This was also the case for the teachers in this study, in which the older teachers had a lower improvement in knowledge because of a lower motivation for the training.16
Furthermore, this study also statistically showed that male teachers had a greater improvement in knowledge than female teachers. Based on one theory, the size of the male brain is 10% greater than the female brain but the female brain has a larger corpus callosum. As a result, this size difference in the brain makes men and women different whereby men tend to focus more on visible objects than women. This is related to the methods used for delivering the materials presented in this study. Although the training was not only focused on a lecture and used a variety of teaching aids, it still turned out that the methods used made it easier for male teachers to capture information than for female teachers.

In addition, this study also statistically demonstrated that the more years of teacher service, the greater the improvement in teacher knowledge after attending the intervention. As stated by Rachman and Tjalla special education school teachers who have more than six years of work experience are more skilled in managing the class because their experience helps them.

This study also showed that the higher the level of teacher education, the greater the improvement in teacher knowledge after completing the intervention. As Rachman and Tjalla showed in their research, teachers with a high level of education have broader insights, facilitating their teaching and learning activities. Notoatmodjo revealed that one of the internal factors that also influence knowledge is education. This demonstrates that the higher the level of education, the easier it is for people to understand new information because they have the analytical skills and ability to receive information.

Furthermore, this study also showed that a teacher’s educational background did not affect the improvement in teacher knowledge. According to Undang-Undang Number 14 Year 2005 of the Republic of Indonesia concerning teachers and lecturers, it is required for the educator certification programs provided by universities to be accredited by the government as to provide structure and equity. As a result, everyone who has obtained an educator certificate has the same opportunity to be appointed as a teacher in their specifically certified field of education. Thus, even though this study found that there were some special education school teachers who were not from a special education background, they had followed the certification procedure as mandated by this law.

Issues such as sexual education need to be understood by all teachers because teachers are the main “transmitters” of knowledge, attitudes, skills, ideas, and competencies for students. They must understand what the best approach is for teaching content on reproductive health education. Nchia has stated that reproductive health education influences knowledge and competency in regard to this subject. This is consistent with this study in that the results show a contribution to the improvement of teacher knowledge.

**Conclusion**

This study shows that the training used psychoeducation module has improving the knowledge of teachers in reproductive health in adolescents with intellectual disability.

**Conflict of Interest:** The authors stated there is no conflict of interest of this study

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**Ethical Clearance:** Ethical review was conducted in accordance with the procedures at the Faculty of Public Health of the Universitas Indonesia and was approved by the Health Research Ethics Committee of the Faculty of Public Health of the Universitas Indonesia. The number of ethical clearance letter is 51/UN2.F10/PPM.00.02/2018.

**Acknowledgement:** The researchers would like to thank all of the teachers and principals of the eight special education schools in Bandung City and the Education Agency of West Java Province who participated in this study.

**Reference**


3. UNICEF. *Children and Young People with Disabilities.* 2013.


Cost Effectiveness of Interventions Using the TB Dots Strategy in Public Healthcare and Private Hospitals in Depok, West Java, Indonesia

Fikrotul Ulya1, Hasbullah Thabrany1, Mardiati Nadjib1, Purnawan Junadi1

1Department of Health Policy and Administration, Faculty of Public Health, Universitas Indonesia, Depok, Indonesia

Abstract

In 2016, the global Tuberculosis (TB) case notification rate was 77%, and 46.5% in Southeast Asia. During the last five years in Indonesia specifically, the rate has been 32–33%; however, in Depok City, it reached 58%. In Depok City, the private sector contributed 18.7% of the notified TB cases in 2016, though only 40% of its private hospitals were involved. However, the costs incurred by the private sector were higher. The aim of this study was to determine the cost effectiveness of implementing the DOTS (Directly Observed Treatment Shortcourse) strategy in private hospitals. A comparative study was carried out for six months, along with a retrospective cohort study between Public Health Centers (PHCs), DOTS hospitals, and non-DOTS hospitals, using 36 samples per group. The calculations of societal perspectives mentioned in Indonesian Rupiah (IDR) using micro-costing. The output was the success rate, which at the PHC hospital was 86.1%, at the DOTS hospital was 77.78%, and at the non-DOTS hospital was 63.89%. The addition of cost providers, especially human resources, at the PHCs and DOTS hospital increased their success rates. The societal cost of TB treatment in the PHCs was 42% that of the private hospital. The average cost-effectiveness ratio (ACER) showed that hospitals that carry out the DOTS strategy are more cost-effective than those that do not. To increase the TB treatment success rate by 1%, IDR 10,084,572 is needed in order to conduct a DOTS program intervention in a private hospital. An independent t-test showed that the cost effectiveness of societal perspectives on TB treatment was significantly different between the PHCs, the DOTS hospital, and the non-DOTS hospital.

Keywords: Cost-effectiveness analysis, DOTS, Private hospital, Success rate.

Introduction

Case detection rate (CDR) is an indicator of a tuberculosis program’s achievement. The 2016 Global Tuberculosis Report showed 77% and 46.5% in Southeast Asia. Indonesia reached a stagnant point in the last five years in the range of 32–33% (1), as did Depok City specifically, which was at 50–58%. In addition, yearly increases in cases of TB recurrence were observed, from 23 in 2014 to 177 in 2016 (an approximately 600% increase). The District Health Office needs to be vigilant because 12% of the MDR TB cases originated from TB relapses. WHO’s global strategy for discovering TB cases involves a non-government health service called Public-Private Mix (PPM), which has diagnosed 36% of the TB cases diagnosed outside PHC (1). PPM has been shown to increase the rate of diagnosing TB cases by up to 20% (2–4) which evolved from ‘Public-Private Mix (PPM)’. Reviono et al. (2017) mentioned that the CDR in central Java increased from 13% to 61.72% after 11 years of PPM implementation. A PPM strategy that involves private health service facilities in TB programs in Depok was activated in 2014 by conducting private health provider training in 10 hospitals and 18 private clinics. Although only four hospitals actively managed DOTS, these hospitals captured 18.7% of the smear-positive patients.
in Depok. Thus, the involvement of private parties in diagnosing TB should be encouraged. The aim of this study was to determine the cost effectiveness of implementing the DOTS (Directly Observed Treatment Shortcourse) strategy in private hospitals.

**Methods**

A comparative study was carried out for six months, between October 2017 and April 2018 along with a retrospective cohort study between Public Health Centers (PHCs), DOTS hospitals, and non-DOTS hospitals, using 36 samples per group. The calculations of societal perspectives mentioned in Indonesian Rupiah (IDR) using micro-costing. The output was the complete treatment rate (success rate) for an intermediate outcome. The inclusion criteria of this study were adult TB patients under Category 1 Anti-TB Drugs (ATD) treatment or a TB treatment plan for six months with no complications or other diseases. The exclusion criteria were patients who, at the time of observation, were found to have other diseases.

This study used primary data sourced from interviews with the respondents. Interviews were conducted three times with each patient; when they were first diagnosed with TB until declared cured, while secondary data were obtained from patient statuses and data reports of TB’s PHC program.

Patient costs consisted of direct costs and indirect costs. Direct costs were divided into the direct medical costs incurred by the patient to obtain health services (consultation fees, investigation fees such as sputum or X photo thorax examinations, and drug costs of both ATD and drug support) and non-medical direct costs, including transportation costs, meals, and other expenses. Indirect costs were the losses to a patient’s income due to their visit to the health provider.

The provider cost was calculated in 2017. Direct costs included fixed and variable costs. Fixed costs were calculated from the investment cost calculation and the DOTS clinic staff, and the room calculated the usage ratio with AIC (Annual Investment Cost), the inflation rate of 2017 by 4%, and the TCM tool grant price. Variable costs consisted of laboratory consumable grants. Indirect costs were the costs of the program, including the start-up costs (if any), honorariums, training, incentives, health promotion, coordination, and monitoring and evaluation.

**Cost Calculations**

**Table 1. Calculation of TB Treatment Costs per Health Service Facility**

<table>
<thead>
<tr>
<th>Cost Description</th>
<th>PHCs</th>
<th>Dots Hospital</th>
<th>Non-Dots Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient Costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Direct Medical Costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Consultation Fee</td>
<td>22.6 ± 3.9</td>
<td>1,375.7 ± 209.1</td>
<td>1,161.7 ± 120.3</td>
</tr>
<tr>
<td></td>
<td>(16–30)</td>
<td>(1,080–1,980)</td>
<td>(960–1,440)</td>
</tr>
<tr>
<td>b. Sputum Examination</td>
<td>34.2 ± 6.7</td>
<td>210.7 ± 152.4</td>
<td>279.8 ± 77.6</td>
</tr>
<tr>
<td></td>
<td>(10–40)</td>
<td>(0–400)</td>
<td>(165–330)</td>
</tr>
<tr>
<td>c. X Photo Thorax</td>
<td>11.3 ± 26.2</td>
<td>154.3 ± 144.6</td>
<td>388.3 ± 107.7</td>
</tr>
<tr>
<td></td>
<td>(0–70)</td>
<td>(0–360)</td>
<td>(229–458)</td>
</tr>
<tr>
<td>d. ATD</td>
<td>360 ± 0</td>
<td>360 ± 0</td>
<td>581.3 ± 526.8</td>
</tr>
<tr>
<td></td>
<td>(0–210)</td>
<td></td>
<td>(435.2–2,957.3)</td>
</tr>
<tr>
<td>e. Other Laboratory Costs</td>
<td>16.5 ± 39.9</td>
<td>75.6 ± 86.2</td>
<td>147.8 ± 87.3</td>
</tr>
<tr>
<td></td>
<td>(0–210)</td>
<td>(20–283)</td>
<td>(0–340.5)</td>
</tr>
<tr>
<td>f. Drugs Other than ATD</td>
<td>6.8 ± 2.0</td>
<td>88.9 ± 79.2</td>
<td>111.5 ± 169.4</td>
</tr>
<tr>
<td></td>
<td>(0–11.3)</td>
<td>(0–240)</td>
<td>(0–818.1)</td>
</tr>
<tr>
<td>Medical Direct Costs Subtotal</td>
<td>451.4 ± 47.3</td>
<td>2,265.2 ± 366.1</td>
<td>2,670.5 ± 708.3</td>
</tr>
<tr>
<td></td>
<td>(38.4–633.3)</td>
<td>(1,460–3,130)</td>
<td>(1,949.2–5,574.9)</td>
</tr>
</tbody>
</table>
## Cost Description | PHCs | Dots Hospital | Non-Dots Hospital
--- | --- | --- | ---
**Non-Medical Direct Costs**
a. Transportation Costs:
Registration | - | | 31.7 ± 22.2 (0–98)
Drug Taking | - | - | 34.3 ± 26.4 (0–98)
Medical Services | 59.6 ± 36.6 (0–190) | 109.7 ± 103.5 (29.2–440) | 76.7 ± 58.3 (34.4–296)
Transportation Costs Subtotal | 59.6 ± 36.6 (0–190) | 131.5 ± 97 (51.4–440) | 142.8 ± 87.3 (41.3–408)
b. Meal Costs, etc. | 47.3 ± 76.5 (0–323) | 24.3 ± 45.3 (0–195) | 71.4 ± 74.6 (0–210)
Non-Medical Direct Costs Subtotal | | | 155.8 ± 105.4 (57.7–551)
Indirect Costs | | | 214.3 ± 105.4 (84.1–568)
Total Cost of Patient | 1,238.9 ± 524.6 (484.3–2,928) | 2,946.6 ± 115.9 (1,518–5,031) | 3,434.2 ± 775.3 (2,033–7,892)

### Provider Costs

| Direct Costs: Fixed Costs |  |  | |
| Direct Costs: Variable Costs | 343.5 ± 58.8 (242.7–455) | 122.9 ± 18.7 (96.5–177) | 0 |
| Direct Costs of Provider | 409.1 ± 58.8 (308.3–520.7) | 150.2 ± 18.7 (123.8–204.2) | 1.9 ± 0 |
| Indirect Costs of Provider | 29.7 ± 0 | 6.3 ± 0 | 7.8 ± 0 |
| Total Costs of Provider | 438.8 ± 58.8 (338–550.3) | 156.5 ± 18.7 (130.1–210.5) | 9.7 ± 0 |

**SOCIETAL COSTS**

| 1,677.7 ± 529.8 (822.2–3,478.5) | 3,103.1 ± 550.4 (1,648–5,241) | 3,443.9 ± 775.3 (2,033–7,893) |

N.B: Cost in thousand rupiahs (IDR)

Direct medical costs were largely determined by the examiners. Significant differences are found in the ATD, other investigation costs, and the costs of drugs other than ATD. Most of the costs (80%) were inspection fees; thus, if the examination costs could be reduced, the medical costs would decrease. Application of the DOTS guidelines comprised only 28% of the direct costs of the patients, while the healthcare providers who had not implemented the DOTS strategy had 46% direct medical costs. This is in line with research in India and South Africa\(^7\)\(^8\) in which patient costs were higher when guidelines were not followed.

**Table 2. The Differences Between the Costs and the TB Treatment Results**

<table>
<thead>
<tr>
<th>Type of Cost</th>
<th>Levene’s Test for Equality of Variances</th>
<th>Sig. (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Direct Medical Cost</td>
<td>0.000</td>
<td>0.030</td>
</tr>
<tr>
<td>Total Non-medical Direct Cost</td>
<td>0.135</td>
<td>0.005</td>
</tr>
<tr>
<td>Indirect Cost of the Patient</td>
<td>0.006</td>
<td>0.674</td>
</tr>
<tr>
<td>Total Cost of the Patient</td>
<td>0.173</td>
<td>0.016</td>
</tr>
<tr>
<td>Direct Cost: Fixed Cost</td>
<td>0.219</td>
<td>0.031</td>
</tr>
<tr>
<td>Direct Cost: Variable Cost</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Indirect Cost of Provider</td>
<td>0.000</td>
<td>0.097</td>
</tr>
<tr>
<td>Total Cost of Provider</td>
<td>0.001</td>
<td>0.002</td>
</tr>
<tr>
<td>Societal Cost</td>
<td>0.703</td>
<td>0.001</td>
</tr>
</tbody>
</table>
The average cost for the TB patients who recovered in PHC was 42% lower than those treated at the DOTS hospital. The non-DOTS hospital had 16.5% higher costs than the hospitals that applied the DOTS program. Table 2 also shows that more than 75% direct medical costs incurred to recover. There was no significant difference in the non-medical direct costs between the PHCs and the hospitals, which were about 5–7% of the total cost. At the PHCs, 50% of the costs were attributed to indirect costs or productivity losses.

### Table 3. ACER Calculations per Healthcare Service Facility

<table>
<thead>
<tr>
<th>Description</th>
<th>PHCs</th>
<th>Dots Hospital</th>
<th>Non-Dots Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient’s Cost (IDR)</td>
<td>1,238,910</td>
<td>2,946,563</td>
<td>3,434,208</td>
</tr>
<tr>
<td>Provider’s Cost (IDR)</td>
<td>438,757</td>
<td>156,529</td>
<td>9,670</td>
</tr>
<tr>
<td>Societal Cost (IDR)</td>
<td>1,677,667</td>
<td>3,103,092</td>
<td>3,443,877</td>
</tr>
<tr>
<td>Success Rate (%)</td>
<td>86.10</td>
<td>77.78</td>
<td>63.89</td>
</tr>
<tr>
<td>ACER</td>
<td>1,677,667/86.10 = 1,948,284</td>
<td>3,103,092/77.78 = 3,989,576</td>
<td>3,443,877/63.89 = 5,390,323</td>
</tr>
</tbody>
</table>

The lowest societal cost is PHC. Meanwhile, when the interhospitals were compared, the value of the ACER DOTS hospital was 35% lower than that of the non-DOTS hospital. Thus, it can be said that for hospitals that cooperate with the government by implementing the DOTS program, it costs IDR 3,989,576 per 1% increase in the success rate. However, in PHCs, which are the responsible programs in communities, each 1% increase in the success rate only costs IDR 1,948,284.

The results of the statistical (Levene’s) test showed that the data had a 0.703 variance ($p > 0.05$); thus, the normal distributed data under t-test analysis obtained a $p$ value $<0.05$ in terms of patient perspective ($p = 0.016$), perspective provider ($p = 0.002$), and societal perspective ($p = 0.001$). This means that there were significant differences in the cost effectiveness of the TB treatment at the health centers, the hospitals that use DOTS, and the non-DOTS hospitals in Depok City from 2017–2018 from the perspective of patients, providers, and society. This is in line with the research of Mahendradhata et al. (2010), who obtained a $p$ value of 0.01 but only analyzed the perspective of the patient.

### Discussion

When DOTS is applied comprehensively, a patient gains the confidence to follow up with their treatment at certain healthcare service facilities. They are getting enough information and treatment support (9,10). The advantages of private hospitals compared to public healthcare service facilities such as PHCs are their faster responses, greater time flexibility, and more complete service (11). Almost all research has suggested that the success rate for healthcare service facilities that run DOTS is higher than healthcare service facilities without DOTS (7,8,12). This proves that the management of DOTS in private healthcare service facilities can improve the success rate of TB treatment, and this is in line with Ramaiah and Gawde’s (2015) research in India. Even the success rate of healthcare service facilities with the DOTS program in India increased from 70% to 78% in 12 months (6). The success rate of non-DOTS hospitals in the current study was 63.89%, which is lower than a study in India that had a 68% result (6); however, it is higher than the cost effectiveness study for PPM programs in Vietnam and India, which both showed a 51% result (7). This is in line with the increase of Indonesia’s success rate in 2017 by 85%, though the DOTS method has not been run optimally.

The difference in the allocation of provider fees affects the improvement of the success rate. Around 24.39% of the societal cost at the PHCs is provider fees, while at the DOTS hospital, provider fees comprised 6.2% of the societal cost, and at the non-DOTS hospital, only 0.29% of the societal cost was provider fees. Most of the provider cost is used for the addition of human resources, and apparently, the addition of this cost becomes leverage for the increase in the success rate.

The ACER calculation for the non-DOTS hospital compared to the DOTS hospital was 35% higher, while research in Yogyakarta showed three times that difference (Mahendradhata et al., 2010). The results of this calculation are similar to the study conducted by
Floyd et al. (2011) in India, whereas the differences were only 72% and 92% of the study conducted by Ramaiah and Gawde (2015). Thus, the involvement of private healthcare providers in the management of TB programs should focus on using DOTS for the patient’s healing needs.

**Conclusion**

This study was a retrospective cohort study conducted for six months along with cost-effectiveness analysis: three PHCs that use DOTS, one DOTS hospital, and one non-DOTS hospital. A PHC that had implemented a DOTS strategy was used as a comparator. The results from 36 samples per group showed that the success rate of the PHCs was 86.1%, at the DOTS hospital was 77.78%, and at the non-DOTS hospital was 63.89%. The addition of the PHCs and DOTS hospital’s provider fees increased their success rates. The cost of the societal management of TB at the PHCs was 42% of the cost in private hospitals. From the ACER calculation, it was found that the hospitals that implemented the DOTS strategy are more cost-effective, as the ACER value at the PHCs was IDR 1,948,284, at the DOTS hospital was IDR 3,989,576, and at the non-DOTS hospital was IDR 5,390,323. A bivariate analysis revealed that there were significant differences in the cost effectiveness of societal perspectives on TB treatment at PHCs, DOTS hospitals, and non-DOTS hospitals.

**Ethical Approval:** This research was approved by the Ethics Assessment Team of the Faculty of Public Health Universitas Indonesia No.550 / UN2.F10 / PPM.00.02 / 2017.

**Competing Interests:** The authors declare that they have no competing interests.

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**References**


Determinants of Nurse Quality Service in Jakarta Private Hospital

Bernadetha Nadeak¹, Sasmoko²,*

¹Lecturer, Educational Administration Department, Faculty of Post Graduate Universitas Kristen Indonesia, Jakarta, Indonesia, ²Professor, Primary Teacher Education Department, Faculty of Humanities, ²Researcher, Research Interest Group in Educational Technology, Bina Nusantara University, Jakarta, Indonesia 11480

Abstract

The quality of hospital services can be seen from the quality of services provided by nurses. This study aims to look at the factors that determine the realization of nurse service quality. The study uses the Neuroresearch method, a mixed method or alternative method used to obtain a truth in the field of social science. Data collection techniques used questionnaire instruments with a Likert Scale ranging from 1-5. Instrument calibration using Orthogonal Iteration with a trial sample of 30 nurses, r-criteria of 0.361. The study population was all nurses in private hospitals in Jakarta with a sampling technique in the form of cluster random sampling, which was chosen by all nurses from UKI, Jakarta, Tebet and Pluit hospitals. The study sample was 300 nurses. The results of the study were nurses who had a very good response to the patients who most determined the Quality of Nurse Service in a private hospital in Jakarta.

Keywords: Nursing, service, quality, neuroresearch.

Introduction

The quality of hospital services to patients is very important because of the nature of the hospital as the service itself. Most governments in developing countries are starting to focus on managing the improvement of the quality of services in health institutions by making infrastructure investments, one of which is given in the human resources section¹. Service itself cannot be separated from everyone in it, in this case a nurse. greatly determined by the quality of services provided by nurses. Because nurses are one of the front liner workers who have a greater chance to interact with patients than other health workers who work in hospitals². Research related to the quality of nurse care has been done because it triggered a question whether there were nurse staff able to provide effective and efficient care and how to measure and monitor this?³.

Before looking further at how nurses are able to provide optimal service quality, a study in Australia emphasizes the importance of understanding nurses’ perceptions of the quality of patient care⁴. On the other hand it is also necessary to have an appropriate understanding of the patient’s perspective about the quality of the nurse’s service as desired⁵.

One of the studies ever conducted in Indonesia to assess the quality of care for nurses is about the Length of Stay (LOS) from patients in the Emergency Department. This study resulted in a time study in identifying and measuring the factors that extend ED LOS. For hospitals in Indonesia there are still 26.9% of cases where nurses need more than the average LOS required.

With the phenomenon and the importance of the role of nurses in the quality of service in hospitals, this study wants to look at the factors that determine the nurse quality service of private hospitals in Jakarta.

Literature Review: Quality is a term that is often considered subjective because it has an intangible nature. The characteristics possessed by this term are difficult to define. So the definition given varies depending on the perspective and context of the term itself. Quality of service in the health sector is even more difficult to
define because it has characteristics that are intangibility, heterogeneity and simultaneity. Therefore the quality of services in the health sector depends on service processes and service providers 6–8.

In this study the dimensions that become a benchmark for the realization of nurse service quality are Tangibility, Reliability, Responsiveness, Assurance, and Empathy 9.

Tangibility is a service that has a physical form. Examples of tangibility are physical facilities, tools or equipment, the appearance of employees, and other customers.

Reliability includes consistency of performance and firmness in work. This factor is one form of appreciation for the customers owned.

Responsiveness is defined as the willingness or readiness of nurses to provide services. One example is timeliness.

Assurance is defined as a guarantee of the right knowledge, politeness and their ability to convey information with confidence.

Empathy is more interpreted by giving care to nurses to patients 9,10.

**Research Methods**

The research method with Neuroresearch as one type of mixed method. Neuroresearch is an alternative method used to obtain a truth in the field of social science11. The procedure in the Neuroresearch method is carried out through three processes: exploratory research (constructing theoretical constructs), explanation research (validity, trend analysis, and hypothesis testing) to find the most dominant indicators that determine the formation of Nursing Quality Services (NursQualServ_Y)12. Data collection techniques with Likert Scale questionnaire range from 1-5. Instrument calibration using Orthogonal Iteration with a trial sample of 30 nurses, r-criteria of 0.361. As a result, all items are valid and reliable at 0.956. The study population was all nurses of private hospitals in Jakarta. The sampling technique with cluster random sampling was selected by all nurses from UKI, Jakarta, Tebet and Pluit hospitals. The study sample was 300 nurses.

**Results and Discussion**

Test requirements analysis carried out by normality test and linearity test. Data normality test for Nursing Quality Services (NursQualServ_Y) variable using the proportion estimation Blom formula approach is Q-Q Plot, because the study sample > 200 nurses in Jakarta. As a result, the distribution of data shows normal because it does not have an outlier. And detrended data also do not form sine and cosine curves.

The linearity test is calculated by deviation from linearity, the line relationship between each exogenous variable, namely Tangibility (Tangibility_X1), Reliability (Reliability_X2), Responsiveness (Respons_X3), Assurance (Assurance_X4), and Empathy (Empathy_X5) with endogenous variables namely Nursing Quality Services (NursQualServ_Y). As a result, all relationships must be linear.

**The results of the first hypothesis:** The researcher determined 5 conclusion categories of conditions for the quality of care for private hospital nurses in Jakarta, namely: (1) very poor quality, (2) not qualified, (3) poor quality, (4) quality, and (5) very high quality. Data analysis was performed with confidence intervals at a significance level of α <0.05. The lower and upper bound result is 117.7511 and 119.8222.

Based on the results of the analysis it can be concluded that nurses in private hospitals in Jakarta tend to be of less quality service at α <0.05.

**The results of the second hypothesis:** The results of the second study analyzed the influence of each exogenous variable together, exogenous variables, namely Tangibility (Tangibility_X1), Reliability (Reliability_X2), Responsiveness (Respons_X3), Assurance (Assurance_X4), and Empathy (Empathy_X5) on endogenous variables namely Nursing Quality Services (NursQualServ_Y). The analysis was carried out with a binary segmentation approach, also called Classification and Regression Trees. In this analysis, researchers determined Depth Prunning of 2, Parent Prunning of 2, and Child Prunning by 1, with a significance level of α < 0.05.

The results of the analysis prove that the nurses who had a very good response to the patients (Respons_X3) predominantly determined the Quality of Nurse Service in a private hospital in Jakarta (NursQualServ_Y). This very positive and very good response (Respons_
X3) increases 62,260 times the quality of Nurse Service Quality in a private hospital in Jakarta (NursQualServ_Y). While this excellent response from nurses in Jakarta will be realized, if done consistently to the patient (Reliability_X2), because it will be able to increase 10,987 nurses’ responses to patients who are working in the hospital provided (Respons_X3).

**Conclusions**

This study provides several results. The first results obtained were that there was a tendency for the lack of nurses’ services in private hospitals in Jakarta. This means that nurses need to improve their physical appearance or skills in the use of facilities and equipment used to serve patients. Nurses also need to be more consistent in their work so that when serving patients it can be seen the nurse’s willingness or readiness to provide services. Nurses need to increase the right knowledge and be more polite in providing information. This certainly has an impact on the empathy of nurses who are not satisfying patients.

This study proves that nurses who have a very good response to the patients most determine the Quality of Nurse Service in a private hospital in Jakarta. Where a very positive and very good response is able to increase 62 times the condition of the Quality of Nurse Service in a private hospital in Jakarta that exists today. While the excellent response from nurses in Jakarta will be realized, if done consistently to patients, because it will be able to increase 10 times the nurse’s response to patients who are being treated at the private hospital.

It is also proven that service quality, especially nurses, can increase patient loyalty. Patient loyalty can be seen from how they recommend hospitals to others. Loyalty can also be seen from the patient’s return to the hospital as the first choice, and referring the hospital to the family.

**Conflict of interest:** NIL

**Source of Funding:** Self source

**Ethical clearance:** Done research committee

**References**

Analysis of Clinical Pathway Implementation on Pneumonia Case in PMI Bogor Hospital

Musliyah Syahrawani Elsa1, Atik Nurwahyuni1

1Faculty of Public Health, University of Indonesia, Depok, Jawa Barat, Jakarta

Abstract

Background: Pneumonia is the largest infectious disease that contributes to the world child mortality. Around 16% from the death of under five-year-old child is caused by pneumonia. Since the era of universal coverage, the hospital is required to maintain quality control and costs in the form of clinical pathway. Furthermore, Clinical Pathway is one of the requirements that must be met in the hospital’s accreditation standards. The aims of this study were to evaluate the implementation of clinical pathway for pneumonia patients during the inpatient charge that consisted of length of stay, doctor visit, laboratory tests, medication, clinical practice and variation.

Method: Retrospective study was conducted on 73 pneumonia patients. The data and information were obtained from medical records and hospital information systems. In addition, the source of data was from the patient’s recapitulation which obtained from medical record by the medical report unit in hospital that consists of patient’s characteristic, length of stay, consultation, the laboratory test and radiology test.

Result: At first there were 73 pneumonia patients in six months, but there were only 5 patients that met the inclusive criteria. Sample’s characteristics consisted of 3 males (60%) and 2 female (40%) with the age of under five years old and the elderly. The length of stay was shorter with an average of 4.6 days (maximum 11 days and a minimum 1 days), compared with the length of stay of the clinical pathway (around six until seven days). The average of doctor’s visit regarding the clinical practice was about 1.4 times to the patient.

Conclusion: From six pneumonia clinical pathway indicators, there were 2 indicators that produced variances from the hospital practice which consist of laboratory tests and medication. These variances would contribute to the hospital’s expenses.

Keywords: Clinical Pathway, Pneumonia, Variance Analysis.

Introduction

About 16% from all the deaths of children under 5 years old were caused by pneumonia in 20151. Indonesia became one of the 15 countries that were estimated to have the highest number of new pneumonia2. The mortality rate in developed countries is low (<1 per 1000 per year). In developing countries, respiratory tract infections are not only more prevalent but more severe.

Coressponding Author**
Musliyah Syahrawani Elsa
Faculty of Public Health, University of Indonesia, Depok, Jawa Barat, Jakarta
e-mail Address: musliyah.syahrawani@ui.ac.id

Worldwide, lower respiratory tract infections accounted for nearly 800,000 deaths among children ≤19 years of age in 2015 (31.1 per 100,000 population), second only to neonatal/preterm birth complications3. Pneumonia is not only found in children under five years old but also in people aged 65 and over and who have other health problems. In United States, there are 915,900 episodes of pneumonia estimated in adults >65 years of age each year4. Since 2014, Indonesia has enacted Law No. 24 of 2011 concerning the Social Security Administration Agency (BPJS) which demands hospitals to provide quality control and cost control services5. To support this, one of the efforts that can be done by the hospital is to make a clinical pathway. Rotter’s study showed that clinical pathways have contributed to a decrease in the length of stay, a reduced risk of re-admission,
complications, and a reduction in hospital costs. In addition, the study of the Clinical Pathway Implication Effect on the total cost of hospitals in Thyroidectomy and Parathyroidectomy patients showed a decrease in Length of Stay (LOS) in patients that were given services according to the clinical pathways, as well as in average for the costs per case. Furthermore, Clinical Pathway is an important part in realizing Good Clinical Governance in hospitals and is one of the conditions that must be met in the RS Accreditation Standards 2012 KARS version.

The aim of this study is to evaluate the implementation of pneumonia clinical pathway in PMI Bogor Hospital by knowing the description of variations in the output (in compliance with the implementation of clinical pathway).

**Method**

This study used a quantitative method with retrospective analysis from medical records and hospital information systems from October 2016 to March 2017. There were 73 patients diagnosed with pneumonia and then re-selected based on the inclusion criteria of pneumonia with no comorbidities and inpatient patients. The number of cases that met the inclusion criteria was 5 patients. The Clinical Pathway developed at PMI Bogor Hospital was Pneumonia with no comorbidities with ICD-10 code, J18.9.

The source of data was from the patient’s recapitulation which obtained from medical record by the medical report unit in hospital consisted of patient’s characteristic (age, sex, payment method, and inpatient room type), length of stay (duration in days between admission to discharge date), consultation (frequency of doctor specialist’s consultation), the laboratory test and radiology test. Moreover, there was medication data that were collected from the billing unit in the form of drugs name and their frequencies of usage. That medication data was classified into several classes of drugs using ISO (Identifikasi Standar Obat) such as Antibiotic, Analgesics, Antiemetic, Anti-inflammatory, Bronchodilator, Mucolytic, Antihistamines, Anti-hypertension, Antiseptic and Digestive system. All the variance and clinical data were analyzed using Microsoft EXCEL software while statistical analysis was carried out using Clinical Pathway Evaluation Tools version beta 2.6 software. Data were analyzed using descriptive statistics and presented as average utilization then compared with the clinical pathway standard.

**Result**

At first there were 73 pneumonia patients in six months but there were only 5 patients that met the inclusive criteria. Sample’s characteristics consisted of 3 males (60%) and 2 female (40%) with the age of under five years old and the elderly. Three of them had completed the pathway until getting better while two others were dead during hospitalization. All of the samples used the National Health Assurance as the guarantee for hospital care. The patients were cared in class I (20%), class II (20%), class III (20%) and ICU (40%).

**Table 1. Room Care Distribution**

<table>
<thead>
<tr>
<th>Items</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS (Days)</td>
<td></td>
</tr>
<tr>
<td>ALOS</td>
<td>4.6</td>
</tr>
<tr>
<td>Minimum LOS</td>
<td>1</td>
</tr>
<tr>
<td>Maximum LOS</td>
<td>11</td>
</tr>
<tr>
<td>Age (Years Old)</td>
<td></td>
</tr>
<tr>
<td>Average Age</td>
<td>46</td>
</tr>
<tr>
<td>Minimum Age</td>
<td>1</td>
</tr>
<tr>
<td>Maximum Age</td>
<td>80</td>
</tr>
<tr>
<td>Sex (%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>60</td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
</tr>
<tr>
<td>Payment Methods (%)</td>
<td></td>
</tr>
<tr>
<td>JKN</td>
<td>100</td>
</tr>
<tr>
<td>Discharge Status (N)</td>
<td></td>
</tr>
<tr>
<td>Recovery</td>
<td>3</td>
</tr>
<tr>
<td>Dead after 24 hours</td>
<td>1</td>
</tr>
<tr>
<td>Dead before 24 hours</td>
<td>1</td>
</tr>
<tr>
<td>Room Care (N)</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>1</td>
</tr>
<tr>
<td>II</td>
<td>1</td>
</tr>
<tr>
<td>III</td>
<td>1</td>
</tr>
<tr>
<td>ICU</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Data Analysis
Table 2. Utilization of CP compliance

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Clinical Pathway</th>
<th>Utilization (average)</th>
<th>Variances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average length of stay</td>
<td>6-7</td>
<td>4.6 days</td>
<td></td>
</tr>
<tr>
<td>Doctor’s visits</td>
<td>1</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Medical Support and monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Monitor Vital Sign</td>
<td>1</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>• Nebulizer</td>
<td>-</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Lab test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Complete Blood Count</td>
<td>1</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>• LED</td>
<td>-</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>• Oxygen Saturation (SpO2)</td>
<td>-</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>• Blood Gas Test</td>
<td>-</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>• ECG</td>
<td>1</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>• Sputum Gram Stain</td>
<td>1</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>• Antibiotic Resistance</td>
<td>-</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>• Acid Resistant Bacteria</td>
<td>-</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>• Creatinine Clearance</td>
<td></td>
<td></td>
<td>1.2</td>
</tr>
<tr>
<td>• Urea Clearance</td>
<td></td>
<td></td>
<td>1.2</td>
</tr>
<tr>
<td>• Albumin Test</td>
<td></td>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td>• Na, K, Cl, Test</td>
<td></td>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td>• SGOT and SGPT test</td>
<td></td>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td>• Anti-HCV</td>
<td></td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>• HBsAg (Hepatitis B Surface Antigen)</td>
<td></td>
<td></td>
<td>0.2</td>
</tr>
</tbody>
</table>

Radiology test
• Ro Thorax                      | 1                | 0.6                   |           |

Medicine:
• Antibiotic                     | 1                | 3.0                   |           |
• Analgesics                      | -                | 6.4                   |           |
• Antiemetic                      | -                | 1.0                   |           |
• Anti-inflammatory               | -                | 1.0                   |           |
• Bronchodilator                  | -                | 0.6                   |           |
• Mucolytic                       | -                | 0.6                   |           |
• Antihistamines                  | -                | 0.4                   |           |
• Anti-hypertension               |                  |                       | 7.6       |
• Antiseptic                      |                  |                       | 0.4       |
• Digestive system                |                  |                       | 1.4       |

Source: Data Analysis

Table 3. The Price of Medicine Variance

<table>
<thead>
<tr>
<th>Name of Medicine</th>
<th>Price (IDR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-Farsix Injection</td>
<td>4776/ampoule</td>
</tr>
<tr>
<td>Ranitidin Injection (H)</td>
<td>4505/ampoule</td>
</tr>
<tr>
<td>Amlodipin TB 5MG</td>
<td>712/tablet</td>
</tr>
<tr>
<td>Saccharin Tablet</td>
<td>250/tablet</td>
</tr>
<tr>
<td>Furosemide Tablet 40MG</td>
<td>237/tablet</td>
</tr>
<tr>
<td>M-Diovan 80 TAB</td>
<td>2341/tablet</td>
</tr>
<tr>
<td>M-Instilla Gel</td>
<td>49858/10 ml</td>
</tr>
<tr>
<td>Diovan TB 80 MG</td>
<td>15540/tablet</td>
</tr>
</tbody>
</table>

Source: Data Analysis

The data shows that the hospital length of stay was shorter with an average of 4.6 days, compared with the length of stay of the clinical pathway (around six until seven days). However, there was one patient who deserved to be taken care of for more than six or seven days. The average of doctor’s visit regarding the clinical practice was about 3 times by the specialist doctor and 0.8 by the doctor to the patient which meant that it had fulfilled the clinical pathway standard. Based on the clinical practice, there were 12 types of laboratory test that had been given to the patient which consist of 5 tests written in clinical pathway document and 7 variance tests.
In addition, medical support and monitoring the patient by the physician and nurse such as monitoring vital sign and nebulizer were utilized in about 0.2 and 0.4 respectively. It means that monitoring was not applied to all patients each day during treatment period. As medical support and monitoring, the radiology usage was only 0.6 which meant that this test was not applied to all five patients. At the end, there was one more variance that was applied to the practice, which was the medication. According to pneumonia clinical pathway, medication consisted of antibiotics, analgesic, antiemetic, anti-inflammatory, bronchodilator, mucolytic and antihistamines. There were three kind of variances and the biggest medication variances was anti-hypertension (utilization = 7.6). The other medication variances were antiseptic and digestive system of about 0.4 and 1.4 times respectively. Furthermore, it was considered that the medicine utilization would also impact the price. Table 3 showed that the price would be decreased around ten thousand rupiahs for every type of medication if the variance can be eliminated.

**Discussion**

Pneumonia clinical pathway in this hospital was designed without considering the payment types such as private, private insurance or universal coverage, and inpatient room classification. Among five patients, there was only one kind of payment, which was universal coverage. That was usual because it had been enforced since 2014 and BPJS users kept increasing over the years. There were six different types of inpatient room, which were class 1, 2, 3, VIP, VVIP and ICU at PMI Bogor Hospital. The distribution of patients according to room care is shown in table 1.

Pneumonia is generally diagnosed based on a history of typical symptoms, abnormal breath sounds that can be heard with a stethoscope, a chest radiograph showing characteristic shadows, and, sometimes, laboratory tests. The Clinical Pathway document manages that characteristic shadows, and, sometimes, laboratory be heard with a stethoscope, a chest radiograph showing of typical symptoms, abnormal breath sounds that can be given a clinical assessment, while the radiology (Ro Thorax) and the laboratory test (complete blood count, Oxygen Saturation (SpO2), ECG, and Sputum Gram Stain) should be tested in the first day of hospitalization. The Ro Thorax had been implemented to most of the pneumonia patients but only a fifth of them that met the clinical pathway standard, which was to be tested in the first day.

In addition, after the patient is diagnosed with pneumonia, the doctor may recommend some laboratory test to ensure about the immune system, bacterial infection, complications and others. The clinical pathways listed seven types of laboratory test which are Blood Test, Pulse Oximetry, Erythrocyte Sedimentation Rate, Arterial Blood Gas, Electrocardiogram, Sputum Test, and Pleural Fluid Culture Pneumonia. Along all the samples, unfortunately, from 8 kind of laboratory tests in pneumonia clinical pathway document, only five that had been tested by the hospital and 3 others were not implemented, especially the ECG which is really important as a part of the clinical assessment and should be tested in the first day of inpatient period. For further details, the CP said that the compulsory laboratory tests of pneumonia are Blood Test, Electrocardiogram, and Sputum Test which should be tested in the first day of inpatient period. In fact, the data described that about eighty per cent of data had met the CP standard but half of them overused the blood test which was tested around two or five times during the period. There was a finding that concluded that the useful diagnosis for pneumonia was by using the erythrocyte sedimentation rate (ESR), leucocyte count, and C-reactive protein (CRP) \(^{10}\)

Treatment of pneumonia depends on its likely cause and how ill the person is. The usual approach is to give effective antibiotics against the most likely bacteria causing the infection. In theory, based on the CP document, there are three kinds of medicine that should be given to the patient which are Empiric Antibiotic, antibiotic related to the bacteria, and symptomatic. However, the data explain that around 22% of the drug types (including three groups of medicine, such as Anti-hypertension, Antiseptic and Digestive system) which were given are not the medicine for pneumonia. In other words, it is not classified in the Pneumonia Clinical Pathway or the variance of care in this hospital. Moreover, about 78 per cent of drugs were known as antibiotic and seven groups were symptomatic.

**Conclusion**

From six pneumonia clinical pathway indicators, there are 2 indicators that produce variances from the hospital practice, which consist of laboratory test and medication. Laboratory and radiology tests are needed for ensuring the diagnostic and supporting medical service. However, there were several unimportant laboratory tests that were given to the pneumonia patients. There was an overuse of complete blood count,
Creatinine, and urea tests in patients with pneumonia. Moreover, the creatinine and urea are not considered as the part of clinical pathway assessment and of course it can impact the hospital’s expenses. In addition, three medication variances, which are anti-hypertension, antiseptic and digestive system, are considered as unnecessary care and would contribute to the hospital’s financial expenses. In fact, the hospital should manage to maintain the expenditure but still keep their quality of care, especially because the INA-CBGs pricing policy for private hospital has been implemented. To prevent the unbalanced cost between the practice and INA-CBGs pricing policy, the evaluation of pneumonia clinical pathway implementation is essential to maintain the quality and cost of hospital services.

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Conflict of Interest: The authors declare that there is no conflict of interests.

Source of Funding: This study is funded by the PITTA Grand (International Indexed Publication for University of Indonesia’s Student Final Project).

Ethical Clearance: This study is a using secondary data so it does not require for ethical clearance.

Reference

Effects of Servant Leadership and Training Programs on Servant motivation of Hospital Medical Personnel

Bernadetha Nadeak1, Sasmoko2,*

1Lecturer, Educational Administration Department, Faculty of Post Graduate Universitas Kristen Indonesia, Jakarta, Indonesia, 2Professor, Primary Teacher Education Department, Faculty of Humanities, 2Researcher, Research Interest Group in Educational Technology, Bina Nusantara University, Jakarta, Indonesia

Abstract
Servant motivation is a basic thing that must be owned by medical personnel as a profession that prioritizes service. This research wants to see how servant motivation of medical personnel is affected by servant training and leadership style. The study used a correlational survey method with neuroresearch. The results of the study indicate that the role of leaders who have the character of service will increase the effectiveness of training which will ultimately have an impact on servant motivation of medical personnel.

Keywords: Hospital medical personnel, servant motivation, training, servant leadership.

Introduction
Motivation is an important aspect for health care workers who work in hospitals. Motivation becomes a factor that is relevant to the quality of work so it needs to be interpreted fundamentally because there is an increase in demand and challenges in the field of health care 1,2. Various studies have been conducted to carry out an analysis of motivation among medical personnel. One study found that intrinsic work motivation of medical personnel in several public hospitals in the Netherlands was more determined by the elements of work that made the work they did challenging and valuable so that they could improve skills, autonomy, social contacts and opportunities for learning 3,17.

An experiment tried to compare the motivation and impact of training. And to obtain the optimal effect, high interpersonal effectiveness is a determining factor for the success of employees as individuals and as part of the team 4. Training as a learning transfer process has a significant relationship to motivation, where motivation will increase with the implementation of training that is appropriate to the needs 5,6.

For institutions engaged in health services, increasing the motivation of medical personnel and providing appropriate training will be more optimal when there is support from leaders, especially leaders who have a spirit of service. Servant leadership has a picture of a leader who combines their motivation to lead with the need to serve so that a serving leadership is realized.

Therefore this study aims to see the influence of servant leadership and implementation of training on servant motivation of hospital medical personnel in Jakarta.

Literature Review: Motivation theory shows the degree to which one hopes to achieve success so motivation arises as a need to achieve success and avoid failure 7-9. In terms of health services, the success in question is the success of medical personnel in providing quality services to their patients. The key to providing motivation and increasing motivation, including through efforts and the right way in accordance with the needs of medical personnel for example with training 10.

Training as a form of intervention is most often used to develop human resources including medical personnel in a hospital. The effectiveness of training is greatly influenced by trainees and the role of leaders. Trainees

Corresponding Author**
Sasmoko
Professor Sasmoko, Primary Teacher Education Department, Faculty of Humanities, Bina Nusantara University, Jakarta, Indonesia
e-mail: sasmoko@binus.edu
and leaders will help the knowledge transfer process and the ultimate goal of training can be achieved.

Training must begin with an introduction to training needs so that they can be adapted to work requirements and performance appraisal. This can run optimally when the training is also part of the leader's responsibility. Character leaders that are appropriate for the field of medical services are leaders who have a soul of service or commonly called servant leadership.

Servant leadership has several basic characters. The first is the ability to listen. These leaders are valued because they have good communication skills so they are the basis of their decision-making. The second character is empathy. Servant leaders will strive to understand and develop empathy with others. The third character is healing. These leaders have the power to heal themselves and relationships with others who experience emotional wounds. The fourth character is awareness. Awareness of him is an important part of these leaders. This ultimately appears in their awareness in helping others to understand various problems. Another character is that this leader also has a high spirit of persuasion, is able to conceptualize well, foresight, stewardship, commit to the growth of others and has the ability to build community.

Research Methods: The research method with a correlational survey is then equipped with Neuroresearch as one type of mixed method. Data collection techniques for 3 variables used a Likert Scale questionnaire ranging from 1-5. The study population was hospital medical personnel in Jakarta. Sampling technique with simple random sampling.

Results and Discussion: Test requirements analysis carried out by normality test and linearity test. Servant Motivation variable (ServMot_Y) data normality test using the proportion estimation Blom formula approach is Q-Q Plot, because the study sample is > 200 medical personnel. As a result, the distribution of data shows normal because it doesn't have an outlier. And detrended data also do not form sine and cosine curves.

The linearity test is calculated by deviation from linearity of the line relationship between each independent variable, namely servant leadership (X1) and training (X2) to Servant motivation (Y).

Based on results, it can be concluded that the relationship of the lines of each independent variable with the dependent variable are all linear.

The results of the first hypothesis: The researcher determined three categories of conclusions: Servant motivation for medical personnel (Y): (1) very low motivation, (2) low motivation, and (3) high motivation. Data analysis was performed with confidence intervals at a significance level of $\alpha < 0.05$. Lower and upper bound results are 56.5716 and 59.7284.

Based on the results of the analysis it can be concluded that medical personnel tend to have significantly lower motivation servants at $\alpha < 0.05$.

Results of the second hypothesis: The researcher set 3 categories of conclusions on the condition of medical personnel’s assessment of the leadership leadership of the hospital (X1), namely: (1) leadership in the hospital was not as expected, (2) leadership in the hospital was not as expected, and (3) leadership in the hospital it was so strong that it supported the advancement of medical personnel. Data analysis was performed with confidence intervals at a significance level of $\alpha < 0.05$. Lower and upper bound results are 58.1031 and 61.2469.

Based on the results of the analysis it can be concluded that hospital medical staff tend to assess the leadership of the hospital leadership as not as expected significantly at $\alpha < 0.05$.

The results of the third hypothesis: The researcher determined 3 conclusions categories of conditions for the assessment of medical personnel on hospital training (X2), namely: (1) training in the hospital was not as expected, (2) training in the hospital was not as expected, and (3) training in hospitals it is very relevant to support the careers of medical personnel. Data analysis was performed with confidence intervals at a significance level of $\alpha < 0.05$. Lower and upper bound results are 59.2215 and 62.2035.

Based on the results of the analysis, it can be concluded that hospital medical personnel tend to assess the training held by hospitals as not as expected significantly at $\alpha < 0.05$.

The results of the fourth hypothesis: The results of the fourth study are by analyzing the influence together from each independent variable, namely servant leadership (X1) and training (X2) on Servant motivation (Y). The analysis was carried out with a binary segmentation approach, also called Classification and Regression Trees. In this analysis, researchers determined Depth Prunning of 2, Parent Prunning of 2,
and Child Prunning by 1, with a significance level of $\alpha < 0.05$.

The results of the analysis prove that the assessment of medical personnel on training held by hospitals is the most dominant in determining the formation of Servant motivation ($Y$) for medical personnel. A very positive and correct response to hospital training ($X_2$) was able to increase 18,729 times the condition of Servant motivation of hospital medical personnel ($Y$). Whereas a very good response to the training held by the hospital ($X_2$) is very much determined by its assessment of the style of the hospital leadership ($X_1$), because it will be able to increase 12,633 times the response of medical personnel to hospital-organized training ($X_2$).

**Results of the fifth hypothesis:** The results of the fifth study are by analyzing the effect together of the indicators forming the servant leadership variable ($X_1$), namely ($L_1$ up to $L_{15}$) and the forming of Training variables ($X_2$) namely ($T_1$ up to $T_{15}$) on Servant motivation ($Y$). The analysis was carried out with a binary segmentation approach, also called Classification and Regression Trees. In this analysis, researchers determined Depth Prunning of 2, Parent Prunning of 2, and Child Prunning by 1, with a significance level of $\alpha < 0.05$.

The results of the analysis prove that the positive assessment of medical personnel on the opportunity for self-development by the hospital ($T_{13}$) is the most dominant in determining the formation of Servant motivation ($Y$) for the medical personnel. A very positive and correct response to the opportunity for self-development in the hospital ($T_{13}$) was able to increase 22,741 times the condition of Servant motivation for hospital medical personnel ($Y$). While a very positive and correct response to the opportunity for self-development in the hospital ($T_{13}$) is very much determined by the medical staff’s self-assessment of the relationship with the hospital leadership ($T_{15}$), because it will be able to increase 5,033 positive responses to the opportunity to develop themselves medical at the hospital ($T_{13}$).

**Conclusions**

The results of the study show that servant motivation is not something that is easy to be possessed even by medical personnel. This is influenced by their perceptions of leaders and the implementation of programs that do not suit their needs.

Hospital medical personnel who tend to judge the leadership of the hospital leadership are not as expected, being less motivated because they lack the right support for their personal development.

Therefore it is important for hospital management to manage human resources by understanding the motivations and various factors that influence them in depth so that leaders can apply the service values they have through the programs provided.

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**References**


The Role of Environmental Leadership and Personality on VBN Model

I Made Putrawan¹, Lisa Dwi Ningtyas²

¹Professor at Department of Biological Education, Faculty of Math & Sciences, ²A Master Student in Educational Evaluation and Research, Postgraduate Studies, State University of Jakarta

Abstract

The Value-Belief-Norm (VBN) model found and developed, since 1994, by Stern & Dietz. The objective of this research was to find out whether Instructional Environmental Leadership (IEL) and Environmental Personality (big/five EP) could positively contribute and have the role in affecting Value-Belief-Norm (VBN) model. A causal survey used by selecting randomly 209 senior high schools. There were six valid and reliable instruments developed for measuring IEL, Values Orientation (VO), NEP, EM, and PEB. Data analyzed by path analysis through multiple regression. Research results revealed that IEL only directly affected students’ PEB, but IEL did not have any role in the VBN model. The model itself was not complete since personal norm/moral (EM) did not affect significantly on students’ PEB, compared to VO which directly affect NEP then NEP affects EM, so EM was not good mediated variable. It could be concluded that personality (EP) was the best factor in influencing VBN model indicated by its direct and significant effect on VO, NEP, and PEB, except on EM. If the new model could be built, therefore variables such as environmental personality, values orientation, especially altruistic orientation, the New Environmental Paradigm should be taken into consideration by building new model called PVBN (Personality-VBN). However, the role of leadership could not be neglected since the VBN model was aimed at improving pro-environmental behaviour (PEB) as one of the efforts in saving our planet.

Keywords: Value-Belief-Norm (VBN), Pro-environmental Behavior, Environmental Personality, Environmental Moral, Path Analysis.

Introduction

There are plenty of studies related to environmental issues which focus on environmental behavior. Why behavior? It was argued that whatever the individual level of education, social and economic status, their behavior toward the ecosystem was assumed to be not friendly. Most of the studies associated these phenomena as brought about individual belief, perception toward the environment, their attitudes, their personality intention to act, values, norm, moral, and finally human behavior. It was called a variety of terms such as pro-ecological behavior, responsible environment behavior, environmental protection behavior, citizenship behavior, or only behavior intention (Stern, et.al., 1999, Hines, 1987, Hungerford, 1990, Valentin, 2013, Chang, 2015), especially for Markle (2013) has validated pro-environmental behavior (PEB) found its reliability range 0.62 - 0.74.

Nevertheless, all environmental research conducted in order to look for whether it was right that environmental problems currently brought about by human behavior. Since Stockholm conference (1972) and followed by sustainable development concept (1987/1988) and several meetings to save our planet held around the world, but carbon emission, deforestation, ozone depletion, greenhouse effect, etc. could not be slowdown, indicated by climate change (read Gibson, 2019) That was why, most of the environmental research directed to study about human behavior, one of them called Value-Belief-Norm (VBN).

Needless to say, the problem is, since VBN model has a strong interrelationship among variables and
sociologically/psychologically its subject would be a human being, do leadership, in this case, environmental leadership and personality have an important role at the model?

Garling and Jacobson (2003) have tested the VBN model and found that social altruistic was more than egoistic in term of as a causal effect on pro-environmental behavior. Schultz ((2001) found that there was strong distinction between altruistic, egoistic and biospheric environmental concerns based on theory of environmental attitude derived from Stern, et.al. (1999) Another research conducted by Snelgar (2006) which used SEM found that all closely lead to egoistic such as human or anthropocentrism concern than biospheric concern (as general altruistic).

This VBN model (see fig. 1) has been successfully explained recycling behavior, community contribution in gardening activities, evaluated toward the pharmaceutical company in implementing SD, evaluated also on people land management, etc. Steg (in Stern, 2000) has tested the VBN model which found that all variables involved significantly as a causal chain indicated by its relationship among variables. Currently, this VBN model has been so far studying its interrelatedness among (altruistic, biospheric, dan egoistic), moral (personal norms), (NEP) as behavioral predictors. VBN has been widely studied and validated and its postulate has also been tested which stated that a causal chain which involving all variables relationship was highly significant (p < .001, Stern, et.al.,1999, Stern, 2000).

Research conducted by De Groot & Steg (2007) found out that there was a relationship between value orientation with behavior specific value in those five countries and these values were useful in studying environmental relevant behavior. Their research also showed that all three values (biospheric, egoistic, altruistic) instruments were valid and useful in investigating the relationship between values, belief, and intention related to environmental significant behavior (De Groot & Steg, 2008).

Yu & Yu (2017) proposed big-five personality put as a moderator in his model, actually a modified VBN model, between values sustainability, environmental concerns, the social norm with environmental attitudes/NEP. According to Ogunbode (2013), personality factor should be considered when the NEP scale could be developed. Pro-environmental behavior would be improved, factors such as environmental awareness and pro-ecological view or NEP should be paid attention by program developers (Pavalache & Cazan, 2018). Gifford dan Nilsson (2014) found that environmental behavior affected by around 18 personal and social factors and one of them is personality. Moreover, Kvasova (2015) explained that big-five personality factors such as Agreeableness, Conscientiousness, Extraversion, and Neuroticism, positively correlated with tourism pro-environmental behavior. In predicting environmental concern, agreeableness and openness, from big-five personality have strong contribution and weak relationship found from conscientiousness and neuroticism (Hirsh, 2010).

In sum, meta-analysis results conducted by Bamberg & Moser (2007), showed that Hines et.al. (1986/87) model could be extended by including all other psychosocial such as attitude, behavioral control personal moral.
norm, social norm, and awareness, could be a significant predictor of pro-environmental behavior. Instead, Gifford & Nilsson (2014)\(^8\) found that a combination of personal and social factors undoubtedly as a determinant of environmental outcomes, it could be environmental behavior.

**Research Methodology:** The purpose of this research was to find out whether environmental leadership and personality could be built into VBN model developed by Stern, et.al. (1999)\(^9\) as antecedent factors directly on values orientation and other chain causal variables. A causal survey used in this research by selecting randomly 209 senior high school students. There were six valid and reliable instruments developed to measure Instructional Environmental Leadership (IEL= X1), Environmental Personality (EP=X2), Values Orientation (VO=X3) which consisted of Biospheric (B), Egoistic = E, and Altruistic = A, the New Environmental Paradigm (NEP= X4), Environmental Norm/Moral (EM=X5), and Pro-environmental Behavior (PEB= X6). Its reliability respectively as follows, for IEL was 0.838 (9 items), EP was .715 (19 items, 2 was not valid), VO was 0.823 (24 items, B was 0.694; E was 0.531, and A was 0.606), NEP was 0.810 (21 items), EM was not reliable, and PEB was 0.587 (17 items, 3 items was not valid). Data analyzed by path analysis based on multiple regression and correlation.

**Results and Discussion**

It was not surprising when all of the computation results interpreted, since almost all the research findings supported the VBN model, even it has been modified. There were three critical things which need to be argued found from this research, compared to other findings, first, environmental moral or norm was not proven to be good mediated variable as shown by the model and not significantly affect directly on pro-environmental behavior (PEB).

Bamber & Moser (2007)\(^2\) interpreted that personal norm/moral was good as a mediated factor on behavioral intention before indirectly influenced on PEB. This is one of the reasons why from this finding found moral was not a good mediated factor, so it is suggested to include a behavioral intention for further research. Secondly, instructional environmental leadership (IEL) only has a significant and direct effect on PEB, and fortunately, PEB was significantly affected by environmental personality (EP) as well, so the presence of this IEL at VBN model could be considered. Third, value orientation (VO) was contributed significantly merely by altruistic orientation, the same with what has been found by Aguilar-Luzon, et.al. (2012),\(^1\) not even by biospheric or egoistic (see fig. 2 below).

![Empirical Exploratory VBN Model](image_url)

*Fig. 2. Empirical Exploratory VBN Model X1=Leadership; X2+Personality; X3=Values Orientation; X4= NEP; X5=Moral/Norm:X6=Pro-environmental Behaviour B=Biospheric; E=Egoistic; A=Altruistic (* p < .05; **p < .01)*

When Yu & Yu (2017)\(^23\) put big-five personality as a mediated factor between values orientation (VO) and New Environmental Paradigm (NEP), based on this finding showed that indirect effect of VO on NEP through personality was not significant (0.076). Among those three variables could be built a triangle model which personality directly and significantly affect VO and NEP and VO also directly affect NEP. From this model, it could be stated that personality was not a good mediated factor, it was valued orientation, empirically was good and significant mediated variable (its indirect effect was 0.263) which bridging between personality and students’ NEP. Then, it was also a significant indirect effect of value orientation or concern on environmental moral/norm through NEP (0.104).

Based on this finding, undoubtedly that personality, in this case, environmental personality (big-five personality) indirectly affect also on environmental moral/norm through values and NEP. Moreover, personality also directly and significantly, together with leadership, affect pro-environmental behavior. Therefore, considering these findings, both instructional environmental leadership and also personality strongly support and contribute to the VBN model, even though
environmental moral, empirically, was still weak as a mediated factor on pro-environmental behavior. Nevertheless, since the main objective of the VBN model was to improve environmental behavior to be more positive, both variables, instructional environmental leadership, and environmental big-5 personality could be included in the model. Examine this following figure 2 which show that environmental moral/norm, empirically, did not have a role from this finding.

However, considering the role of leadership and personality, these findings supported by studies carried out by Afsar, et.al. (2016),26 Boiral, et.al. (2014),25 Gils, et.al. (2012),27 Graves, et.al. (2013),28 Gifford & Nilsson (2014),8 Harland, et.al. (2007),29 Hines, et.al. (1986),9 Kvasova (2015),12 etc.

Conclusions

Based on those findings and interpretation, compared to other findings, it could be concluded that the role personality, contributed strongly toward the robust of the VBN model, especially in trying to achieve pro-environmental behaviour to be more positive in order to save the only our one planet. However, the role of personal norm/moral is still questionable from this finding. It implied that the VBN model could be extended to be the PVBN (Personality-VBN) since leadership was not significantly affected values, NEP and norm/moral, it did affect simply on pro-environmental behaviour.

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Ethical Clearance: Done by Research Committee

References


Environment and Commitment, Locus of Control and Intention to Act

Erian Fatria¹, I Made Putrawan²*, Guspri Devi Artanti³

¹Doctoral Student, ²Professor, ³Doctoral, State University of Jakarta, Indonesia

Abstract

This study was aimed at finding out the confirmatory information from the Hungerford and Volk (1990) model regarding the effect of personal investment, personal commitment, locus of control, intention to act, and citizenship behavior toward the environment. A survey method was used by involving 185 generation Z students as sample in this study. There were five instruments in this study for measuring citizenship behavior toward the environment (21 items, reliability .917), personal investment (28 items, reliability .947), personal commitment (30 items, reliability .938), Locus of control (30 items, reliability .923) and intention to act (24 items, reliability .945). Data was analyzed by descriptive statistical analysis, inferential statistics for linearity test and path analysis. The results revealed that citizenship behavior toward the environment significantly affected directly personal investment, personal commitment, locus of control and intention to act. Moreover, it was also found that citizenship behavior toward the environment significantly affected indirectly by personal investment and personal commitment through locus of control and intention to act. Based on those findings, it can be concluded that variations in citizenship behavior toward the environment of generation Z are affected by variations in personal investment, personal commitment, locus of control and intention to act. It means that locus of control and intention to act are suitable mediator variables for personal investment and personal commitment to citizenship behavior toward the environment.

Keywords: Personal investment, personal commitment, locus of control, intention to act, citizenship behavior toward the environment.

Introduction

Environment and humans are an integral and inseparable system in forming a relationship that affects each other. Humans have a dependency on their environment, both physical environment and social environment. The human perspective on the environment, makes humans the main subject in the order of the process of interaction with the environment. The global crisis that has occurred lately, can estimate how the views and patterns of human behavior interact with their environment. During this time the perspective put humans as the center of the universe (anthropocentrism).

The pattern of human behavior that is greedy in utilizing the resources possessed by the natural environment, further worsens environmental conditions to reach the climax of the environmental crisis. This behavior is owned by many people in the current industrial revolution era 4.0, so that the pattern of behavior of generation Z is a generation that is sensitive to environmental issues so that it orientates their pattern of action to wise behavior towards the environment. However, in reality, things are so different we find in generation Z in Indonesia, especially in Jakarta, where their behavior does not reflect wisely towards the environment such as shopping consumptively, reluctant to use recycled products, wasteful in utilizing energy and resources, less interested in action; action of environmental groups, and less concerned with biodiversity. It causes the environment to continue to be degraded both in quality and quantity. Therefore, this study uses the Hungerford and Volk (1990) model to determine the variation of generation Z citizenship behavior from predictor and mediator variables.
Hellen (2012)\(^1\) which provides a definition of the term generation Z known as the digital generation is a young generation that grows and develops with a large dependence on digital technology. Meanwhile Turner (2015)\(^2\) explains that generation Z is also called generation-I, net-gen, and digital natives, referring to community groups born in the mid-1990s to the end of 2010 who are familiar with technological advances in multimedia, such as tablets, smartphones, social media, and flat screen televisions, become accustomed to interacting and communicating in a connected world at all times. Even though the more often they use technology and social media, it will certainly have an impact on increasing consumption of energy sources (especially electricity). This example is one form of Generation Z behavior that is not wise to the environment.

Marin and Pear (1992)\(^3\) define that behavior is everything a person does that is a characteristic inherent in him and in general behavior is equated with activity, action, appearance, response, and reaction. As with the opinion of Santrock (2009)\(^4\), which defines that behavior is everything that humans do, both verbally and non-verbally, and can be directly seen or observed. To develop citizenship behavior toward the environment, Hungerford and Volk (1990)\(^5\) variable identifiers into three categories of variables that contribute to citizenship behavior, namely (1) entry level variables, (2) ownership variables, (3) empowerment variables.

In the behavior model flowchart, it can be seen the predictor variables of citizenship behavior toward the environment, such as personal investment in the resolution of environmental issues which are ownership variables. This means that this variable is essentially owned by someone personally related to his investment in providing resolution to environmental issues or problems. Waymond Rodgers and McFarlin \(^6\) state that, personal investment generally involves all current needs to predict a person’s long-term goals, using personal resources and considering various risks. This investment can be in the form of money, goods and others, the target category of personal investment is divided into three classes, namely maximizing returns, minimizing risk, and personal necessities. Furthermore, Maehr in Tappe (1992)\(^7\) states that personal investment is intended to imply the contribution or investment of individual resources into specific behaviors or actions and is based on subjective meanings of interrelated behaviors, and is a determinant in personal involvement to behave, subjective meanings here consists of categories of thoughts, interrelated perceptions and beliefs that are considered critical so that they reflect reciprocal interactions that occur between factors related to the person with environment and behavior.

Peter and Schmidt (2007)\(^8\) defines that, commitment is a practical reason possessed by someone who does not depend on profit or loss if he is going to take an action, which is manifested in the form of rational recognition and based on a sense of loyalty, fulfillment of duties, and obligations. Firat, Mul, and Wichelen\(^9\) stated that, commitment is often considered to imply a personal identity or position to achieve a goal, often considered a priority that is considered a virtue or quality that any intellectual needs to have. Furthermore Jeffery T. Ulmer (2000)\(^10\) stated that, personal commitment is determined by a variety of choices that encourage internal desire to continue a course of action, in other words, personal commitment refers to individuals who continue the flow of action because they define it as something they want, something they want they do. Furthermore personal commitment flows from three sources: (1) a positive attitude towards the flow of action, (2) a positive attitude towards others with someone who is involved in the course of action, and (3) self-definition in terms of identity mobilized.

Fishbein and Ajzen (2010)\(^11\) explain that one’s desires greatly determine a person’s performance or behavior. The stronger the intention or desire of a person, the more likely that behavior will be carried out. Previously Ajzen (2005)\(^12\) assumed that personal factors that influence the intention to act are: (1) individual attitudes toward behavior, namely positive or negative evaluations of individuals to perform certain behaviors; (2) subjective norms that relate to one’s perceptions of social pressure to do or not take into consideration the behavior; (3) perceived behavioral control such as self-efficacy or the ability to conduct attractive behavior, if people wish to behave when they evaluate it positively, when they experience social pressure to do so, and when they believe they have the means and opportunities to do it. Furthermore Fishbein and Ajzen (2010) explain that intention is the best single predictor for behavior, therefore people are said to do a behavior because they intend to do it, they have the necessary skills and abilities, and lack of environmental constraints to prevent them from doing their wishes.

Methodology: This research was conducted on a number of generation Z students born in 1995 -
There are five instruments used in this study, namely to measure citizenship behavior toward the environment (21 items rel .917), personal investment (28 items rel .947), personal commitment (30 items, rel .938), Locus of control (30 items, rel .923), and intention to act (24 items, rel .945). The technique was using multistage random sampling involved 145 generation Z students as the research sample.

Research Findings and Discussions: The results of the calculation of the path coefficient in this study can be seen in the table below:

<table>
<thead>
<tr>
<th>Path</th>
<th>ρ</th>
<th>Causal Effect</th>
<th>Total</th>
<th>t-count</th>
<th>t-table α = .05</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Direct</td>
<td>Indirect</td>
<td>Total</td>
<td></td>
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<td></td>
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<td>Variables</td>
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<td>being passed</td>
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<td></td>
<td></td>
<td>X3</td>
<td>X4</td>
<td>X3 dan X4</td>
<td></td>
</tr>
<tr>
<td>X1 on X5</td>
<td>ρ51</td>
<td>.222</td>
<td>.044</td>
<td>.055</td>
<td>.025</td>
</tr>
<tr>
<td>X1 on X3</td>
<td>ρ31</td>
<td>.209</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>X1 on X4</td>
<td>ρ41</td>
<td>.161</td>
<td>.074</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>X2 on X5</td>
<td>ρ52</td>
<td>.176</td>
<td>.079</td>
<td>.074</td>
<td>.043</td>
</tr>
<tr>
<td>X2 on X3</td>
<td>ρ32</td>
<td>.378</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>X2 on X4</td>
<td>ρ42</td>
<td>.217</td>
<td>.126</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>X3 on X5</td>
<td>ρ53</td>
<td>.211</td>
<td>-</td>
<td>.115</td>
<td>-</td>
</tr>
<tr>
<td>X3 on X4</td>
<td>ρ43</td>
<td>.335</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>X4 on X5</td>
<td>ρ54</td>
<td>.344</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
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</table>

* p < .05

The results of hypothesis testing show that: (1) there is a direct and significant effect of personal investment on citizenship behavior toward the environment; (2) there is a direct and significant effect of personal commitment on citizenship behavior toward the environment; (3) there is a direct and significant effect of locus of control on citizenship behavior toward the environment; (4) there is a direct effect of intention to act on citizenship behavior toward the environment; (5) there is a direct and significant effect of personal investment on locus of control; (6) there is a direct and significant effect of personal commitment on locus of control; (7) there is a
direct and significant effect of personal investment on intention to act; (8) there is a direct and significant effect of personal commitment on intention to act; (9) there is a direct and significant effect of locus of control on intention to act; (10) there are indirect and significant effects of personal investment on citizenship behavior toward the environment through locus of control; (11) there are indirect effects of personal commitment to citizenship behavior toward the environment through significant locus of control; (12) there is an indirect and significant effect of personal investment on citizenship behavior toward the environment through intention to act; (13) there is an indirect and significant effect of personal commitment on citizenship behavior toward the environment through intention to act; (14) there is an indirect and significant effect of locus of control on citizenship behavior toward the environment through intention to act; (15) there are indirect and significant effects of personal investment on intention to act through locus of control; and (16) there are indirect effects and significant effects of personal commitment on intention to act through locus of control. This means that citizenship behavior toward the environment of generation Z students is influenced by variations in personal investment, personal commitment, locus of control, and intention to act.

The results of this study are supported by other studies such as Davis, Green and Reed (2009) which reveal that individuals who have a greater level of commitment to the environment are also investigated to have better pro-environment behavior. Likewise, individuals who have a high level of sense of association with the environment produce better pro-environment behavior. Granzin, Mason and Bahn in personal investment theory assume that personal investment is the decision of people to devote a portion of themselves to a specific action by giving time, energy, and money to an activity because of the image or prospect of getting sustainable profits in the future front. Hwang, Kim, and Jeng (2000) state that internal locus of control can bring a person’s level of positive attitude, but attitudes do not affect intention to act. Ertz, Karakas, and Sarigöllü (2016) find perceived control to have an effect directly or indirectly on behavior, and this study also makes a strong statement that perceived power is a direct antecedent to Pro Environmental Behavior.

Asghar and Nazneen (2016) also explain that there are significant differences in environmental attitudes and conservation of adolescents, attitudes towards energy resources and behavior towards wild life. People with moderate locus of control have a much better attitude towards cleanliness and environmental and behavioral conservation of wild life. Mafabi et al. (2017) revealed that there is a positive and significant relationship between attitudes, subjective norms, perceived behavioral control and desire to behave, this implies that behavioral desires fully process planned behavior predictions. Ilie and Unianu (2012) explained that there is a significant relationship between internal locus of control and environmental attitude, therefore, it is important to grow internality so it is necessary for someone to reduce trust in the strength of others on various occasions.

**Conclusion**

Based on these findings, it can be concluded that if you want to increase the citizenship behavior toward the environment of generation Z, the predictor variables of personal investment, personal commitment, locus of control and intention to act need to be considered. So that environmental education activities can achieve the goal of forming environmentally responsible behavior, these activities should pay attention to strategies for building personal investment, personal commitment. Personal investment and personal commitment formed will then influence locus of control and intention to act as mediator variables and will ultimately develop generation Z citizenship behavior toward the environment.

To develop personal investment and personal commitment, the environmental education activities carried out need to provide opportunities for generation Z students to actively participate, learn various environmental issues through investigative activities, discuss moral aspects of the environment, and facilitate generation Z to conduct activities with the community and build cross-generation partnerships (baby boom, generation X, millennial and generation alpha). The generation Z whose note is the current generation and prospective leaders for future lives certainly has a big contribution in realizing the Sustainable Development Goals (SDGs) so that our environment can be saved and remain sustainable.

**Acknowledgements:** Thank postgraduate studies at State University of Jakarta, especially to the both of my advisors who helped guiding me to do my research.

**Conflict of interest:** None

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References

The Psychometrics Evaluation of Administrative Staff’s Job Satisfaction

Vema Aisya Rahma¹, Lokman Mohd Tahir¹, Narina A. Samah², Sanitah Mohd Yusof²
Rohaya Talib³, Noor Azean Atan³

¹Associate Professor; ²Associate Professor; ³Senior Lecturer, School of Education, Universiti Teknologi Malaysia, Scudai, Malaysia

Abstract

The objective of the study was to evaluate psychometric properties of a scale which assesses job satisfaction of the administrative staff while working with their Higher Education Institutions (HEI). Data were obtained from 322 administrative personnels from various types of job categories and demographics. The instrumentation utilised the five-point Likert Scale in measuring administrative staff’s job satisfaction to their HEI. The exploratory and confirmatory factor analyses, reliability analysis were executed to investigate the measurement properties of the scales. The results indicated that the psychometric elements were in favour of the factorial structure of the administrative job satisfaction scale.

Keywords: Job satisfaction, administrative staff, higher education.

Introduction

This study of staff’s satisfaction provided imperative feedbacks on how contented administrative staff of the university or HEI felt and acknowledged being part of the university’s members. To scholars, the staff’s satisfaction also influenced and predicted their higher level of creativity and commitment to the university¹. Thus, staff’s satisfaction has been widely employed by previous researchers to indicate staff’s approval to their universities or their HEI. Recently, there are substantial studies conducted which measured academics’ job satisfaction within local context which tried to understand whether local academics obtained their certain level of job satisfaction while working or serving with their HEIs regardless of their public or private-based status. However, little research attention has been directed towards developing the administrative staff’s job satisfaction.

Numerous researchers have proved that university staff, whether academic or administrative, played an important role in realising the university’s mission and vision. Therefore, measuring their satisfaction has received remarkable attention from higher education researchers in ensuring whether their administrative staffs were highly satisfied in ensuring the smooth operation of a university. Nevertheless, most studies on HEI staff’s satisfaction focus on the satisfaction of the academics with fewer studies addressing the perspectives of the administrative staff even though they are also professionals that determine the smooth operation of the university, such as human resources, financial management, facilities and information technology²,³. Further, Smerek and Peterson (2007)² highlighted that most studies related to the administrative posts were mainly concerned with the academicians that hold the administrative roles, such as the department chairs and the academic deans. In fact, previous studies, such as a study by Volkwein and Parmley (2000)⁴ employed samples from the perspectives of, and feedback from, the university’s leadership and administrators and not the whole administrative staff of a public university. In the context of a Korean research university, Jung and Cheolshin (2015)⁵ conducted a study in examining administrative staff’s job satisfaction. Their findings revealed that their demographics, inner motivation, the work environments and the nature of their work -
specifically the clarity of tasks - were predictors of their job satisfaction including interpersonal skills of administrative staff. In addition, through the feedback of 486 administrative staff from three public and three private universities in Kenya, Kipkebut (2010) investigated administrative staff’s job satisfaction and organisational commitment which significantly revealed that employees from private universities were more committed to their universities and satisfied with their jobs than employees from public universities. Statistically, employees’ demographics, their professional commitment, role overload, supervisory support, job security, promotion opportunities, distributive justice and participation in decision making were significant predictors of their job satisfaction among administrative staff in Kenyan universities.

Admittedly, there are limited studies that examine administrative staff’s satisfaction within the context of public universities or HEI in Malaysia. In fact, there are limited studies conducted to develop a scale and evaluation of the psychometrics properties conducted in measuring administrative staff’s job satisfaction within Malaysian context of higher education (colleges and university). Therefore, the purpose of this study is to evaluate the psychometrics properties for administrative staff’s feedbacks towards their job satisfaction.

**Method**

**Participants:** This study randomly selected a sample of 322 administrative staff serving with their HEIs. The distribution of the administrative staff’s demographics is shown in Table 1. Based on Table 1, most of the serving administrative staff are female (Male = 130; 40.2 %; Female = 194; 59.4 %). As for length of working experience, a majority of administrative staff had 5 to 10 years’ experience (N = 85; 26.3%) followed by administrative staff who had less than 5 years of experience (N = 73; 22.6 %) and from 11 to 15 years (N = 61; 18.9 %). 44 administrative staff had 16 to 20 years of experience (N = 44; 13.6 %) with 16 administrative staff had 21 to 25 years of experience working with HEI and another 14 administrative staff had 26 to 30 years of experience and 30 staff had more than 30 years of experience. In terms of their academic qualifications, only two administrative staff had master degrees (N= 2; 6.0 %), 39 administrative staff obtained their bachelor degrees (N= 39; 12.1 %), 86 administrative staff had their Diploma academic qualification (N= 86; 26.6 %), 38 are holders of the pre-university certificates (N = 38; 11.18 %), 137 are the secondary school certificate holders (N = 137; 42.4 %) and 20 administrative staff have others academic qualifications (N = 20; 6.0 %).

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Administrative staff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>130</td>
</tr>
<tr>
<td>Female</td>
<td>194</td>
</tr>
<tr>
<td><strong>Working experience</strong></td>
<td></td>
</tr>
<tr>
<td>Less than 5 year</td>
<td>73</td>
</tr>
<tr>
<td>05 – 10 years</td>
<td>85</td>
</tr>
<tr>
<td>11 – 15 years</td>
<td>61</td>
</tr>
<tr>
<td>16 – 20 years</td>
<td>44</td>
</tr>
<tr>
<td>21 – 25 years</td>
<td>16</td>
</tr>
<tr>
<td>26 – 30 years</td>
<td>14</td>
</tr>
<tr>
<td>More than 30 years</td>
<td>30</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>21 – 30 years old</td>
<td>101</td>
</tr>
<tr>
<td>31 – 40 years old</td>
<td>109</td>
</tr>
<tr>
<td>41 – 50 years old</td>
<td>71</td>
</tr>
<tr>
<td>51 – 60 years old</td>
<td>42</td>
</tr>
<tr>
<td><strong>Academic Qualifications</strong></td>
<td></td>
</tr>
<tr>
<td>PhD</td>
<td>0</td>
</tr>
<tr>
<td>Masters</td>
<td>2</td>
</tr>
<tr>
<td>Bachelors</td>
<td>39</td>
</tr>
<tr>
<td>Diploma</td>
<td>86</td>
</tr>
<tr>
<td>Pre-university certificate</td>
<td>38</td>
</tr>
<tr>
<td>Secondary school certificate</td>
<td>137</td>
</tr>
<tr>
<td>Others</td>
<td>20</td>
</tr>
<tr>
<td><strong>Working Status</strong></td>
<td></td>
</tr>
<tr>
<td>Permanent</td>
<td>285</td>
</tr>
<tr>
<td>Contract</td>
<td>37</td>
</tr>
</tbody>
</table>

N = 322

In terms of administrative staff’s working status, 285 (88.2 %) are permanent staff while 37 (11.5) are contract staff. A total of 109 (33.9) administrative staff are between 31 to 40 years old. While 33.7% are staff ages between 21 to 30 years old. Next, 71 (22.0 %) staff aged between 41 to 50 years old and followed by 42 administrative staff (13 %) are between 51 to 60 years old.

**The instrument:** A closed ended questionnaire with 23 items comprising constructs related to their job satisfaction was used. Attached with the 23 items were six items requesting demographic information such as their gender, working experience, age, academic qualifications and their age. All items are in the positive
expressions. Before proceeding with the questionnaire distribution, detected negative items were gone through the reversing process into the positive expression. All respondents were asked to give their reactions to the 23 items using a five-point Likert scale: 1 – strongly disagree, to 5 – strongly agree. Empirically, the 23 items have three sub-constructs which are: knowledge (2 items), the management process (15 items) and, lastly, escalation elements (6 items).

All items are in the Malay language and demographics indicate respondents are from Malaysian primary, secondary and tertiary education system. Some of the items are adopted from researchers that had studied administrative staff’s job satisfaction such as Jung and Cheolshin (2015) and Volkwein and Zhou (2003) all of whom significantly measured the administrative staff’s job satisfaction from various higher educational systems. All items had undergone a rigorous translation process that involved the forward and backward process of translation by two translators. A Malay language expert and some administrative staff were approached in order to ensure the precision of the Malay language items including the sentence structure, meaning and the measurement of grammatical elements. Items were also translated into English using a backward approach with the help of language experts. Before proceeding with the pilot study, items were checked by a small sample of assigned administrative staff to determine the precision of the meaning, sentence structure and even the relevance of the items to the Malaysian higher educational system.

Before proceeding with the actual data collection, a pilot study was conducted to ten selected administrative staff at a public university. All 10 administrative staff were eliminated from the actual sample for data collection. A vital reason for conducting a pilot study was to obtain the construct validity and reliability of all the items. Through the pilot study, the reliability value was measured at 0.872 based on the Cronbach’s alpha value from the initial pilot study with 10 administrative staff.

Data analysis: Before proceeding with quantitative data analysis, various measurements were taken. First, since some items were negatively worded, the reversing process of data insertion was executed during data analysis. Second, a series of exploratory factor analyses were performed to account for the variance of each dimension and to measure the sampling adequacy. Lastly, the measurement model of the administrative staff’s job satisfaction using the Structural Equation Modelling (SEM) approach was utilised to examine and predict the research university’s staff’s satisfaction.

Results and Discussion

Data normality tests: Based on the 23 items related to administrative staff’s job satisfaction scale, the data normality tests are examined, checked and presented in Table 2 below. Table 2 reports on the normality tests based on three elements of the administrative staff’s job satisfaction from responses provided by administrative staff of the HEI. From the output normality tests, the three studied normality test have skewness between –1 and +1 and there is no extreme value encountered in the checking process.

<table>
<thead>
<tr>
<th>Admin staff’s job satisfaction</th>
<th>Mean Statistic</th>
<th>Std. Deviation Statistic</th>
<th>Skewness Statistic</th>
<th>Std. Error</th>
<th>Kurtosis Statistic</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>3.9550</td>
<td>.75833</td>
<td>-.569</td>
<td>.136</td>
<td>-.641</td>
<td>.271</td>
</tr>
<tr>
<td>Management process</td>
<td>3.8025</td>
<td>.64698</td>
<td>-.727</td>
<td>.136</td>
<td>.554</td>
<td>.271</td>
</tr>
<tr>
<td>Escalation</td>
<td>3.7547</td>
<td>.60044</td>
<td>-.161</td>
<td>.136</td>
<td>-.398</td>
<td>.271</td>
</tr>
</tbody>
</table>

Correlational matrix: Two major tests were employed in analysing the 23 items that measure the knowledge, management process and escalation of administrative staff’s job satisfaction: the correlational matrix and the exploratory factor analyses. Initially, all the 23 items were assessed through the correlational matrix test which was presented in Table 3. On the basis of the statistical findings, the correlational values were between 0.234 and 0.651, which indicated a strong relationship between the three main constructs of the administrative staff’s job satisfaction. At the same time, the highest value was 0.72 (below 0.9), which indicated the least influence of multi-collinearity based on the three major constructs studied because the correlation values exceeded 0.25 and are below 0.95 values. Results from the correlational matrix (Table 3) indicated that the...
correlational matrix values implied good internal values of the items based on the four related constructs. Hence, all items that measured the administrative staff’s job satisfaction towards their HEI are internally consistent and strongly valid.

**Table 3: Correlational matrix**

<table>
<thead>
<tr>
<th>Administrative staff's job satisfaction</th>
<th>Mean</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowledge</td>
<td>3.955</td>
<td>0.668**</td>
<td>0.600**</td>
</tr>
<tr>
<td>2. Management process</td>
<td>3.820</td>
<td>1.00</td>
<td>0.729**</td>
</tr>
<tr>
<td>3. Escalation</td>
<td>3.754</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

N= 322; Significance level at p<0.05*; p<0.01**

**Table 4: Administrative staff's job satisfaction factor loadings and communalities values**

<table>
<thead>
<tr>
<th>Items of administrative staff's job satisfaction</th>
<th>1 Management process</th>
<th>2 Knowledge</th>
<th>3 Escalation</th>
<th>h²</th>
</tr>
</thead>
<tbody>
<tr>
<td>KP1</td>
<td>.638</td>
<td></td>
<td></td>
<td>.643</td>
</tr>
<tr>
<td>KP2</td>
<td>.628</td>
<td></td>
<td></td>
<td>.641</td>
</tr>
<tr>
<td>KP3</td>
<td>.688</td>
<td></td>
<td></td>
<td>.677</td>
</tr>
<tr>
<td>KP4</td>
<td>.483</td>
<td></td>
<td></td>
<td>.469</td>
</tr>
<tr>
<td>KP5</td>
<td>.643</td>
<td></td>
<td></td>
<td>.509</td>
</tr>
<tr>
<td>KP6</td>
<td>.728</td>
<td></td>
<td></td>
<td>.605</td>
</tr>
<tr>
<td>KP7</td>
<td>.479</td>
<td></td>
<td></td>
<td>.287</td>
</tr>
<tr>
<td>KP8</td>
<td>.761</td>
<td></td>
<td></td>
<td>.737</td>
</tr>
<tr>
<td>KP9</td>
<td>.803</td>
<td></td>
<td></td>
<td>.757</td>
</tr>
<tr>
<td>KP10</td>
<td>.804</td>
<td></td>
<td></td>
<td>.711</td>
</tr>
<tr>
<td>KP11</td>
<td>.735</td>
<td></td>
<td></td>
<td>.698</td>
</tr>
<tr>
<td>KP12</td>
<td>.693</td>
<td></td>
<td></td>
<td>.644</td>
</tr>
<tr>
<td>KP14</td>
<td>.780</td>
<td></td>
<td></td>
<td>.709</td>
</tr>
<tr>
<td>KP15</td>
<td>.432</td>
<td></td>
<td></td>
<td>.496</td>
</tr>
<tr>
<td>KP16</td>
<td>.818</td>
<td></td>
<td></td>
<td>.713</td>
</tr>
<tr>
<td>KP17</td>
<td>.810</td>
<td></td>
<td></td>
<td>.685</td>
</tr>
<tr>
<td>KP18</td>
<td>.609</td>
<td></td>
<td></td>
<td>.534</td>
</tr>
<tr>
<td>KP19</td>
<td>.639</td>
<td></td>
<td></td>
<td>.563</td>
</tr>
<tr>
<td>KP20</td>
<td>.829</td>
<td></td>
<td></td>
<td>.731</td>
</tr>
<tr>
<td>KP21</td>
<td>.326</td>
<td></td>
<td></td>
<td>.703</td>
</tr>
<tr>
<td>KP22</td>
<td>.791</td>
<td></td>
<td></td>
<td>.765</td>
</tr>
<tr>
<td>KP23</td>
<td>.694</td>
<td></td>
<td></td>
<td>.670</td>
</tr>
<tr>
<td>Eigen values</td>
<td>10.360</td>
<td>1.289</td>
<td>2.369</td>
<td></td>
</tr>
<tr>
<td>% of variance</td>
<td>45.044</td>
<td>5.605</td>
<td>10.299</td>
<td></td>
</tr>
</tbody>
</table>

In Table 4, all constructs related to administrative staff’s job satisfaction items were checked separately and presented. As for the management process construct, the total variance explained was at 45.044 % with eigen values of 10.360. In addition, the knowledge construct indicates a much lower total variance of 5.605 % and eigen values at 1.289. As for the escalation items, the total variance explained were noted at 10.299% with eigen values at 10.299. After the EFA analysis, an item labelled as KP 13 was deleted due to low value on its

**Exploratory factor analysis:** Subsequently, the exploratory factor analysis (EFA) with the varimax rotation procedure was executed to determine the factorial structure of the items. Through the EFA analysis, results demonstrated items on administrative staff’s job satisfaction had a consistency value higher than 0.30 (cut off value)\(^8,9\). As for the Kaiser-Meyer-Olkin result, the data indicate high values (KMO = 0.925; Approx. \(\chi^2 = 4984\)E3; \(df = 253; \) Sig = 0.00) and the total variance explained for the 23 items overall was 9.48 per cent. As a further measurement and checking on the items’ internal consistency, all items were tested separately.
factor loading (0.200) and communalities value \( (h^2 = 0.71) \). Therefore, only 22 items out of 23 items that have strong validity and consistency in measuring job satisfaction of the HEI administrative staff.

**CFA Measurement model:** In obtaining the structural validity of all items related to job satisfaction of the HEI administrative staff, a measurement model was established using confirmatory factor analysis. The measurement model was constructed using AMOS software. To ensure the internal consistency, the fit statistics indices were referred through the \( \chi^2/df \) Chi-square, the RMSEA (Root Mean Square Error of Approximation), the NFI (Normed Fit Index) and CFI (Comparative Fit Index) values.

In the CFA analysis, the chi-square value was noted at \( \chi^2/df = 4.680 \) with p-value of 0.000 which was significant. In addition, the fit index values were considered accepted with NFI = 0.871, CFI = 0.741. The RMSEA value was determined as 0.100. Figure 2 presents the measurement model based on the confirmatory factor analysis. Therefore, only 22 items were presented in representing the management process, knowledge, escalation for administrative staffs’ job satisfaction in Malaysian HEI.

**Discussion and Conclusion**

This study was an attempt to measure the psychometrics properties of administrative staff’s
job satisfaction which can be used in measuring the Malaysian administrative staff’s job satisfaction. To conduct the study, 322 randomly administrative staff were selected in obtaining their perceptions on their job satisfaction while serving their universities.

Statistically, 22 items that tested with three rigorous tools in determining its’ reliability and validity through the Cronbach’s alpha values, the Exploratory Factor Analysis (EFA) and the Confirmatory Factor Analysis (CFA) in evaluating the internal consistencies of the items of the questionnaire. Through the Cronbach’s alphas analysis, data indicated on high reliability on the 22 items studied. Further, items were analysed through the EFA analysis which two remaining purpose: clustering the items, extracted staff’s job satisfaction and percentage of variance that contributed to the items’ constructs. From the analysis, three factors were extracted which represented the clustering of job satisfaction among HEI administrative in Malaysian tertiary context. The final phase of the analysis involved the development of the measurement model through the CFA analysis. Based on the CFA model, all 22 have been chosen as the suitable revised items and model that represented job satisfaction of the HEI administrative staff with high and satisfactory values on fit statistics.

Admittedly, this study also has its limitation. Firstly, this study relatively used small sample size of 322 administrative staff from Malaysian HEI which can be replicate with much bigger sample size. Secondly, it is appropriate to use only one sample category in assessing these items due to the different preferences on the HEI’ culture and climate even their working condition which assumedly contributed to their job satisfaction. For instance, a study should only use all administrative from a university. To consider, items on the administrative staff’s job satisfaction could be adopted and useful in examining the reliability and construct validity from other positions such as the university and college’s librarians, and other relevance posts. As for future consideration, administrator’s gender and educational background should be considered in examining the job satisfaction while serving with their HEI. In addition, future qualitative research through interviews with administrative staff could be used as sources for triangulation purpose.

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**Conflict of Interest:** NIL

**Ethical Clearance:** Obtained through Research Committee.

**References**


Reliability of Sullivan Emotional Intelligence Scale for Children in Malaysian Context Using Rasch Measurement Model

Nor Aizal Akmal Binti Rohaizad1*, Siti Nazilah Binti Mat Ali1, Azlina Binti Mohd Kosnin2, Aqeel Khan2, Norfishah Mat Rabi3, Norwaliza Binti Abdul Wahab3

1 Lecturer, School of Social and Economic Development Studies, University of Malaysia Terengganu (UMT), 2Lecturer, School of Education, Universiti Teknologi Malaysia (UTM), 3Lecturer, Faculty of Human Development, Universiti Pendidikan Sultan Idris, Malaysia (UPSI)

Abstract

Emphasizing only on intellectual intelligence without stressing on feelings and emotions could negatively affect an individual’s emotional development. Development of stable emotion regulation strategies is important for an individual to function appropriately in different contexts. Although there are many scales developed to measure emotional intelligence (EI), there is a dearth of instruments to measure EI in preschool children. One instrument that taps EI in preschool children is The Sullivan Emotional Intelligent Scale for Children (EISC). EISC was developed for use in the United States and there is no such instrument available in Malaysian context (to the best of our knowledge). The aim of the current study was to adapt EISC to measure Malaysian preschool children’s emotional intelligence. EISC was translated into Malay Language and the reliability value of the instrument was then tested using the Rasch Model. There are 50 respondents (preschool children) was random selected from the research area (Johor Bahru) which had same features with the real respondent for this purpose. The results show a high ‘item reliability’ of 0.94 and also a high ‘person reliability’ of 0.93 after distillations (37 out of 59 items retained). The results suggest that The Sullivan Emotional Intelligent Scale for Children (EISC), adapted for Malaysian children, can be used to determine the level of Malaysian preschool children’s EI with psychometric soundness.

Keywords: The Sullivan Emotional Intelligent Scale for Children (EISC), Malaysian preschool children, rasch model.

Introduction

Emotional intelligence has been defined as the ability to control, understand and use emotions to guide the way we think and act. Mayer and Salovey 14 have developed the concept of emotional intelligence to explain the importance of emotions in life. They defined emotional intelligence as the ability to identify one’s own and other people’s emotions as well as the ability to control and regulate one’s emotions 8, 9, 12, 11.

Research in the area of emotional intelligence has found significant findings relating the construct with various positive outcomes such as one’s health and well-being 3,2,16 adaptability to new life situation and better mental health 10 and higher mental abilities and positive personality attributes 6,17,1.

Studies on children have found that proper development of emotions is important for children because it is a regulation skill which promotes social behavior and positive learning 13, 20-22, thus creating a conducive learning environment of a preschool setting. Emotional intelligence enables children to form behaviors that benefit the learning process 19 such as following instructions, paying attention, listening and ability to solve problems with patience 5 thus show better academic achievement.

Corresponding Author**
Nor Aizal Akmal Binti Rohaizad
School of Social and Economic Development Studies, University of Malaysia Terengganu (UMT)
e-mail: aizal@umt.edu.my
Problem Statement: There are many measurement tools developed to assess the level of individual emotional intelligence. However, the most popularly used measurement tools of emotional intelligence are Bar-On Emotional Quotient Inventory, Schutte Self-Report Inventory, Trait Meta-Mood Scale, Multi-Factor Emotional Intelligence Scale and the latest is Mayer-Salovey-Caruso Emotional Intelligence Test. However, all these EI instruments have been developed with an emphasis on adult and therefore not suitable for children.

There seems to be a lack of measures of emotional intelligence for preschool children. Studies measuring children’s emotional intelligence have often made use of instruments either for adults, youths or older children but with the aid of adults in getting the children to understand the questions. For example Esturgo-Deu and Sala-Roca made use of the Emotional Quotient Inventory: Youth version (EQI-y) to measure the emotional intelligence of 6 to 10 year old children. Adults or older children were also involved to help the younger children in completing the items.

In an unpublished PhD thesis, Sullivan developed a scale of emotional intelligence for children by adapting Mayer and Salovey’s Emotional Intelligence Test (MSCEIT). The Sullivan Emotional Intelligent Scale for Children (EISC) taps the ability to identify, understand, control and use emotions. Its subsets include tests through face expression (20 items) and storytelling (eight items) for the ‘identifying emotion’ dominant also tests through understanding (12 items) and controlling emotion (nine items) and empathy (10 items). There seem to be very limited resources to verify the validity and reliability of the instrument. Nevertheless, a Turkish study translated the EISC into Turkish language and used the scale to measure Turkish children’s emotional intelligence and found the instrument to have strong reliability (alpha ranged between 0.97-0.99).

The present study aims to adapt and test the validity and reliability of Sullivan emotional intelligence scale for children (EISC) for Malaysian preschoolers for possible use in Malaysian context.

Method

The EISC instrument was translated from English language to Malay language using back-translation method. The researchers also changed some of the item statements to coincide with the situations that Malaysian children are more likely to encounter. Some of the stimulus face figures were also replaced with ones resembling Malaysian people. We also changed the response scale from three-option to two-option i.e. ‘yes’, ‘no’ and ‘I Don’t Know’ was changed to ‘yes’ and ‘no’ only because the response categories ‘no’ and ‘I don’t know’ are scored identically. Table 1 shows the examples of changed.

Table 1. An Example of EISC’s Adaptive in Malaysian Preschool Children Context

<table>
<thead>
<tr>
<th>EISC’s Original</th>
<th>EISC’s Adaptive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happy Mad Sad</td>
<td>Happy Mad Sad</td>
</tr>
<tr>
<td>'Rashad and his mother walk slowly out the back door. Rashad carries a small box to the backyard. Together Rashad and his mother stop at the place where he has chosen to bury his pet turtle that died'</td>
<td>'Ramli carries a small box to the backyard. Together Ramli and his mother stop at the place where he has chosen to bury his cat that died'</td>
</tr>
</tbody>
</table>

Participants of this study were 50 preschool children from Johor Bahru area of Malaysia. One of the researchers read each item to a participating child and asked questions present in the EISC (Malay version). Based on the Rasch measurement model, this sample size (50) is considered as sufficient to establish 99 percent confidence level for item calibrations stable within ± 1 logit. The children were then shown the response figures one by one and were asked “is this the right feeling?” and the child had to answer in either ‘yes’ or ‘no’ to every question posed.

A total of 59 translated items with dichotomous rating scale of either zero or one were used during the administration of the EISC. Zero represented ‘no’ and one represented ‘yes’. There are four domains in The Sullivan Emotional Intelligent Scale for Children (EISC) which has been adapted in Malaysian preschool children’s context. The first domain is ‘identify emotion’ which has two method of emotion recognizing, i.e. through face expression recognition (20 items) and storytelling (eight items). The second domain is ‘understand the emotion’ (12 items). The third domain is ‘control the emotion’ (nine items) and the last one is of ‘using the emotion’ (ten items).

Rasch Measurement Model was used to test the validity and reliability of the adapted EISC instrument. It is a measurement model that produces person and item separation indices as a result of the consideration that takes into account the ability of the respondents and item difficulty.
Findings: Data were analysed using Winsteps 3.68.2 and results are presented in several sections: Reliability and Separation Index, Item Polarity, Item Fit and Item Misfit, Residual Principal Component Analysis (PCA) and the last one The Result of Distillation.

Rarsch Dichotomous Model is used to measure Malaysian children’s emotional intelligence using the adapted version of Sullivan Emotional Intelligence Scale for Children as the scale for the items were dichomous (‘yes’ or ‘no’).

Reliability and Separation Index: Table 2 and Table 3 shows the statistic generated by Rasch analysis of EISC’s adaptation in order to determine the reliability of EISC’s adaptation test item instrument using Rarsch measurement model and to what extent the adequacy of separation index item instrument of the EISC’s adaptation test. The Rarsch model conforms to item separation index and person separation index and the item reliability and person reliability is shown from the statistic Table 2.

Table 2. Summary of 59 Item Measure

<table>
<thead>
<tr>
<th></th>
<th>Raw Score</th>
<th>Count</th>
<th>Measure</th>
<th>Model Error</th>
<th>INFIT MNSQ</th>
<th>ZSTD</th>
<th>OUTFIT MNSQ</th>
<th>ZSTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>45.0</td>
<td>50.0</td>
<td>.00</td>
<td>.73</td>
<td>.99</td>
<td>.1</td>
<td>1.12</td>
<td>.0</td>
</tr>
<tr>
<td>S.D.</td>
<td>4.5</td>
<td>0</td>
<td>1.43</td>
<td>.28</td>
<td>.36</td>
<td>.9</td>
<td>1.78</td>
<td>1.1</td>
</tr>
<tr>
<td>Max.</td>
<td>49.0</td>
<td>50.0</td>
<td>2.87</td>
<td>1.11</td>
<td>1.63</td>
<td>2.6</td>
<td>9.90</td>
<td>3.7</td>
</tr>
<tr>
<td>Min.</td>
<td>32.0</td>
<td>50.0</td>
<td>-1.67</td>
<td>.37</td>
<td>.47</td>
<td>-2.3</td>
<td>.05</td>
<td>-1.8</td>
</tr>
</tbody>
</table>

Real RMSE .85 ADJ.SD 1.15 Separation 1.35 Item Reliability .65, Model RMSE .78 ADJ.SD 1.19 Separation 1.53 Item Reliability .70, S.E. of Item Mean = .20

Individual separation index and items can be produces by Rarsch analysis. The number of strata capabilities identified in the sample group is indicates from the individual isolation index. The separation of item difficulty level can see from the item separation index. The value of individual isolation and the item which is more than the value of two is considered as good. The value of separation index > 2.0 is grade measurement system caused by only one or two observation, the value of between 1.5 and 2.0 is not productive for the development of measurement but not demeaning and values between 0.5 and 1.5 and the productivity measurement < 0.5 is less productive for measurement. According to the reliability value of > 0.8 were accepted as high value while the value of reliability between 0.6 and 0.8 and the value which is less than 0.6 is not acceptable for reliability.

Table 3 shows that the separation person measure index for the EISC’s adaptation construct as 1.75 which individual separation index for all construct indicate that the number of strata which measure the ability of individuals are on 2 standard errors. Table 2 shows that separation item measure index for the EISC’s adaptation constructs as 1.35 which mean person measure separation index indicates the number of strata that measured the ability of individuals on 1 standard error. The value of reliability which is more than 0.8 is acceptable and has strong value while value less than 0.8 which is less acceptable. The reliability person measure for the EISC’s adaptation constructs which shown in Table 3 are 0.75 and this constructs have the reliability person measures < 0.8 which is less acceptable. While the reliability item measure for the EISC’s adaptation constructs which shown in the Table 2 are 0.65 which is also there liability item measures < 0.8 and less acceptable.

Table 3. Summary of 50 Person Measure

<table>
<thead>
<tr>
<th></th>
<th>Raw Score</th>
<th>Count</th>
<th>Measure</th>
<th>Model Error</th>
<th>INFIT MNSQ</th>
<th>ZSTD</th>
<th>OUTFIT MNSQ</th>
<th>ZSTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>52.7</td>
<td>59.0</td>
<td>3.13</td>
<td>.63</td>
<td>.99</td>
<td>.1</td>
<td>1.16</td>
<td>.1</td>
</tr>
<tr>
<td>S.D.</td>
<td>6.8</td>
<td>0</td>
<td>1.40</td>
<td>.24</td>
<td>.15</td>
<td>.5</td>
<td>1.79</td>
<td>.9</td>
</tr>
<tr>
<td>Max.</td>
<td>58.0</td>
<td>59.0</td>
<td>4.82</td>
<td>1.03</td>
<td>1.50</td>
<td>2.1</td>
<td>9.90</td>
<td>3.3</td>
</tr>
<tr>
<td>Min.</td>
<td>23.0</td>
<td>59.0</td>
<td>-1.27</td>
<td>.34</td>
<td>.68</td>
<td>-1.1</td>
<td>.16</td>
<td>-9</td>
</tr>
</tbody>
</table>

Real RMSE .69 ADJ.SD 1.21 Separation 1.75 Item Reliability .75, Model RMSE .68 ADJ.SD 1.22 Separation 1.80 Item Reliability .76, S.E. of Item Mean = .22
**Item Polarity:** The validity of a questionnaire can be identified by referring to the analysis of the output program which can check from the polarity item so as to find a correlation coefficient of measurement-point which is known as point-measure correlation coefficient (PTMEA Corr). Rasch measurement model can generate the value of PTMEA Corr in the EISC’s adaptation test instruments.

A high PTMEA Corr means that an item is able to distinguish between the ability of respondents and a negative value or zero indicates that the link for the item response is in conflict with the variable or construct. Have several items which show negative value and zero of PTMEA Corr. The items are 10: A110, 29:B1A, 31:B1C, 37: B3A, 38:B3B, 39:B3C, 40:B3D, 43:C1C, 45:C2B, 55:D6 and 56:D7. Therefore, it can be conclude that has several items cannot be contribute to the measurement of EISC’s adaptation respondents. The items cannot discriminate or differentiate between different types of EISC’s adaptation held by the respondents.

**Residual Principal Component Analysis (PCA):** Table 4 shows a segment of principal contrast analysis of Rasch Principal Component Analysis (PCA) used to identify the uniformity of instrument dimension. The variance explained by measures is noticeably 33.10 percent which is not exceeding the minimum border of 40 percent that Rasch needed. However, the unidimensionality of the survey instrument is confirmed by a more likely to be good unexplained variance in the first contrast (10.1%) which is well controlled and quite far from the ceiling of 15 percent and this evidence further support the structural aspect of construct validity.

**Table 4. Residual Principal Component Analysis (In Eigen value Unit)**

<table>
<thead>
<tr>
<th>Table of Standardized Residual Variance (in Eigenvalue units)</th>
<th>Empirical</th>
<th>Modeled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total raw variance in observations</td>
<td>61.3</td>
<td>100.0%</td>
</tr>
<tr>
<td>Raw variance explained by measures</td>
<td>20.3</td>
<td>33.1%</td>
</tr>
<tr>
<td>Raw variance explained by persons</td>
<td>13.6</td>
<td>22.1%</td>
</tr>
<tr>
<td>Raw variance explained by items</td>
<td>6.7</td>
<td>10.9%</td>
</tr>
<tr>
<td>Raw unexplained variance in 1st contrast</td>
<td>41.0</td>
<td>66.9%</td>
</tr>
</tbody>
</table>

The Result of Distillation: The validity of instruments scale for EISC’ sedative using the Rasch Model was noted a several items which is misfit and will dropped. After the distillation process, the items leaving are about 37 items. As a result of this analysis, an instrument that meets the refined results of measurement parameters such as shown in Table 5 below. The slant given in Table 5 is an EISC’s adaptive original value. Meanwhile, outside the bracket is the best measurement purified value.

**Table 5. Instrument Scale of Sullivan Emotional Intelligent for Malaysian Children after Distillation**

<table>
<thead>
<tr>
<th>Item (After Distillation)</th>
<th>Item (Before Distillation)</th>
<th>Person (After Distillation)</th>
<th>Person (Before Distillation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>0.94</td>
<td>(0.65)</td>
<td>0.93</td>
</tr>
<tr>
<td>Infit MNSQ SD</td>
<td>0.39</td>
<td>(0.36)</td>
<td>0.42</td>
</tr>
<tr>
<td>Mean Error</td>
<td>0.50</td>
<td>(0.73)</td>
<td>0.61</td>
</tr>
</tbody>
</table>

PCA Variance Measured: 56.2% (33.1%), Unexplained 1st Contrast: 11.8% (10.1%)

Based on Table 5, the instrument has been refined to show the reliability characteristics better than before where the changes from 4.54 logic to 7.73 logic for a range of items. While for the person changes from 6.09 logic to 10.49 logic, it is shows an increase longer yardstick and encouraging for the item by 3.19 logic. The PTMEA Corr guideline show that higher increase at 56.2 percent which is over the minimum level of 40 percent needed in Rasch analysis. It is show that the clean instrument (EISC’s adaptive after distillation) has enough ability to measure of what supposed to measure.

**Conclusion**

Based on the result after distillations there are several items that need dropped and leaving 37 items from the 59 items. The clean instrument (after distillations) of Sullivan Emotional Intelligent Scale for Children (EISC) in Malaysian children context was found to be
having a higher value of reliability then the original one. This concluded that the adaptation scale after distillation can be used to measure the level of EI in Malaysian preschool children.

**Funding:** Nil

**Conflict of Interest:** NIL

**Ethical Clearance:** Obtained through Research Committee

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Online Trust: Examining Identity on Health Related Tourism Websites in Southeast Asia

Mohammad Ali Moslehifar¹, Noor Aireen Ibrahim², C. Sandaran³

¹Student, ²Senior Lecturer, ³Senior Lecturer, Language Academy, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Malaysia

Abstract

Health tourism is the process of leaving one’s home country to travel to a destination country in order to seek medical treatment. In recent years, health tourism has seen a sharp growth, particularly in Southeast Asia. Fuelled with the role of internet to offer information about medical destinations, the trustworthiness of health tourism websites plays a crucial role in the decision-making process of tourist patients. Although trust has been examined in different areas, trust construction of health related tourism websites via the focal theme of identity is still at its infancy. This study examined the construction of trust on three health tourism hospitals in Malaysia, Singapore, and Thailand. The findings of this study revealed how trust is constructed via the central resources of identity. The findings have significant implications for website developers and health tourism researchers as well as providing key insights on trust construction.

Keywords: Health tourism, online trust, identity, health websites.

Introduction

Health tourism is known as the combination of activities which includes hospitality, cultural experience, and medical services when people leave their home country to seek medical treatment¹. High quality healthcare service with lower cost²³ is among the main reasons health tourism industry has seen incredible development with revenue expected to increase to $200 billion by 2020⁴. In Southeast Asia, Malaysia, Thailand and Singapore are known as the top health tourism service providers⁵. Malaysia and Thailand are known for quality healthcare services and qualified medical specialists; and Singapore for the short waiting time and advanced medical technology⁶.

The availability of information via the internet has encouraged tourist patients to seek information about destinations and the offered health services that meet their specific needs⁷. Among the available online resources, hospital websites play a crucial role in providing information about the medical treatment that patients seek⁸. In this sense, access to trustworthy information is key in attracting tourist patients⁹.

Trust is a notable phenomenon that helps tourist patients make decision without feeling fear¹⁰. Numerous studies have been conducted to address the concept of trust in different fields of social sciences such as business¹¹, computing¹², doctor-patient communication¹³, quality of health tourism websites¹⁴, significant effect of trust on medical tourists’ attitudes¹⁵. According to Candlin and Crichton¹⁶, trust is constructed through different focal themes, one of which is credibility. Each focal theme has specific dimensions and in the case of credibility, one of its central dimension is identity. Identity plays a key role in the process of decision making for tourist patients⁹. However, the construction of trust through the central dimension of identity in health websites has yet to be examined. Hence, this paper is interested to investigate trust construction via the central dimension of identity on the top ten health related tourism websites in Southeast Asia.

Online Trust and Health Tourism: In terms of the focal themes of trust, Candlin and Crichton¹⁶ proposed the following: credibility, expertise, identity, characterisation, capacity, recognition, relationship, purpose, agency, membership, risk, and responsibility,
which are twelve interconnected themes to construct trust. The concept of credibility has been identified as synonymous to trust and in other studies may refer to consistency and truth in relation to persuasive sources, message construction, and media perceptions\(^{17}\). Credibility is constructed through the dimensions of identity, which has the following key features: i) background, ii) history, iii) language, and iv) culture of an organisation Candlin and Crichton\(^{16}\). As such, when these four resources are made available, the information will be deemed trustworthy.

Online trust plays a significant role in ensuring better online communication among individuals, groups and organisations\(^{18}\). The lack of trust may lead to ineffectual communication, and unproductive working relationships\(^{19}\). Trust on health related tourism websites is crucial for consumers’ health decision making process\(^{20}\). In this context, Zucker\(^{21}\) believed that the identity of the parties involved can shape trustworthy expectation, which is the main focus of analysis in this paper.

Identity includes resources about locations, dates, names, roles, and relationships\(^{22}\), which in the perspective of Ronzhyn\(^{23}\) are useful components to construct trust. This is aptly pointed out by Perloff\(^{24}\) that the profile of an organisation offers an opportunity to consumers to learn about the identity of the organisation. Establishing the identity of organisations is largely based on the organisational relationship with consumers, supporters, and owners\(^{25,26}\). In addition, according to Wilcox\(^{27}\), providing evidences for institutional achievements are significant for identity construction as it is a testament of the knowledge of the organisations\(^{16}\). With regard to a hospital’s quality improvement, World Health Organisation (WHO)\(^{28}\) reported that accreditations and awards are the major indicators of the hospital’s identity. Similarly, Paliszkiewicz and Klepacki\(^{26}\) pointed out that establishing professional achievements, licenses and awards on websites of organisations; reflect the identity of the organisation.

**Methodology:** Qualitative method of data collection was utilized for this study. Data was collected via documentation by downloading the relevant sections and subsections from the three private hospital websites within the period of one week (2 January 2017 to 9 January 2017). The hospitals selected are ranked top 10 by the world’s best hospitals for medical tourists as reported by the website of Medical Travel Quality Alliance (MTQUA) from 2010 to 2014. The three hospital websites examined in this study are: Prince Court Medical Centre (PCMC), Malaysia; Gleneagles Hospital (GH), Singapore; and Bumrungrad International Hospital (BIH), Thailand. Data for this study were retrieved from the following pages including “Home Page”, “Navigation Bar Sections” and “Sub-Sections” as shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1. Information analysed on the selected websites</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Website</strong></td>
</tr>
<tr>
<td>Prince Court MC</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Gleneagles H</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Bumrungrad IH</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

The data for the current study focused on the following sections and sub-sections; the background of hospitals\(^{16,22}\); the hospitals’ relationship with other organisations\(^{25,26}\); and the list of accreditations and awards\(^{26,28}\). Data analysis was conducted on the selected health related tourism websites to identify the central resources of identity on the promoted information.

**Findings and Discussion:** The first central resource of identity were found through the references made to the location of hospitals\(^{24,21,34}\) and the name of owners and supporters\(^{25,26}\) in the “Hospitals’ Foundation” feature. For instance, the hospitals’ location was achieved via the following phrases “located in the heart of Kuala Lumpur, Malaysia” (Extract 1); “Located next to Singapore Botanic Gardens” and “close to the heart of the local shopping district” as underlined in Extract 2;
and “located in the heart of Bangkok” as shown in Extract 3.

(Extract 1): Prince Court Medical Centre is a 277-bed private healthcare facility located in the heart of Kuala Lumpur, Malaysia...

(PCMC-Top Navigation – About Us)

(Extract 2): Located next to Singapore Botanic Gardens and close to the heart of the local shopping district...

(GH-Home Page – Footer – About Us)

(Extract 3): Bumrungrad International is a Joint Commission International accredited, multi-specialty hospital located in the heart of Bangkok, Thailand...

(BIH-Top Navigation – About Us – Corporate Information)

The highlighted phrases address the specific location of hospitals to explicitly locate the hospital in a well-known district or area to show their actual existence. It is interesting to note that the description of the hospital location is always made in reference to a well-known landmark (e.g. Kuala Lumpur, Singapore Botanic, and Bangkok). It is through the identity of these well-known landmarks that the hospitals establish their own identity located in or near an established land-mark that is not only well-known but also accessible.

Under the central resource of “Hospitals’ Foundation”, the names of owners, supporters and affiliates of the institutions and in this case, the hospitals, were highlighted in the health tourism website. The hospitals’ foundation is constructed via claiming evidences (e.g. partners profile, well-known people or organisations) to persuade viewers that the content is trustworthy. For instance, introducing the owner of Prince Court Medical Centre via the phrase “Petronas Malaysia’s national petroleum company” as shown in Extract 4. Introducing supporter was achieved on Gleneagles Hospital via the phrase “Parkway Ambulance Service” as underlined in Extract 5; and highlighting the supporters of Bumrungrad Int. Hospital was achieved via the phrase “CBS’s 60 Minutes, NBC’s Today Show, Time, Newsweek, and other international press” in Extract 6.

(Extract 4): Prince Court Medical Centre is fully owned by Petronas, Malaysia’s national petroleum company. 

(PCMC-Top Navigation – About Us)

(Extract 5): Gleneagles Hospital is supported by Parkway Ambulance Service in the provision of emergency and non-emergency medical transportation...

(GH-Top Navigation – Plan Your Visit – Ambulance and Special Transport)

(Extract 6): ...It has been featured by CBS’s 60 Minutes, NBC’s Today Show, Time, Newsweek, and other international press as a leader in medical tourism...

(BIH-Top Navigation – About Us – Corporate Information)

All the underlined phrases highlight well-known organisations, which are affiliated to the hospitals. Most often, the hospital owners and supporters are trusted or well-known organisations, hence enhancing the trust of the viewers.

As for the third central resource of identity, accreditations and awards, foregrounding professional achievements of a particular organisation enhances the trustworthiness of the organisation. In this study, the central resource of identity is evident in the information available under the “Accreditations and Awards” section. For instance, the name of certificates and awards were highlighted on the website of Gleneagles Hospital “Singapore Service Excellence Medallion Commendation Award” as underlined in Extract 7; and the phrase “Joint Commission International (JCI)” on Bumrungrad Int. Hospital website as shown in Extract 8.


(GH-Home Page – Header – Singapore Service Excellence Medallion)

(Extract 8): Bumrungrad was the first Asian hospital accredited by the Joint Commission International (JCI), the international arm of the organisation that reviews and accredits American hospitals...

(BIH-Top Navigation – About Us – JCI Accreditations and Awards)

According to Wilcox establishing awards on health websites is one of the most important evidences to construct trust and persuade the patients of the organisation’s credible background. In the current study, the data shows that publishing the certificates and awards clearly enhances the credible character of the hospitals.

The analysis of identity as the central dimension of credibility in this study was carried out by analysing information in the central resources of “Hospitals’ Foundation” and “Accreditations and Awards”. Establishing the resources about location and location.
introducing owners and supporters in the central resource of “Hospitals’ Foundation”; and highlighting the certificates and awards in the central resource of “Accreditations and Awards” all contribute to the identity construction of the hospital.

Conclusion

In summary, this paper examined the construction of trust through the focal theme of credibility and its central dimension – identity, across the three health related tourism websites from Malaysia, Singapore and Thailand. The focal theme of identity was found through the two central resources of “Hospitals’ Foundation” on the three selected websites, and “Accreditations and Awards” on the Gleneagles Hospital and Bumrungrad Int. Hospital websites. The analysis show that trust through its focal theme of credibility is constructed through information found on the central resource of “Hospitals’ Foundation” which includes information about the hospitals’ location, and founders and supporters. In addition, identity is also constructed through the central resource of “Accreditations and Awards” which refers to resources about the certificates and awards achieved by the hospitals.

From the findings of this study, it is clear that identity as the central dimension of credibility is important in the construction of online trust. Hence, for website developers or any online platform in which involves the dissemination of crucial information, it is important that the identity of the organisation or institution is readily available for easy access by the public. It is also imperative to include key features of identity such as location, achievement and affiliates to further enhance the trustworthiness of the website. Once the website is deemed trustworthy, important information that needs to disseminated will be readily accepted by member of the public.

Conflict of Interest: No potential conflict of interest was reported by the authors.

Source of Funding: Self source

Ethical Clearance: Done research committee

References


Coping Strategies and Challenges among International Married Postgraduate Students in Universiti Teknologi Malaysia

Narjes Rahmani Movahed¹, Mahani Mokhtar², Zainudin Hassan²

¹Student, ²Associate Professor, School of Education, Universiti Teknologi Malaysia, Skudai, Johor

Abstract

There have been numerous researches on international students’ experiences and challenges at Malaysian universities. However, there has been lack of research on the experiences and challenges of married international postgraduate students at Malaysian universities. Therefore, this study explored the experiences and challenges faced by international married postgraduate students during first year of studying in Universiti Teknologi Malaysia. This study investigated their experiences, challenges, effects of the challenges on their academic performance and also their coping strategies. Qualitative research approach and phenomenological design were adopted, and data were collected using semi structured individual interview. The interview data were analysed using thematic analysis. The data showed that international married students and their spouses encountered different types of experiences and faced numerous challenges during their first year of studies. The experiences and challenges were related to children, health care, accommodation, climate and food. As a result, ultimately these challenges affected their academic performance. In addition, the themes on coping strategies were time management, family and social support.

Keywords: International Married Students, Experiences, Challenges, Coping Strategies.

Introduction

Malaysia has become a hub for international students from all over the world. For the purpose of internationalizing higher education, universities are in need to recruit and enrol international students¹. In addition, pursuing higher education abroad and attracting international students for the purpose of academic studies and educational tourism has now become a trend ². The growth of international students’ enrolment in Malaysian universities in postgraduate programs validates the importance of education in this region.

However, homesickness, language barrier, different educational systems and lack of social support are among the challenges faced by international students when they experience new culture³,⁴. Even though universities organise orientation programs for international students, the effects of cross-cultural transition is inevitable.

There are numerous researches on international students studying at Malaysian universities in different settings. However there is lack of research on the issues and challenges of international married postgraduate students. Therefore, this study intended to investigate and identify the experiences and challenges faced by international married postgraduate students during first year of study in Universiti Teknologi Malaysia.

Methodology: This study adopted qualitative research approach since it relies on the opinion and perception of the participants ⁵ and phenomenological design was chosen as it could provide a unified structure of the whole participant’s live experiences⁶. Phenomenological design was used in this research since the design allowed exploration of experiences and challenges faced by international married postgraduate students and their families during first year of study. In addition, issues on how the challenges affected the students’ academic performance and the strategies adopted to overcome those challenges were also being investigated.
Respondents of the study were international postgraduate students who are in their second semester or more and they were accompanied by their families. Therefore purposive sampling method was used in order to provide data for this study. All respondents were interviewed using semi structure interview method. A detailed summary of the respondents’ background is provided in Table 1 below.

### Table 1: Background of respondents

<table>
<thead>
<tr>
<th>Names</th>
<th>Gender</th>
<th>Countries of origin</th>
<th>Age</th>
<th>Status</th>
<th>Level of studies</th>
<th>No of Children</th>
<th>Duration of stay in Malaysia (Months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalia</td>
<td>Female</td>
<td>Saudi</td>
<td>35</td>
<td>Student</td>
<td>PhD</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Adu</td>
<td>Male</td>
<td>Nigeria</td>
<td>35</td>
<td>Student</td>
<td>PhD</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>Fatima</td>
<td>Female</td>
<td>Nigeria</td>
<td>33</td>
<td>Spouse</td>
<td>Master</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Aimen</td>
<td>Male</td>
<td>Iraq</td>
<td>33</td>
<td>Student</td>
<td>Master</td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>Amina</td>
<td>Female</td>
<td>Iraq</td>
<td>31</td>
<td>Student</td>
<td>Master</td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>Faran</td>
<td>Male</td>
<td>Pakistan</td>
<td>35</td>
<td>Student</td>
<td>PhD</td>
<td>2</td>
<td>28</td>
</tr>
<tr>
<td>Asima</td>
<td>Female</td>
<td>Pakistan</td>
<td>33</td>
<td>Spouse</td>
<td>Master</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>Ali</td>
<td>Male</td>
<td>Pakistan</td>
<td>38</td>
<td>Student</td>
<td>PhD</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Banu</td>
<td>Female</td>
<td>Pakistan</td>
<td>38</td>
<td>Spouse</td>
<td>Master</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

The data were analysed using thematic analysis since it allows interpretation of phenomenological data. According to Boyatzis, thematic analysis would assist the researcher to attain an explicit image of the raw data and be more engaged with the collected data.

### Results

Results of the study can be divided into several themes and sub themes. The first theme which emerged from the data of students’ experiences was cultural differences. Most of the respondents highlighted elements of Malaysian multi ethnic culture which influenced their positive living experiences. “I surprised just from one thing. In Malaysia has three different cultures. I see Malays, Chinese and Indians, different culture, different God, different religion but very peaceful” (Aimen, Iraq).

The second theme was about living adjustment and how they settled in new environment. Consequently, at the phase of adjusting, the feeling of homesickness was mentioned by majority of the respondents. For example one respondent highlighted that, “I am totally a home-oriented person. I never lived out of my home before or never got a chance to live in a hostel as such so for me was a shock of moving away from my home and of course, being away from home it was difficult” (Faran, Pakistan).

Furthermore, the data on students’ challenges which was the second research objective of the study revealed a wide range of transitional challenges. Four themes emerged from the findings which are; children, health care, accommodation and climate and food.

The importance of children’s education in a foreign country was the significant challenge. Majority of the respondents who have school aged children put priority on quality of education. Most of them mentioned that the school system in Malaysia is different from their respective countries and therefore it caused challenges to adapt. “Malay public schools are not English, they are not doing in international language and we don’t know Malay language (laughter) and the Chinese schools are good but their study is not too much good like our Pakistanis schools, like their books are much difficult than the Chinese schools, so the study is the major issue for us” (Asima, Pakistan).

Another issue related to education was financial challenge since the high amount of fees charged by international schools became an obstacle for them to send their children to schools which use English as medium of instruction and also with international syllabus. As a result, one respondent had to leave two of his school aged children back home and only brought the infant one. “The system is different here in Malaysia, the international schools are paid monthly but, in my country, it is paid termly which is three times a year and so here is costly. I left the elder ones back home and just brought the small one” (Adu, Nigeria).
Furthermore, some respondents highlighted the challenge in the aspect of lack of day care centre for children. Therefore, for couples whom both are students, it is difficult for them to juggle between studies and childcare. “Like coming here with kids is very challenging. Is not easy at all, because the first issue is when you are going to attend classes is that where do you keep your kids. Like in UTM they don’t have any day care for kids and off-campus day-care centres are expensive and time consuming” (Fatima, Pakistan).

The next theme which emerged pertaining to the challenges faced by students was in relation to health care. “My family don’t have any health coverage. They can have some insurance, but I think is only the payment, no outcome from the insurance because it covers accidental conditions, not a regular. Like if they are feeling cough or they are having fever, ... anything like this the insurance won’t support.” (Ali, Pakistan).

Furthermore, location of health care provider also was mentioned. “Another thing is the hospital. It’s very far from university. I cannot take my children to hospital or clinic. They are just open in the morning and afternoon. But sometimes you need to go to see a doctor at night, like emergency, especially when kids have high fever or cough. So, it’s the most challenge to me, I cannot do anything I just crying because I want to go to doctor” (Amina, Iraq).

In addition, another challenge faced by the respondents was in the aspect of accommodation. Matters concerning process of accommodation application, lack of in-advance platform to apply, conditions of the campus houses and higher cost of off-campus housing were among the feedback of the respondents. For example, “Actually, there was no platform by UTM here for students to get formally accommodation in advance. The system is like you have to get your family here before you get for the accommodation. So, it was very challenging to get accommodation” (Adu, Nigeria).

“The outside houses are a bit expensive and the housing inside the university is very difficult to get because there is a drop process and usually there are very less available flats. For the last two or three times I have tried but it was seven to 10 flats I think was available at a time and the applicants were more than 17. So, it’s not possible and usually is difficult to get home inside university” (Ali, Pakistan).

The next challenge was on climate and food. As an example, one participant claimed that in her home country there are four seasons but there is only one season in Malaysia which is hot throughout the year. This caused difficulty for her in the beginning. She stated that;

“My experience with weather, here is one season and hot and humid but in my country four season. So is difficult because somehow it hurts me. I have Sensitive skin and many mosquitos here were difficult at the beginning (laughter)” (Amina, Iraq). Regarding food issues, Dalia simply replied that “food it takes time because we don’t eat spicy hot food and it was really hard for kids to adopt for the food” (Dalia, Saudi).

The third research objective was on the effects of those challenges on their studies. One theme which emerged from the data was on academic struggles. All the participants reported that those challenges affected their academic performance. One respondent mentioned that juggling between family adaptation issues and time spent on her children’s education had affected her study. “My challenge with having family with me and putting lots of efforts it’s kind of really hard for me and sometimes I struggle my performance won’t be the way I wanted so was really hard for me to teach the kids and at the same time work on my study” (Dalia, Saudi).

Another respondent who is a wife highlighted the struggle her husband had on managing study and family settlement. “Off course while he is attempting to settling our children school and home and a lot of things. He has a lot of pressure, so he is not focusing on his lab work, actually he is a technical student, so he has to be focused on lab”. (Banu, Pakistan).

The last research objective was on the strategies adopted by the respondents to overcome those challenges. The coping strategies they employed were time management, family support and social support.

One respondent highlighted that, “I preferred to study at home at night while my children sleep. My schedule is such that during day I sleep I think time is the only thing that we cope with issues, you need to spend time and to observe things ” (Faran, Pakistan).

Then in relation to family support, majority agreed that emotional and financial support from their family members especially their spouses had reduced the stress which they felt while studying.
One respondent reiterated that, “Their support is of course important so maybe they emotionally charge you in some certain extend that you can always accomplish your academic task well before time... on the other hand I feel that the time I rather spend with my family I could have been spending my on my PhD task but on the other hand I think that if they were not with me I am so emotionally disturb that could not concentrated on my work as such” (Faran, Pakistan).

Other respondent stated that, “My wife is thinking to do activities at home to make some money, just planning. And, she is working hard to home-schooling our children and educate them at home” (Ali, Pakistan).

Lastly, the theme on social support was mentioned, “I try to make friends as much as possible it was only after that I tried to adopt and try to meet with some people even if we couldn’t communicate together. meeting with locals was the most helpful, because by meeting them I was trying to understand few of their language and know how to eat their food, mostly from my neighbours” (Adu, Nigeria).

Discussion

In terms of experiences, Pascoe\textsuperscript{10} indicated that the first reaction an international student has about the new culture is known as culture shock. Indeed, this was the first experience shared by most of the participants. Although being stated as cultural difference in the study, but the meaning is the same. Even though experience of culture shock often accompanied by stress\textsuperscript{11}, only few respondents reported it and for majority the experience of being in a different culture was a pleasant experience.

Issues pertaining to children, health care, accommodation, food and climate were stated by majority of the respondents. In a study by Suárez-Orozco\textsuperscript{12} children’s level of adaptation in a new environment is reflected through their academic and education. In other words, good schools could maintain the need of children, respect their student’s identity and value their culture. However, concern on children’s education, the curriculum and discipline of local educational systems, lack of day-care centre at university and the issue of children’s entertainment were highlighted by all the respondents.

Lack of proper health care services as a general living condition\textsuperscript{13} was pointed out by most of the participants. The insurance coverage for both students and their families were an issue as it only covered for emergency cases. Since most of the respondents were financially tight, for them paying the high health related fees was an obstacle and stressful concern.

The issue of in-campus and off-campus accommodation and its comparison emerged in the data. University accommodations were expressed as their desire accommodation to live as the fees are much affordable and accessible to all the facilities, transportation and academic colleges as compared to off-campus houses. In addition, living inside campus can prevent the feeling of isolation and existence of their homeland fellows would assist them to reduce their acculturation stress and fulfil the sense of their home country\textsuperscript{14}. However, unavailability of advance booking system and limitation in the number of apartments had forced the respondents to choose off-campus housing.

Studying with children is a difficult task for parents, especially when living in a foreign country. Therefore, in that situation, other stressors would affect their concentration on academic work\textsuperscript{15}. Issues with children, more importantly their education condition was among the challenges mentioned in this study. In addition, language barrier also affected their academic performance. Lack of English and Malay proficiency created a challenge in their process of adapting to the new culture and academic work\textsuperscript{16}.

Managing their time wisely was the most common strategy mentioned by the respondents. The theme is similar to other studies by various researchers\textsuperscript{17} who stated that time management is crucial. Another strategy, which emerged from the responses, was family support. For married international students, the existence of their family members is a blessing since it gives motivation for them to persevere and succeed in their studies.

In conclusion, experiences, challenges and strategies adopted by international married postgraduate students are aspects of lifelong learning, which need to be taken into consideration by universities in order to ensure positive learning experience among international students.

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Improving Spatial Visualization Skills in Educational Settings

Marlissa Omar¹, Dayana Farzeeha Ali²*, Johari Surif², Mahani Mokhtar², Nurul Farhana Jumaat², Norazrena Abu Samah², Zakiah Mohamad Ashari²

¹Scholar, School of Education, ²Senior Lecturer, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia (UTM), Skudai, Johor, Malaysia

Abstract

Spatial visualization skills have been demonstrated to be one of the critical skills to guarantee success in Science, Technology, Engineering and Mathematics (STEM) education and careers. With the fast-paced technological progress nowadays, numerous visualization tools have been designed to address the lack of visualization problems in educational settings. However, there is a lack of studies evaluating the implementation of these visualization tools. To address this gap, this study will provide a systematic review of empirical research involving improving spatial visualization skills in instructional environments. A total of twenty-one articles were examined between 2009 and 2019. Analysis has revealed that the use of visualization training tools significantly enhances learners’ spatial visualization skills, as well as other aspects such as performance, motivation and problem-solving skills.

Keywords: Visualization skills, spatial, education, systematic review, STEM.

Introduction

This paper intends to present a review of the literature that focuses on improving spatial visualization skills in instructional environments. This section will provide the overview of issues regarding visualization skills studies.

Various research in this field is studying the impact of spatial visualization skills towards students’ confidence¹,², performance³,⁴,⁵, motivation⁵ and skills such as cognitive skills⁶ and reasoning skills⁷. Even though these reviews concisely summarize and discuss approaches implemented in improving spatial visualization skills in educational settings, there is an increase in the utilization of technologies as visualization tools, especially in medicine and engineering subject area. This is due to the importance of spatial visualization skill in Science, Technology, Engineering and Mathematics (STEM)⁸. According to Malaysian Blueprint 2013-2025, there are initiatives aimed at fostering STEM learners with the skills to prepare them with the fast-paced advanced technology⁹.

According to Scopus database, there has been an increase in the number of studies regarding spatial visualization skills in education. Researchers have begun to realize the significance of nurturing and training these abilities towards the future of the learners. This skill is also identified as one of the intelligent domains in multiple intelligence theory.¹⁰ Spatial visualization skills are defined as “the mental manipulation of spatial information to determine how a given spatial configuration would appear if portions of that configuration were to be rotated, folded, repositioned, or otherwise transformed”¹¹. Spatial visualization skills have been receiving high interests in various subject areas including Medicine, Computer Science, Engineering, Social Sciences, Mathematics, Health Professions, and Earth and Planetary Sciences¹²,¹³.

Due to the importance of spatial visualization skills, particularly in the STEM field, researchers have

Corresponding Author**
Dayana Farzeeha Ali
Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia

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come out with different approaches to address the spatial visualization skills problems. Some of the issues recognized are the dependence of young people on the machine or technology that has an impact on reducing their perception ability\textsuperscript{14}. Other than that, there are significantly higher differences in individual’s spatial visualization skills, particularly in higher education, because, during the pre-university phase, there is no emphasis on this ability.\textsuperscript{15} Gender differences are also one of the problems in this domain where men’s spatial visualization skills are mostly developed than women\textsuperscript{16}. Several studies also mention a low level of spatial visualization skills among first-year university learners. These are a few of the spatial visualization skills problems that trigger the researcher’s need to create a strategy to minimize learner problems\textsuperscript{17,18}. The issues differ according to the subject area and the complexity of the topics. Thus, this literature review will address the specific literature on the successful implementation of various visualization training tools in various subject areas.

**Research Questions:** A systematically analysis of the empirical research identified in this study is conducted on improving spatial visualization skills in instructional environments. In order to address the issues in the reviewed literature above, these are the research questions that have been constructed for this literature review: (1) Which subject areas commonly studies on approaches to improve visualization skills?; (2) What are the observed advantages of using visualization tools in educational settings?.

**Methodology:** To identify the studies to be included in this literature review, the Scopus database (https://www-scopus-com) is selected. Noted that the searching process for the articles is according to the prepared research string: ((Visualization Skills) OR (Spatial Visualization) AND Tools AND Education).

**Inclusion and Exclusion Criteria:** To ensure all the research questions in the previous sections were addressed, the following criteria are integrated in order to identify the research studies which will be included in the review:

**Inclusion Criteria:**

- Studies must directly address one of the research questions addressed in the previous section (Visualization Skills/Spatial Visualization, Education, Tools)
- Studies should be published between January 2009 and April 2019
- Empirical research studies to ensure that this review will focus on building knowledge surrounding visualization skills in education.

**Exclusion Criteria:**

- Studies which document types are labelled other than “articles” in the databases searched. (i.e., conference papers, conference reviews, book chapter, review, book and undefined)
- Studies which used a language other than English.

**Procedures:** A total of five hundred and ninety-four papers were gathered based on the keywords mentioned in the previous section through the Scopus database. Through the automatic filter function, searches were then filtered automatically by publication years (January 2009 to April 2019), document type (article) and language (English). The database searching for this paper was conducted on June 11, 2019. Manual sorting process was incorporated to ensure that only the most relevant papers that fit the inclusion and exclusion criteria are selected to be reviewed. This is by reading through the title and abstracts of the identified papers intensively. After the manual sorting process, twenty-one articles remained relevant to this study.

**Results**

Based on the reviewed articles, the most cited article (78 times cited) is a paper addressing improving spatial visualization skills in medical subject area. This is followed by a paper in geology (24 times cited) and engineering graphics (15 times cited).

**RQ1- Subject Areas:** Results related to the types of the subject area commonly studied on approaches to improve spatial visualization skills indicates that geography (n=5) is the most commonly studied subject area followed by engineering (n=4), medical (n=4), Science (n=3), and Mathematics (n=1). However, there is other subject areas, such as basic concepts of spatial visualization, apparel design and psychology identified in the reviewed articles.

**RQ2-Advantages of Visualization Tools in Education:** Findings found from the reviewed articles shows that there is an explicit agreement on the use of visualization tools to improve spatial visualization skills in educational settings. Spatial visualization skills are
skills that can be enhanced with appropriate training, mainly intended training design specifically to train spatial visualization skills. In the studies reviewed, varieties of visualization tools were used to enhance the visualization skills of students. However, there are also other aspects found in some of the research apart from improvements in visualization skills.

The first aspects observed in some studies is improved understanding. These studies discovered that apart from enhancing the visualization skills of students, their knowledge also improved considerably. Babu, Suman and Srivinasa Rao drew a comparison between student examination results, showing a drop in the student failure rate of up to 85 percent. The results of the exam are compared between the students’ batch, which utilizes the visualization tools and conventional mode. The results showed an increase in understanding among students learning using visualization tools because understanding spatial representations help to boost the efficiency of learners considerably. Especially among geoscience major, spatial visualization is essential for understanding geological characteristics where there is an essential connection between spatial visualization skills and problem-solving capacity.

Using suitable tools to train spatial visualization skills could improve the training’s efficiency, particularly when the instruments were created solely based on content. As an example, the use of augmented reality to enhance spatial visualization skills has a significant advantage when attempting to make learners understand the rotation and transformation of objects related to each other. Other than that, another aspect is enhanced problem-solving skills. A research that demonstrates students studying geoscience course using visualization tools showed an increase in their geological knowledge-related problem-solving skills. It is also stated that students require visualization skills to solve geological problems, thus contributing to the outcomes provided. Thus, this result may vary depending on the types of courses examined, where it may demonstrate contrasting results for some courses.

Next, the use of visualization tools in educational settings also showed increased motivation among students. A study by Önal, Önal and Büyük found that students showed an increase in motivation when learning using visualization tools in the classroom. It improves their involvement during classes, encouraging learners to learn more interactively. Students were more satisfied with the use of technology as visualization tools as they felt it could boost the quality of education and facilitate learning. Other than increased motivation, they also found that using visualization tools is timesaving. By utilizing visualization tools in the lessons, students can quickly grasp and concretizing the abstract concepts. In addition to students benefiting from the use of these tools, teachers can also save more time to clarify the complex concepts and concentrate more on providing the students with important information.

Discussion

Findings from this literature review demonstrate a prevalent knowledge of implementing visualization tools in instructional environments primarily to improve spatial visualization abilities. There is an increase in the development of visualization tools in various fields in the excluded research papers. These research papers provide an empirical study which statistically proves the effectiveness of the proposed visualization tools. Some of the excluded research papers also proposed a specific framework for developing an effective visualization tool in particular field or subject areas. This shows that there is still a lack of research on the development framework for visualization tools that can work for all fields.

In the literature review sections, it has been addressed that spatial visualization skills are often studied to find out its relationship with performance, motivation and skills. This review has identified some of the relationships in the reviewed studies. Huynh and Sharpe identified that spatial visualization skills positively correlates with problem-solving skills. In this study, it is found that students with higher spatial visualization skills tend to use multiple problem-solving methods while students with low spatial visualization skills tend to use the basic problem-solving method when solving a given task. Other than that, studies also found that spatial visualization skills have an impact on students’ motivation to learn. Findings from this research show a substantial enhancement in the overall spatial visualization skills of learners after integrating visualization tools into the learning environment. The author also receives feedback from learners after learning to use more visualization tools applications as it can assist them to improve the precision of their visualization activity. Based on the review, it is proven that spatial visualization skills are important in Science, Technology, Engineering and Mathematics. In addition, technology has the potential to boost students’ learning as it brought
positive impact in speeding up their learning process. Thus, incorporating technologies as spatial visualization tools is recommended for educators.

**Conclusion**

Visualization is commonly researched in various fields, particularly in science, technology, engineering and mathematics (STEM). Today, a range of technologies are introduced to ease visualization tasks primarily to allow learners to learn effectively, efficiently and interactively. Technologies such as augmented reality, virtual reality, and virtual environment are often used to cater to learners’ visualization problems at school or university level. Increasing numbers of research in this field show that visualization skills are considered necessary for learners, particularly in the STEM field. However, teachers and educators need to find out the most efficient methods to develop and enhance visualization skills based on content characteristics in each respective course. Furthermore, more empirical studies should be conducted to find out whether improvements in spatial visualization skills might affect more aspects in various subject areas. This is to guarantee that efforts are not wasted in creating an appropriate method to improve visualization skills in educational environments.

**Conflict of Interest:** None

**Ethical Clearance:** Done research committee

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Enhancing Training for Multicultural Counseling Efficiency According to the School Counselors Perspective Toward Clients Psychological Health

Kamarul Md Shah¹, Aqeel Khan², Rozita Jayus³

¹Senior Lecturer, ³Lecturer, School of Social and Economic Development, Universiti Malaysia Terengganu, Kuala Terengganu, Terengganu, ²Senior Lecturer, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Johor, Malaysia

Abstract

Malaysian school students are multiracial and multicultural; thus, guidance and counseling services provided should be tailored to the needs of diverse clients. This circumstance requires school counselors to be competent for multicultural client’s psychological health in counseling sessions. The study attempted to obtain feedback from school counselors on the training of multicultural counseling competencies. The findings show, school counselors can demonstrate good training in multicultural counseling efficiencies and enhance the effectiveness of counseling sessions.

Keywords: Training, Multi-cultural Counseling, Psychological Health.

Introduction

Malaysia is a country of diverse cultures and societies. Migrants who come to work and study in Malaysia have added more diversity in society. Recent scenarios show that Malaysians are also faced with various social changes and challenges apart from migrants such as increases in coverage, divorce, family structure changes and illegal immigrant entry. This situation illustrates that the issue of cultural diversity has become important in counseling practices¹,²,³,⁴. Hence, practice on multicultural counseling exercises should be emphasized in counseling studies in preparation for current counselors to deal with cultural diversity issues. A student’s overall experience of school is shaped by many factors including individual characteristics as well as their family and immediate social networks, the societal and cultural context in which they live and learn⁵.

This situation is in line with the focus of the multicultural counseling exercise in America which gives major attention to the training of ethnicity and ethnic majority and minority to the trainees²,⁶,³. Multicultural counseling is a counseling service provided where existing and relevant cultural attributes are incorporated in the context of the counseling process carried out. These cultural attributes include ethnicity, race, gender, sexual identity, socioeconomic status, disability, age, and religious grip. This situation demonstrates the need to have multiple cultural counseling skills developed through a fourth approach in the field of counseling⁷. The same situation occurs in Malaysia where the standards of its counseling programs also emphasize the importance of multicultural competence training⁸.

According to Ministry of Education Malaysia, school counselors are full-time counseling teachers who carry out guidance and counseling activities in primary and secondary schools. They provide full-time service with hours of schooling as well as other subject teachers. Therefore, the full time of work must be fulfilled with guidance and counseling activities for all students in accordance with the prescribed guidelines either in degrees or in other suitable places⁹,²⁸. According to the Code of Ethics of Counselor by The Malaysian Counseling Association to researcher⁸, there are three...
parts to emphasize the importance of the need to improve efficiency and counselors specializing in various aspects of culture. This suggests that the detailed emphasis has been expressed in the code of ethics of counselors in the practice of counseling in Malaysia to meet the needs of counseling services for the diverse Malaysian community and culture.

**Statement of Problem:** At present, there are 5467 counselors in secondary schools with 1907 men and 3560 women who support the vision and mission of guidance and counseling services in the Malaysia’s school system. Meanwhile, in terms of racial proportions, 71.8% are bumiputeras, especially Malays and 28.2% are non-bumiputeras or other races, especially Chinese and Indians. This situation illustrates the diversity of students, leading to cultural diversity among high school students.

According to Ching Mey See and Kok-Mun Ng, at present, there is a lack of clear theoretical framework to be practiced by school counselors in relation to multicultural counseling. Therefore, school counselors only use the existing counseling theories to conduct multicultural counseling sessions, especially in understanding and planning appropriate treatment processes with multicultural clients. For the improvement of its development, school counselors need to incorporate various therapeutic approaches into their practiced techniques such as family counseling approach, psychological approach and multicultural approach. This is because there are features in the school’s diversity that are similar to what is happening in the Malaysian society.

In addition, studies on the effectiveness of multicultural counseling in Malaysia is still lacking as compared to the western context. Meanwhile, this competence is also one of the personal and professional characteristics that need to be addressed to school counselors and to influence their efficacy while carrying out guidance and counseling services to further enhance effectiveness. Therefore, this study aims to identify the various forms of multicultural counseling training among school counselors towards client psychological health.

**Research Methodology**

**Design:** This qualitative study design used the case study method of multicase-multisite by Yin (2003). The purpose of this study is to determining training to improve the efficiency of multicultural counseling. This study not only allows researchers to meet the participants directly but also be able to interact and to observe with empathy as the researcher is the main tool for the study.

**Sample:** The sample of this study consisted of 15 secondary school counselors in Selangor which were randomly selected with regard to demographic factors such as gender, race, education level, professional experience and school location. They also comprise survey respondents who have high levels of multicultural counseling skills based on Multicultural Counseling Competency Questionnaire by Kamarul previously conducted.

**Instrument:** This study was conducted qualitatively in which an interview protocol was developed and reviewed by the expert, and then used as a research instrument to get the information in depth from the sample of the study. The data were then analyzed using Nvivo 8 software to identify the theme to answer the research questions.

**Results**

**Training of multicultural counseling among counseling teachers:** To answer the question of this study, the analysis conducted using Nvivo coding techniques has resulted in three major themes that determine the practice of multicultural counseling skills in guidance and counseling services towards client psychological aspect namely (1) basic training, (2) exposure to multicultural counseling received during study and work, (3) training form during service.

**Basic training:** According to the survey respondents, the basic training they have is through a training course at the university and the training is not enough and requires further training. The knowledge and experience gained are the basis for conducting counseling sessions with multicultural clients. Among the statements of respondents are: “There is no exercise. Learn in the university only” and “Lectures and discussions with multicultural partners”.

The second sub-theme is the basic training received is insufficient for them to obtain or improve the efficiency of multicultural counseling. The following are the statements of respondents: “That’s not enough. Exercises are held like that. Additionally, if we’ve been studying for so long, there are many new things” and “For the knowledge of these competencies be given to
school counselors as much as possible. If there is a case that is too critical we can refer to the school counselor”.

There are also three sub-themes, the first one being the existing training needs to be improved either through university or counseling experience so that school counselors are always ready to carry out multicultural counseling sessions.

**Disclosure of multicultural counseling:** According to the survey respondents, disclosure of multicultural counseling is only through the course that follows their program of study in universities. All study respondents stated that they only received exposure in the form of a cross-cultural counseling course during university studies such as the following statements: “The study time in UPM has a cross-cultural counseling subject”.

We visited three friends in her home to recognize her Malay, Chinese and Indian cultures. We conducted a study using a questionnaire” and “I learned about these cultures through graduate and undergraduate levels”.

The second sub-theme that emerged was a study respondent stated that no exposure on multicultural counseling was received during work and all study respondents stated the same thing except for one study respondent. Here are some of the statements of respondents: “During my work, I have never followed any cultural-related courses or seminars but it feels that this is very important in our service” and “While working, only direct experience is obtained with students of different cultures, especially the Malays and the Chinese.”

**Training form during service:** Training during the service to obtain multidimensional counseling skills is through learning from experience, participating in student activities, learning through electronic media and using internet. For the first sub-theme of learning from experience, study respondents pointed out that they can observe and visit student homes to recognize and understand the student’s culture and way of life. Among the statements of respondents who supported the sub-theme are: “I will if there are other cultures in addition to Chinese and Malay as a foreign culture, I want to know their way of life, including the observation” and “Take a picture and send a report while studying first. A visit to a student’s home can familiarize yourself with the client’s culture. Go down the field and see for yourself”.

The second sub-theme is to participate in student activities, which means school counselors get a lot of benefits if they take advantage of any form of student activity; whether formal or informal. Here are some of the statements of the respondents for this sub-theme: “Join them in doing activities or courses that are considered informal training but this can directly make us aware and understand our students. Not necessarily for us as a committee member only” and “Among students, there is a cross culture that causes misunderstandings. Not only different students, but different teachers and different school cultures. So we’re together with them”.

**Discussion**

The training of multicultural counseling competencies, the study participants stated they only used the training received during their studies at the undergraduate or master’s degree as a guide to conducting multicultural counseling. For them, these exercises are inadequate where with only one cross-cultural course, they use them throughout the service as counseling teachers. They need continues training, so that this knowledge can be recalled and updated. This is in line with the studies that have been conducted on counselors who opted for input in multicultural counseling. This is because the effectiveness of the various cultural counseling services is closely linked to the counselor’s own willingness to deal with multicultural issues. Hence, inputs received at universities are one of the assets to improve the efficiency of school counselors in a multicultural environment. The study by Sue and Sue found that trainee counselors did not receive enough training in various cultures. They have provided feedback that a multicultural or cross cultural course is inadequate in preparation for clients from various cultures. According to Coleman, some experiences can significantly influence the multicultural training in counseling psychology programs. The respondents of this study emphasized more on current courses in the service as a new input and additional inputs for improvement. They see that this effort is important to be realized as school counselors in Malaysia are always faced with various cultural issues due to the diverse Malaysian students and society in particular in terms of race, ethnicity, religion and belief.

Extra knowledge is acquired through lectures, it is still inadequate to identify the needs in multicultural communities. Thus, training through experience requires the individual to engage with a multicultural community that will enhance the intellectual processes. Learning through this experience means a
profound and extensive experience gained by engaging in social, cultural, environmental and other aspects of the community\textsuperscript{20}. Learning through experience is also considered a valuable tool for enhancing the skills and competence of various cultures\textsuperscript{21}. Experiential learning also allows students to learn more effectively, suggesting where it helps them to see the importance of feelings and thoughts in addition to the increase of self-consciousness\textsuperscript{22}. Previous studies show that there are many forms of learning through experience that have been used in multicultural training\textsuperscript{23,24,25}. The benefits gained from learning through this experience can be maximized when an activity reflects the strengths and experiences experienced by the students collectively\textsuperscript{26}.

Furthermore, involvement in cultural activities is one of the ways that school counselors can do for the benefit of multicultural counseling. The study participants noted that through the involvement in cultural activities of the people in terms of festive and religious celebrations, school counselors will easily understand their clients and their cultures. This will help shape mutual respect and create a sense of belonging and similarity to one another. This means, a counselor can plan a treatment program that is appropriate to his client to understand and dive into the perspective of the client from his cultural perspective, life experience and cultural value. The counselor will then be seen as sensitive to his client’s culture and ultimately the counseling process will be enhanced\textsuperscript{27}. A school counsellor who is alert towards his client’s culture will be able to define his client’s problems, build goals and apply consistent treatment methods in the counseling process.

**Conclusion**

In conclusion, school counselors training in multicultural counseling efficiencies and enhance the effectiveness of counseling sessions demonstrate a good services towards clients psychological health. The three main themes that determine the practice of multicultural counseling skills in guidance and counseling services namely (1) basic training, (2) exposure to multicultural counseling received during study and work, (3) training form during service. All of these illustrate that school counselors are conscious of the importance of training multicultural counseling competence that affects the process of counseling and the effectiveness of multicultural counseling sessions. Additionally, school counselors should also be aware that these multicultural counseling efficiencies will increase their confidence in conducting counseling sessions with clients of different cultures and can have a positive impact on clients psychological health such as respect, sense of belonging, self-esteem and sense of equality which in turn will demonstrate the school counselor as an individual who cares for his students.

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**Ethical clearance:** Done research committee

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Does Psychological Empowerment Mediates the Relationship between Leader-Member Exchange and Organisational Citizenship Behaviour among Nurses?

Junaidah Yusof\textsuperscript{1}, Siti Aisyah Panatik\textsuperscript{2}, Azizah Rajab\textsuperscript{3}, Norakmar Nordin\textsuperscript{4}

\textsuperscript{1}Senior Lecturer, Faculty of Social Sciences, Quest International University, 30250 Ipoh, Perak, \textsuperscript{2}Associate Professor, \textsuperscript{3}Associate Professor, Language Academy, \textsuperscript{4}Lecturer, School of Human Resource Development and Psychology, FSSH, Universiti Teknologi Malaysia, Johor, Malaysia

Abstract

Despite great attention related to organisational citizenship behaviour in the literature, little is known about organisational citizenship behaviour among Malaysia public hospital nurses. Hence, this study aims to investigate the mediating effect of nurses’ psychological empowerment on the relationship between the leader-member exchange and organisational citizenship behaviour. This study was a quantitative study which used questionnaires to gather the data and 539 nurses had participated. The data was analysed using Structural Equation Modelling. The results found that psychological empowerment is a significant mediator between leader-member exchange and organisational citizenship behaviour. This study makes theoretical contributions by providing information concerning the Social Exchange Theory and its application to nursing practitioners.

Keywords: Organizational citizenship behaviour; nurse; psychological empowerment.

Introduction

Nowadays, organisations are confronting unanticipated challenges including changes in technological structure, shocks in economic trends, social changes, and structural transformations\textsuperscript{1}. Meeting all these challenges is indispensable for an organisation’s survival but it has become a tough trade to do \textsuperscript{2,3}. It is believed that positive employees’ behaviour can enable an organisation to cope with these challenges by practising organisational citizenship behaviour (OCB) among employees \textsuperscript{3-5,6}. OCB is an extra-role individual behaviour that is discretionary, not directly or explicitly recognised by the formal reward system, but it promotes the effective functioning of the organisation. Successful organisations need employees who will do more than just their formal job scope and provide performance beyond the expectation\textsuperscript{7,8,9}.

The successive increases in patient admittances to hospitals consequently lead to increases in nurses’ job demands such as workload, working period, pressure, and the need to solve problems in unexpected situations to satisfy patient’s expectations and achieve standard hospital service quality \textsuperscript{10}. The concept of OCB is useful for reducing nurses’ workload by promoting the inclination towards helping others, the feeling of responsibility, sharing information, and sportsmanship within nurses \textsuperscript{10,11}.

Literature Review

Relationship between LMX and Organisational Citizenship Behavior: According to the LMX theory\textsuperscript{12,13}, leaders form relationships of different levels of quality with their subordinates. Subordinates in high-quality LMX relationships receive greater levels of trust, attention, communication, and emotional support from their leader\textsuperscript{12,13}. Employee’s feeling of indebtedness for the good relationship from their leader can be paid back by performing behaviours that are above and beyond formal work requirements \textsuperscript{4,15}. A positive relationship between LMX and OCB is expected because OCB will help fulfil subordinates’ obligations and represent an exchange of
currency. Furthermore, study by Chernyak-Hai and Tziner have found LMX to be significantly associated with the quality of OCB. Meanwhile, those reporting low-quality LMX only perform the more routine tasks of a workgroup. Hence, subordinates with high-quality LMX will actually perform better because of the support, feedback, resources, and opportunities provided to them and it directly leads to OCB.

**Psychological Empowerment as Mediator:** High-quality LMX can increase employees’ psychological empowerment in the workplace. When subordinates feel psychologically empowered by their leader, it will lead to employees’ OCB. Past studies have shown that high-quality LMX is positively and significantly related to psychological empowerment. Furthermore, Schermuly and Meyer have indicated high-quality LMX increase psychological empowerment among employees since they perceive their job is more meaningful, self-determination, impact, and competence.

Furthermore, the past studies indicated that an increased in psychological empowerment will increase employees’ OCB in the workplace. Lin indicated that the smooth operation of an organisation does not simply depend on the employees completing the in-role job requested by the organisation, but also depend heavily on OCB. Besides, being able to participate in decision-making allows the employees to perceive the power of influencing their work and they would be willing to remain in the organisation by making efforts to achieve the organisational performance. Once the employees feel empowered, they are likely to exhibit the extra-role behaviour of their own free will.

### Method

The population involved 59,364 Malaysian public hospital nurses. The researcher distributed randomly 1531 sets of questionnaires and managed to get 539 respondents with the return rate about 35.2%. SEM AMOS 23 was utilized to analyze the data. Majority of the respondents are female nurses with 461 (96.8%), while only 15 male nurses (3.2%) participated in this study. The result also showed that most of the respondents are aged between 25-34 years (62.6%), followed by 114 nurses with the age of 35-44 years (23.9%). Only 36 nurses are below 25 years old (7.6%), while 28 nurses are aged between 45-54 years (5.9).

### Results and Discussion

Table 1 highlighted that high quality perceived contribution can increase the occurrences of meaningfulness which in turn increases the behaviours of altruism, courtesy, and civic virtue among nurses in public hospital of Malaysia. This study supported the previous studies that high quality of perceived contribution can lead to positive effect of meaningfulness feeling among employees and can lead to the behaviours of altruism, courtesy, and civic virtue among employees. High quality of work-based relationship between the leader and nurses benefits them by easing access to data, giving more feedback, and adding support from leader which in turn increase the meaningfulness at the workplace. High experience of meaningfulness causes nurses to feel more likely to perform some positive and extra-role behaviours beyond their formal duties as a return favour to their leader. These extra-role behaviours ultimately lead to performing of altruism, courtesy, and civic virtue among nurses.

### Table 1: Mediation Effect of meaningfulness in the relationship between LMX and OCB

<table>
<thead>
<tr>
<th>Path via Meaningfulness</th>
<th>Direct effect</th>
<th>Indirect Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>P-value</td>
</tr>
<tr>
<td>Perceived contribution → Altruism</td>
<td>.072</td>
<td>.392</td>
</tr>
<tr>
<td>Perceived contribution → Courtesy</td>
<td>.055</td>
<td>.528</td>
</tr>
<tr>
<td>Perceived contribution → Civic virtue</td>
<td>-.051</td>
<td>.452</td>
</tr>
<tr>
<td>Perceived contribution → Conscientiousness</td>
<td>.097</td>
<td>.276</td>
</tr>
<tr>
<td>Perceived contribution → Sportsmanship</td>
<td>.242</td>
<td>.004</td>
</tr>
<tr>
<td>Affect → Altruism</td>
<td>.093</td>
<td>.208</td>
</tr>
<tr>
<td>Affect → Courtesy</td>
<td>.045</td>
<td>.554</td>
</tr>
<tr>
<td>Affect → Civic virtue</td>
<td>.151</td>
<td>.040</td>
</tr>
<tr>
<td>Affect → Conscientiousness</td>
<td>-.098</td>
<td>.263</td>
</tr>
<tr>
<td>Affect → Sportsmanship</td>
<td>-.167</td>
<td>.025</td>
</tr>
</tbody>
</table>

Note: Bias corrected (BC) 95% confidence interval
Subsequently, meaningfulness was found to be able to fully mediate the relationship of affect with altruism and courtesy, and at the same time partially mediate the relationship between affect and civic virtue. This findings support the Social Exchange Theory stated that people help each other when there is a positive cost-benefit analysis, especially when the benefits outweigh the risks in the relationship. It also refers to human interaction and transaction with the aims of taking advantage of one’s rewards and reducing one’s cost. In this study, when the leader and nurses have a good personal relationship between them, this interaction gives a positive effect on increasing the feeling of meaningfulness among nurses. This, in turn, increases nurses’ behaviour of altruism, courtesy, and civic virtue.

Table 2 shows the results of competence as mediator. The results revealed that mediating effect of competence has the strongest effect on the relationship between affect with civic virtue compared to the other dimensions of OCB among nurses. The plausible reason of this finding is that in the context of nurses, being competent is crucial in explaining the association between affect and civic virtue. Perceiving themselves as competent helps in improving nurse’s civic virtue at the workplace. Furthermore, high-quality affect can increase the experience of competence among nurses, which in turn increases the act of altruism, courtesy, and also civic virtue at the hospital.

Table 2: Mediation effect of competence in the relationship between LMX and OCB

<table>
<thead>
<tr>
<th>Path via Competence</th>
<th>Direct effect</th>
<th>Indirect Effect</th>
<th>Mediation type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>P-value</td>
<td>β</td>
</tr>
<tr>
<td>Perceived contribution → Altruism</td>
<td>.105</td>
<td>.199</td>
<td>.001</td>
</tr>
<tr>
<td>Perceived contribution → Courtesy</td>
<td>.091</td>
<td>.271</td>
<td>.001</td>
</tr>
<tr>
<td>Perceived contribution → Civic virtue</td>
<td>-.006</td>
<td>.889</td>
<td>.002</td>
</tr>
<tr>
<td>Perceived contribution → Conscientiousness</td>
<td>.104</td>
<td>.242</td>
<td>.000</td>
</tr>
<tr>
<td>Perceived contribution → Sportsmanship</td>
<td>.245</td>
<td>.003</td>
<td>.000</td>
</tr>
<tr>
<td>Affect → Altruism</td>
<td>.088</td>
<td>.235</td>
<td>.055</td>
</tr>
<tr>
<td>Affect → Courtesy</td>
<td>.039</td>
<td>.609</td>
<td>.061</td>
</tr>
<tr>
<td>Affect → Civic virtue</td>
<td>.155</td>
<td>.036</td>
<td>.067</td>
</tr>
<tr>
<td>Affect → Conscientiousness</td>
<td>-.115</td>
<td>.193</td>
<td>.013</td>
</tr>
<tr>
<td>Affect → Sportsmanship</td>
<td>-.147</td>
<td>.044</td>
<td>-.021</td>
</tr>
</tbody>
</table>

Note: Bias corrected (BC) 95% confidence interval

The results in Table 3 indicated that self-determination is a significant mediator. A high-quality affect can increase self-determination among nurses, which in turn increases the behaviours of altruism, courtesy, civic virtue, and conscientiousness among them. This study suggested that self-determination is crucial among nurses in explaining the association between affect and civic virtue. The increase in the personal-based relationship between the leader and the subordinate will increase self-determination which in turn lead to the behaviour of OCB.

Table 3 Mediation Effect of self-determination in the relationship between LMX and OCB

<table>
<thead>
<tr>
<th>Path via Self-determination</th>
<th>Direct effect</th>
<th>Indirect Effect</th>
<th>Mediation type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>P-value</td>
<td>β</td>
</tr>
<tr>
<td>Perceived contribution → Altruism</td>
<td>.079</td>
<td>.315</td>
<td>.022</td>
</tr>
<tr>
<td>Perceived contribution → Courtesy</td>
<td>.066</td>
<td>.422</td>
<td>.021</td>
</tr>
<tr>
<td>Perceived contribution → Civic virtue</td>
<td>-.045</td>
<td>.506</td>
<td>.035</td>
</tr>
<tr>
<td>Perceived contribution → Conscientiousness</td>
<td>.076</td>
<td>.398</td>
<td>.022</td>
</tr>
</tbody>
</table>
The results in Table 4 indicated that high quality perceived contribution can increase impact among nurses which in turn increases their behaviours of altruism, courtesy, and civic virtue. The results also justified the fact that impact has the strongest mediating effect in the relationships of perceived contribution and affect on courtesy compared to altruism and civic virtue. In this study, impact is crucial in explaining the association between perceived contribution and affect on courtesy. The improvement in work and personal relationship between leader and the subordinate will increase perceivability of impact among nurses, which will then lead to the behaviour of preventing interpersonal problems from occurring among nurses. These behaviours include giving earlier notice of any changes in work schedule and leaving workstation in good condition. The higher the quality of work and personal relationship between the leader and the subordinate, the higher the tendency to perceive impact among nurses. When nurses know their action gives an impact to the flow of work and organisation, they will increase their awareness in being more courteous at the workplace. The main idea of courtesy is avoiding actions that unnecessarily make other nurses work harder.

Table 4 Mediation effect of impact in relationship between LMX and OCB

<table>
<thead>
<tr>
<th>Path via Impact</th>
<th>Direct effect</th>
<th>Indirect Effect</th>
<th>Mediation type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \beta )</td>
<td>P-value</td>
<td>( \beta )</td>
</tr>
<tr>
<td>Perceived contribution ( \rightarrow ) Altruism</td>
<td>.074</td>
<td>.375</td>
<td>.026</td>
</tr>
<tr>
<td>Perceived contribution ( \rightarrow ) Courtesy</td>
<td>.052</td>
<td>.515</td>
<td>.033</td>
</tr>
<tr>
<td>Perceived contribution ( \rightarrow ) Civic virtue</td>
<td>-.042</td>
<td>.541</td>
<td>.032</td>
</tr>
<tr>
<td>Perceived contribution ( \rightarrow ) Conscientiousness</td>
<td>.088</td>
<td>.337</td>
<td>.008</td>
</tr>
<tr>
<td>Perceived contribution ( \rightarrow ) Sportsmanship</td>
<td>.232</td>
<td>.005</td>
<td>.009</td>
</tr>
<tr>
<td>Affect ( \rightarrow ) Altruism</td>
<td>.124</td>
<td>.090</td>
<td>.026</td>
</tr>
<tr>
<td>Affect ( \rightarrow ) Courtesy</td>
<td>.074</td>
<td>.343</td>
<td>.033</td>
</tr>
<tr>
<td>Affect ( \rightarrow ) Civic virtue</td>
<td>.196</td>
<td>.005</td>
<td>.032</td>
</tr>
<tr>
<td>Affect ( \rightarrow ) Conscientiousness</td>
<td>-.100</td>
<td>.234</td>
<td>.008</td>
</tr>
<tr>
<td>Affect ( \rightarrow ) Sportsmanship</td>
<td>-.174</td>
<td>.018</td>
<td>.009</td>
</tr>
</tbody>
</table>

Note: Bias corrected (BC) 95% confidence interval

Conclusion

This study contributes to current theoretical development by expanded the original structure of Social Exchange Theory within the context of psychological empowerment. This study also provide valuable information on the importance of OCB among nurses in the workplace. Information gained from this research help hospitals to design better working environment that emphasis on OCB at work.

Conflict of interest: NIL

Source of Funding: Self source

Ethical clearance: Research committee of SHARPS
References


23. Boroh RP, Bahron A, Nasser SS. Exploring and measuring the level of psychological empowerment (PE) and organizational citizenship behavior.


Social Support, Optimism, Parental Self-efficacy and Wellbeing in Mothers of Children with Autism Spectrum Disorder

Farhan Sarwar1, Siti Aisyah Panatik2, Azizah Rajab3, Norakmar Nordin4

1Student, Azman Hashim International Business School, Universiti Teknologi Malaysia, Johor Bahru, Malaysia
2Associate Professor, Language Academy, 3Associate Professor, School of Human Resource Development and Psychology, 4Lecturer, Universiti Teknologi Malaysia, Johor, Malaysia

Abstract

It was hypothesized that optimism, self-efficacy and social support are positive predictors of life satisfaction and positive affect and negative predictors of perceived stress and negative affect. Data was collected by survey method from 47 mothers of autistic children in Lahore and Faisalabad. Hypotheses were tested on four models of four dependent variables using hierarchical regression analysis. Results depicted that parental self-efficacy was a significant predictor of all four dependent variables, social support was a significant predictor of life satisfaction and perceived stress, while optimism only significantly predicted variance in life satisfaction. The study was first of its type to be done with a sample in Pakistani context and has important implications for clinical psychologist. They can plan interventions to enhance subjective wellbeing and reduce stress directly or indirectly by focusing on antecedents tested in the study.

Keywords: Social support, optimism, self-efficacy, wellbeing, autism spectrum disorder.

Introduction

Mothers of children with ASD are prone to mental health issues and often reports symptoms of stress, depression and lower wellbeing.1-3. Parents of ASD have higher psychological distress as compared to parents of children with other mental disorders such as attention deficit hyperactivity disorder 4, cerebral palsy 5 or down syndrome 6. One of the reason that parents feel greater mental pressure is because apparently autistic child has no signs of disability and any disruptive behavior is subjected to social scrutiny 7. Lower quality of life and greater stress in mothers can have further detrimental effect on child, spouse and families as a whole8. Therefore it is important to explore the factors which influence subjective wellbeing of mothers of ASD children especially in Pakistan where mothers share most burden of parenting without substantial support and structural facilities 9. Subjective wellbeing is an umbrella term which is measured with multiple components such as life satisfaction and stress as cognitive components and positive and negative affect as emotional components 10.

Social support has been identified as a critical resource which can diminish the psychological distress related to upbringing a child with ASD 11. Lu, Yang 12 pointed out that there is a lack of studies on informal social support in Asian context. Research has reported that informal social support can be both emotional and instrumental and is especially important resource when one is coping with stress 2. Literature also indicates that social support especially from spouse is extremely useful in reducing stress and improving wellbeing for families of disable children. Moreover support coming from sources external to family such as friends or certain similar parents support groups also significantly contribute to better mental health, greater life satisfaction and lower stress 11-13.

H1: Informal social support available to mothers is positively related to their (a) life satisfaction and (b) positive affect and negatively related to (c) perceived stress and (d) negative affect.

In addition to social support the current study also endeavored to test trait optimism and parental self-efficacy
as predictors of mother’s wellbeing. It is suggested that focus on positive personality characteristics of individuals along with contextual factors can enhance individual wellbeing. A meta-analytic study on impact of parenting stress in mothers of ASD \(^{14}\) concluded that there is a paucity of research on impact of positive parental characteristics on stress. Optimism is a trait of an individual to expect good outcomes from events occurring in life and leads to positive psychological and physical health\(^ {15}\). A positive relationship between dispositional optimism and effective parenting can be established from earlier researches \(^ {16}\).

**H2**: Trait optimism of mothers is positively related to their (a) life satisfaction and (b) positive affect and negatively related to (c) perceived stress and (d) negative affect.

Self-efficacy is a confidence on ones capabilities to organize and execute specific type of actions in order to achieve goals\(^ {17}\). The parental self-efficacy can be defined as the belief of the parents about their competency to set the environment of their child such that it becomes helpful in their positive development so that they become successful in the walk of life\(^ {18}\). Parents high in parenting self-efficacy are in a better position to response to their children’s needs. Therefore, it is hypothesized that:

**H3**: Parental self-efficacy of mothers is positively related to their (a) life satisfaction and (b) positive affect and negatively related to (c) perceived stress and (d) negative affect.

**Methods**

**Research design and Sample**: A cross sectional survey of mothers of autistic children was conducted in two autism schools in Lahore and two special education schools in Faisalabad city of Pakistan. A total of 94 questionnaires were distributed of which 49 were returned. Two of the questionnaires were rejected leaving sample size to 47. The questionnaire was preceded by informed consent. Filled questionnaires were returned anonymously. All the children whose mother filled that questionnaire were diagnosed as autistic without intellectual disabilities.

**Demographics**: All the mothers were married with mean age of 34.4 years ranged between 25 to 47. The ages of child ranged from two years to 16 years with mean of eight years. 78.7% (37) autistic children were boys. Response on level of autism yielded 16(34.0%) on level 1(require support), 18(38.3%) children had autism of level 2 (require substantial support), and 13(27.7%) children had level 3 autism (require very substantial support). All the children were getting education. In 24 (51.1%) cases only mother (OMC) was the sole care take with minimal external support. Majority of mothers were educated with 6 (13%) intermediate, 7 (14%) having 14 years of education, 18(38%) having 16 years of education and three (6%) had post-graduate (masters/PhD) degrees. Only two mothers reported to be under-matric. Majority of mothers i.e. 40 (85.1%) were not doing job.

**Measurement**: All the measures were adopted from previous studies and administered on a five-point scale. The adopted scales and their reliability values are presented in table 1.

**Table 1: Measurement scales and reliabilities**

<table>
<thead>
<tr>
<th>Construct</th>
<th>Scale</th>
<th>No of Items</th>
<th>Cronbach Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Satisfaction</td>
<td>Satisfaction with life scale (SWLS)(^ {19})</td>
<td>5</td>
<td>0.85</td>
</tr>
<tr>
<td>Positive Affect</td>
<td>Positive and Negative Affect Scale (PANAS)(^ {20})</td>
<td>10</td>
<td>0.73</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>PANAS(^ {20})</td>
<td>10</td>
<td>0.89</td>
</tr>
<tr>
<td>Perceived Stress</td>
<td>Perceived Stress Scale(^ {21})</td>
<td>12</td>
<td>0.77</td>
</tr>
<tr>
<td>Optimism</td>
<td>Life Orientation Test (LOT)(^ {15})</td>
<td>6</td>
<td>0.75</td>
</tr>
<tr>
<td>Parental Self-efficacy</td>
<td>Parenting sense of Competence (PSOC)(^ {22})</td>
<td>8</td>
<td>0.92</td>
</tr>
<tr>
<td>Social Support</td>
<td>Multidimensional scale of Perceived Social Support(^ {23})</td>
<td>12</td>
<td>0.94</td>
</tr>
</tbody>
</table>

**Analysis and Results**

**Descriptive and Correlation Analysis**: Table 2 summarizes the mean, standard deviation and Pearson correlation analysis of the study variables. The results show that optimism was not significantly correlated with
at least three outcome variables while social support was not significantly correlated with positive affectivity. All other correlations between dependent and independent variables were significant.

Table 2: Mean, standard deviation and correlation of study constructs

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Optimism</td>
<td>3.36</td>
<td>0.58</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. PSE</td>
<td>3.95</td>
<td>0.83</td>
<td>.596**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Life Satisfaction</td>
<td>3.37</td>
<td>0.92</td>
<td>.543**</td>
<td>.591**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Stress</td>
<td>3.43</td>
<td>0.86</td>
<td>-.24</td>
<td>-.503**</td>
<td>-.508**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. PA</td>
<td>2.78</td>
<td>0.66</td>
<td>0.175</td>
<td>.308*</td>
<td>0.088</td>
<td>-.455**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6. NA</td>
<td>3.07</td>
<td>0.63</td>
<td>-.164</td>
<td>-.520**</td>
<td>-.424**</td>
<td>.642**</td>
<td>-.17</td>
<td>1</td>
</tr>
<tr>
<td>7. Social Support</td>
<td>2.21</td>
<td>0.87</td>
<td>.335*</td>
<td>0.274</td>
<td>.477**</td>
<td>-.468**</td>
<td>0.236</td>
<td>-.325*</td>
</tr>
</tbody>
</table>

**, p < 0.01 (2-tailed), *p < 0.05 level (2-tailed), PSE = Parental Self Efficacy, PA = positive affect, NA = Negative Affect.

Hierarchical Regression Analysis: SPSS was used to carry out four hierarchical regression analysis. For every regression all eight control variables and three predictors were added simultaneously. The results are depicted in Table 3. From the results it is evident that social support had a significant positive relationship with life satisfaction and negative with perceived stress hence H1a and H1c were accepted. Optimism was only significantly related to life satisfaction therefore only H2a was accepted. However parental self-efficacy had significant and most strongest relationship with all four of the predictors therefore H3a, b, c and d were accepted. From the control variables OMC was significantly related to life satisfaction and level of optimism with perceived stress. The control variables and predictors explained approximately 61% variance in life satisfaction, 30% in positive affect, 52% in negative affect and 60% in perceived stress.

Table 3: Hierarchical regression results for four independent variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Life Satisfaction</th>
<th>Positive Affect</th>
<th>Negative Affect</th>
<th>Perceived Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.14</td>
<td>-0.41</td>
<td>-0.07</td>
<td>0.09</td>
</tr>
<tr>
<td>Education</td>
<td>-0.08</td>
<td>-0.27</td>
<td>-0.14</td>
<td>0.22</td>
</tr>
<tr>
<td>Job</td>
<td>-0.12</td>
<td>0.1</td>
<td>0.15</td>
<td>0.07</td>
</tr>
<tr>
<td>OMC</td>
<td>0.27*</td>
<td>-0.05</td>
<td>-0.17</td>
<td>-0.24</td>
</tr>
<tr>
<td>Child Age</td>
<td>0.18</td>
<td>0.42</td>
<td>-0.40</td>
<td>-0.11</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.08</td>
<td>-0.10</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td>Level of Autism</td>
<td>-0.01</td>
<td>-0.14</td>
<td>0.22</td>
<td>.298**</td>
</tr>
<tr>
<td>Birth order</td>
<td>0.30</td>
<td>-0.15</td>
<td>0</td>
<td>-0.003</td>
</tr>
<tr>
<td>Social support</td>
<td>.28*</td>
<td>0.10</td>
<td>-0.23</td>
<td>-.35**</td>
</tr>
<tr>
<td>Optimism</td>
<td>.37*</td>
<td>-0.17</td>
<td>0.23</td>
<td>0.20</td>
</tr>
<tr>
<td>PSE</td>
<td>.28**</td>
<td>.65**</td>
<td>-.68***</td>
<td>-.56***</td>
</tr>
<tr>
<td>R²</td>
<td>.61***</td>
<td>0.30*</td>
<td>.52***</td>
<td>.60***</td>
</tr>
</tbody>
</table>

*P<0.05, **P<0.01, ***P<0.001, OMC = only mother cares, PSE = parental self-efficacy

Discussion

The present study focused on the relationships of social supports, optimism and self-efficacy of mothers of autistic children with maternal subjective well-being. To our knowledge, this is the first study to examine these associations among Pakistani parents of children with ASD. Distress and emotional turmoil is obviously very common during parenting in comparison with parenting of normally developing child. To cope with this stress, self-efficacy is established as an overall important factor by this study. Parental self-efficacy not only brings the satisfaction for the family life but has benefits for the children to.
Albeit the higher level of optimism of mother of children with ASD as expressed in the study, there seemed to be no significant reduction in stress and significant corresponding change in positive and negative affect. This insignificance can be attribute to culture. In Pakistani society to express of being positive and optimistic is more a habit rather than cognitive decision. Another explanation is that optimists tend to hope for the best in adverse situations. They have beliefs that can turn into high expectations about a desired outcome. These high expectations lead them to focus obsessively on the outcomes. A child with ASD has pervasive and severe deficits which continuously require the efforts of caretaker and produce the persistent emotional disturbance. In such scenario the high expectations are not fulfilled, and the result is disappointment and distress. Persistent or uncontrollable stressors violated optimists’ positive expectations that they could terminate or control the stressors, leading to distress

The findings on relationship of social support with stress and life satisfaction are in accordance to earlier studies. No empirical support was found for relationship of social support with these components of emotional wellbeing. The social support network in Pakistan is not as extensive and health care facilities are limited. It is mostly limited to the informal social support (spouse, family and friends). As all the members of immediate family also experience the emotional disturbance, so the mother of the autistic child cannot have the adequate emotional benefit from the social support of family members. There is lack of formal support i.e., support from community centers e.g., club for such parents having this same scenario, easily accessible schools for Autistic children, organizations for providing financial aid and healthcare units. It is required that there should be interaction of the families and specifically mothers facing the same situation of having the children with ASD.

Implications and Recommendations: The current research has various implications for clinical and counselling psychologist. They need to understand that various subjective wellbeing measures can also help them identify and treat whole range of mental disorders. For instance both low positive affect and high negative affect reflects presence of depression whereas anxiety is more relevant to negative affect and less related to positive affect. Growing research and awareness of contextual factors and personality characteristics as antecedents of subjective wellbeing and stress suggests that clinical psychological approach can play very influential part. In a study carried out in 2010 on relationship between autism and parents coping behaviour and mental health, it was found that using cognitive reframing techniques was helpful in eliminating their depression and anger thereby improving their wellbeing.

Our findings identified importance of social support in enhancing life satisfaction and diminishing stress. Therapeutic intervention of “social skills training” based on cognitive restructuring can prove to be influential in teaching new behaviours to people enhances individual ability to establish and retain new social relationship thereby positively influencing wellbeing. Moreover antecedents of subjective wellbeing and stress has been found to vary across cultural context. This can help clinical practitioners to device intervention which do not fall into trap of one size and fits all rather be more tailored for the target population which in this case is Pakistani mothers whose child(ren) suffer from ASD. The knowledge of various factors that leads to stress in mothers identified in this study can help practitioners to concentrate on nabbing those issues while providing counselling to the mothers.

Conflict of interest: NIL

Source of Funding: Self source

Ethical clearance: Done Research committee of SHARPs

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Employee Performance of Private Hospital Non-Medical Services

Bernadetha Nadeak¹, Sasmoko²,*

¹Lecturer, Educational Administration Department, Faculty of Post Graduate Universitas Kristen Indonesia, Jakarta, Indonesia, ²Professor, Primary Teacher Education Department, Faculty of Humanities, ³Researcher, Research Interest Group in Educational Technology, Bina Nusantara University, Jakarta, Indonesia

Abstract

The performance of non-medical employees is a very important concept especially for a hospital in measuring the quality of services provided. Therefore a measure is needed that is able to measure how the expected performance and its achievements can provide input to produce optimal performance. This study aims to look at the factors that can be used as benchmarks for performance and how the performance description of non-medical employees in private hospitals. The study was conducted with a correlational survey. The results showed that the performance of non-medical services in private hospitals showed good service supported by the ability of employees to complete a number of service tasks simultaneously and carefully.

Keywords: Employee performance, private hospital non-medical services.

Introduction

Indonesia is currently making efforts to improve in various fields so that it can adjust to the various advances that have taken place. Similarly, industries engaged in services and services, especially hospitals, also experience increased competition, especially in providing quality services provided to their customers. Service quality is one of the performance benchmarks for hospitals which is the output of hospital employee performance, especially for non-medical employees.

Performance is a concept that has been developed and is always interesting to study. Performance is a multi-dimensional concept and is related to many factors. Performance can be related to the process of learning and mastery of tasks, abilities, knowledge and skills in carrying out these tasks. Moreover, performance measures are the most important thing to measure the sustainability of an organization. In addition, performance is important because it can be one of the satisfaction indicators for both employees and the organization itself.

Therefore, considering the importance of performance measures, this study wants to look at factors that can be used as benchmarks for performance and how the performance description of non-medical employees in private hospitals.

Literature Review: Performance is an action that is under the control of an individual or conscious behavior that contributes to the achievement of organizational goals. Performance is divided into task performance and contextual performance, where individual factors play an important role in realizing contextual performance. Performance also has two other dimensions, namely adaptive performance and counterproductive work behavior.

To be able to produce high performance, the employee must be able to fulfill the four components. So that personally each employee must be able to hone themselves to further develop a proactive personality in order to meet the demands of performance as expected.

In terms of task performance, for non-medical employees in private hospitals, performance benchmarks can be seen from how employees are able to fulfill daily...
tasks that can be realized through several indicators, namely employees skilled in doing technical work so they can have the ability to direct work correct, serious in completing tasks, and completing tasks with consistent and efficient use of time. Thus the employee will be able to complete a number of service tasks simultaneously and carefully.

Contextual performance looks more at how someone does things that can support performance. This can be realized through a number of indicators, namely rarely making mistakes, being careful in doing work so as to produce accurate work, working in detail, being able to determine priorities, being able to maintain upward relationships with co-workers, superiors or customers. In addition, employees are also able to show a responsible attitude and are able to account for the work as well as the results because they have full attention to their duties. Therefore contextual performance is usually related to the personality or character possessed by employees.

While adaptive performance can be seen from how employees are able to make decisions, develop alternative solutions and appropriate actions and understand the consequences of the task. In managing change, better ideas are needed from employees and initiatives towards new tasks. Therefore employees can support the organization in making decisions with these new ideas and in different ways.

**Research Methods**

The research method is carried out with correlational surveys. Sampling technique is done by accidental sampling with a sample of 400 employees. Technique of collecting data with self-assessment through a scale questionnaire of 1 to 5.

The instrument was developed through the study of 40 performance indicators for non-medical employees, namely:

1. Technically skilled (X1),
2. Steering ability (X2),
3. Seriously complete the assignment (X3),
4. Complete tasks consistently (X4),
5. Use time efficiently (X5),
6. Rarely make mistakes (X6),
7. Thorough (X7),
8. Accurate (X8),
9. Work with details (X9),
10. Able to determine priority (X10),
11. Maintain relationships (X11),
12. responsible (X12),
13. Able to account for work (X13),
14. Able to complete a number of service tasks simultaneously and carefully (X14),
15. Insured on the results of the assignment (X15),
16. Have full attention (X16),
17. Perform tasks according to the time target (X17),
18. Report to supervisor if there is a problem (X18),
19. Able to make decisions, develop alternative solutions and appropriate actions (X19),
20. Understand the consequences of the task (X20),
21. Discipline (X21),
22. Present on time (X22),
23. Obedient (X23),
24. Obey the leader’s instructions (X24),
25. Complete the task on time (X25),
26. Carry out instructions (X26),
27. Maintain workplaces (X27),
28. Have initiative (X28),
29. Have a better idea (X29),
30. Initiate new assignments (X30),
31. Make decisions with new ideas (X31),
32. Complete tasks in different ways (X32),
33. Work on tasks without being ordered (X33),
34. The willingness of the concerned person to correct the error in carrying out the task with tangka (X34),
35. Give creative ideas (X35),
36. Take advantage of the Bali bait (X36),
37. Have initiatives to deal with institutional problems (X37),
38. Have innovative solutions (X38),
39. Can work independently (X39), and
40. Give support and help from others (X40)
Results And Discussion

Test the normality of variable empirical data on the performance of employees of non-medical services in private hospitals.

First, tested the empirical data distribution normality of the variable performance of non-medical services in private hospitals. Normality test is done by Proportion Estimation through Blom Formula with Q-Q Plot approach. Q-Q approach The plot was taken because the number of research samples was > 200 people (40- non-medical servants).

Based on the results of the Q-Q Plot Normal calculation, the data distribution shows normal, that is, the distribution of the data tends to lead to the normal line, and the distribution of the data does not have an outlier. Likewise if seen from Detrended Normal Q-Q the plot, the distribution of the data does not describe sine or cosine curves. So in conclusion, the variable distribution of empirical data on the performance of non-medical services for private hospitals has a normal distribution.

The results of the first analysis that looked at the trends in the performance conditions of private hospital non-medical services showed that in proving the results of this study, researchers in determining 4 (four) categories of performance of private hospital non-medical service employees were: (a) the service performance was very low, (b) service performance is low, (c) service performance is high, and (d) service performance is very high. Data analysis was carried out with a confidence interval at a significance level of 5%, and a lower and upper bound was produced between 170.7062 to 173.6488. Based on these results, it can be concluded that employees of private hospital non-medical services tend to have high service performance significantly at $\alpha < 0.05$.

The results of the second analysis, carried out with Binary Segmentation called Classification and Regression Trees. In this analysis, the researcher set a Prunning depth of 2, a Prunning Parent of 2, a Child Prunning of 1, and a significance level of $\alpha < 0.05$. The results of this analysis prove that the ability to complete a number of service tasks simultaneously and carefully (X14) is the most decisive shape of the performance of employees of non-medical services in private hospitals. If the task of a number of services carried out simultaneously and meticulously is increased, then its performance as a non-medical service employee will increase 139,380 times from the current condition. To be able to make it happen, non-medical service employees are required to have the ability to make decisions, develop alternative solutions and appropriate actions (X19) as well as jointly with the willingness of the concerned person to correct his / her own mistakes in carrying out the task (X34). If both of these are done well, the capacity of non-media service personnel to complete tasks will increase 33,852 times from current conditions.

The results of the third analysis that looked at demographic influences showed that

From the gender differences both male and female non-medical service employees, the service performance was significantly higher at $\alpha < 0.05$.

In addition, there are differences in terms of service performance of non-medical staff of private hospitals, if differentiated based on their educational background, namely between doctoral (S3) and master’s (S2) education with t-student of 6.394 with a significance value of 0.000 which is very significant at $\alpha < 0.01$. Based on the difference in mean, it was found that non-medical service personnel with doctoral degrees (S3) had a moderate service performance that had a very significant master’s degree (S2) performance at $\alpha < 0.01$.

There are differences in terms of service performance of non-medical private hospital employees, if differentiated based on age with F of 3.191 with significance value 0.013 is significant at $\alpha < 0.05$. Based on the difference in mean, it was found that non-medical service employees of private hospitals aged 50-64 years had high performance, while others, employees who were aged 50 years and over 64 years had low performance.

There are differences in terms of service performance of non-medical private hospital employees, if distinguished by hospital location with F equal to 3.825 with significance value 0.002 is significant at $\alpha < 0.05$.

There are differences in terms of service performance of non-medical private hospital employees, if distinguished based on work experience in private hospitals with F of 3.272 with a significance value of 0.021 is significant at $\alpha < 0.05$.

Conclusions

The results showed that employees of non-medical services in private hospitals had performance that had
good service. This performance is supported by the realization of the ability of employees to complete a number of service tasks simultaneously and carefully. This means that fulfilling task performance is important in producing optimal performance so that employees must clearly understand the job description that must be done\textsuperscript{14-17}.

To be able to complete a number of simultaneous and careful service tasks, non-medical service employees are required to have the ability to make decisions, develop alternative solutions and appropriate actions and also jointly with the willingness of the concerned person to correct mistakes in carrying out tasks with suspicion. Both of these are related to contextual performance and adaptive performance which are important factors in producing performance\textsuperscript{8,18-20}.

**Conflict of interest:** NIL

**Source of Funding:** Self source

**Ethical clearance:** Done research committee

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16. Lauver KJ, Kristof-Brown A. Distinguishing between Employees’ Perceptions of Person–Job


Perceived Effects of KOACI.COM Health Campaign Targeting Mother-Child with HIV/AIDS in Côte d’Ivoire

Hasmah Zanuddin1, Ousmane Koffi Abdoulaye2

1Associate Professor, 2Student, Department of Media Studies, Faculty of Arts & Social Sciences, University of Malaya, Kuala Lumpur, Malaysia

Abstract

Through a variety of media, many health care practitioners and health sectors have employed mass media to disseminate public health information to the general public and to raise awareness of HIV/AIDS, because media representations are deemed able to impact public perceptions and opinions, advocate behavior change, and influence policy and campaign strategies1. The aims of this study are the access to health information, and able to reach the public through online newspaper services. The analysis of HIV/AIDS awareness campaign through the daily online newspaper, targeting mother-child within the Ivorian people. Koaci.com, a online newspaper created since 2008 and based in Abidjan, which gathers every day on its supports (web, mobile, and application) nearly 100,000 readers per day, it achieved the highest score at the time; all press focal points with a superb trophy. The national AIDS Indicator Survey (AIS) find out that the HIV/AIDS epidemic in Côte d’Ivoire has changed in gender, age, and geographic distribution. Female HIV prevalence declined from 6.4% to 4.6%, still much higher than male HIV prevalence, which remained almost unchanged at 2.7%. Prevalence dropped dramatically among women ages 30-34 (from 14.9% to 6.8%) and women are the HIV-positive partner in about 50% of serodiscordant couples now, down from about 67% in 2005. Geographically, HIV prevalence remains highest in Abidjan and in the Southwest, but other higher-prevalence zones have shifted to the Center-North and the West, where civil and ethnic conflict-displaced populations, disrupted social networks, and increased rates of gender-based violence (GBV).

Keywords: Health information, online newspaper, awareness campaigns, mother-child, HIV/AIDS.

Introduction

This study about HIV/AIDS prevention the Mother-Child with the stated goal of improvement of effective health information and awareness campaigns. The aspiration of women and girls to have a child and become a mother even though many of them lack awareness and information about sexual health expose them to risk. Therefore, to enable women’s access to health care. National control programs against HIV; improved health care of people living with HIV with antiviral therapy; the free testing in some medical centers, along with NGOs and civil society are as well involved in the eradication of this epidemic. In Côte d’Ivoire, sensitization programs were put in place in different areas via the media, including awareness campaigns, advertisements programs1.

The health status of the infant and child mortality rates remain high, at 88 deaths per 1,000 live births. Infectious diseases, primarily malaria, gastrointestinal ailments, respiratory infections, measles and tetanus, account for most of the illness and death among children2. According to the national AIDS Indicator Survey that the HIV/AIDS epidemic in Côte d’Ivoire has changed in gender, age, and geographic distribution. However, HIV prevalence among Female HIV declined from 6.4% to 4.6%, but still much higher than male HIV prevalence, which remained almost unchanged at 2.7%, while, prevalence dropped dramatically among women ages 30-34 (from 14.9% to 6.8%) and increased significantly among older children2.
men (from 5.9% to 7.8% among ages 40-49, reaching 9% among ages 50-59)\textsuperscript{3,4}. Table 1 illustrates the HIV/AIDS as the first most important cause of death in Cote d’Ivoire.

Table 1. Top 10 Causes of Death in Cote d’Ivoire

<table>
<thead>
<tr>
<th>No.</th>
<th>Disease</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>HIV</td>
<td>13%</td>
</tr>
<tr>
<td>2.</td>
<td>Lower Respiratory Infection</td>
<td>11%</td>
</tr>
<tr>
<td>3.</td>
<td>Malaria</td>
<td>6%</td>
</tr>
<tr>
<td>4.</td>
<td>Diarrheal Diseases</td>
<td>5%</td>
</tr>
<tr>
<td>5.</td>
<td>Stroke</td>
<td>5%</td>
</tr>
<tr>
<td>6.</td>
<td>Preterm Birth Complications</td>
<td>4%</td>
</tr>
<tr>
<td>7.</td>
<td>Meningitis</td>
<td>4%</td>
</tr>
<tr>
<td>8.</td>
<td>Ischemic Heart Disease</td>
<td>4%</td>
</tr>
<tr>
<td>9.</td>
<td>Birth Asphyxia &amp; Trauma</td>
<td>4%</td>
</tr>
<tr>
<td>10.</td>
<td>Protein Energy Malnutrition</td>
<td>3%</td>
</tr>
</tbody>
</table>

Source:\textsuperscript{5}

Health Information campaigns: Information, education, and training are important components of Prevention of Mother-to-Child Transmission of HIV (PMTCT) efforts. However, the health workers in the field should receive formal PMTCT training that would allow them to take care of pregnant women\textsuperscript{6,7}. The information and condom distribution campaigns show that the level of awareness about HIV and its transmission modes is rising over time; such approach suffers from a number of limitations. While information campaigns were focused on the urban areas, were of temporary nature and seldom targeted the high-risk groups. The distribution of condom, because of the resistance of religious groups and difficulty to persuade people to use them and, indeed, sexual behaviour does not appear to change easily in response to public information campaigns\textsuperscript{8,9}.

Objective of the Study: The aim of this study is awareness campaigns in relation to child and women health issues, particular, HIV/AIDS, the specific aims as follow:

a. To provide a review of the effectiveness of online media to increase Prevention of Mother to Child Transmission of people living with HIV

b. To determine the effectiveness of social marketing in the view of online media to enhance HIV/AIDS message delivery

Research Questions: The study was guided by the following research questions:

a. What are the health programmes and health awareness campaign covered by the online newspaper?

b. How do social marketing and online newspapers impact community and health awareness campaigns?

c. Could health coverage of HIV preventive and awareness message impact the people?

Literature Review

Health System and HIV Prevention: In early 2012, the government of Côte d’Ivoire shifted toward a program of “targeted free services” for pregnant women, children, and medical emergencies. Given that HIV/AIDS services are fully integrated into the public health system\textsuperscript{10}. To increase the provision and quality of health services at all levels of the health system. The government has adopted the country’s performance-based financing program as a key strategy for reducing maternal and infant mortality among the most vulnerable populations.

Regarding HIV counseling and testing, regularly, women seeking prenatal care at participating health center receive general health education, including information about HIV and major prevention messages. All women obtain specific posttest counseling, which is more time-consuming than was pretest counseling, given the need to effectively shape information for women according to serostatus. Addressing infant feeding choices for mothers is important since one third to one-half of all mother-to-child transmissions occur postnatal through breastfeeding\textsuperscript{11}. In Cote d’Ivoire, the national HIV testing and counseling and antiretroviral treatment programs have continued to grow, with monthly ART enrollment increasing to 2,500 in May 2010 and stabilizing at 2,000 by October 2011\textsuperscript{12}.

Media intervention: Media health campaigns are undertaken to disseminate information about. They can be standalone interventions or be integrated into complex social marketing programmes\textsuperscript{13}. The programs in which mass media is part of a multifaceted intervention approach are more likely to be successful than mass media alone and that one-off or episodic behaviors are more amenable to mass media effects than habitual. In fact, health communication campaigns are almost always implemented in conjunction with other
interventions. However, the successful intervention is one that combines several methods, such as the theory of planned behavior, seeing that HIV/AIDS infection is a perceived social norm.

Although Côte d’Ivoire’s significant progress in mobilizing HIV/AIDS interventions, the level of unmet need for treatment is high and appears to be related to the large number of people who do not know their HIV status and are unable or unwilling to access public services. However, the media can help inform people to act on their healthcare.

Role of Online Newspaper: Media in general provide social movements an opportunity to shape public “collective minds” about specific political or social problems, in this study the role of online newspaper in shaping health information and coverage, such as Koaci.com created in 2008, is an independent pan-African online newspaper based in Abidjan. The following news articles reported by Koaci.com in fighting against parental and child death, as well as coverage of HIV/AIDS, the Ministry of Health and Public Hygiene launched mobile clinics and emergency medical services throughout the national territory. Taking into account the fight against maternal and infant mortality, HIV testing and to assist people in the event of disasters.

To mark, the World AIDS Day, the government announced, “Zero mother-to-child transmission, zero child deaths”, “To increase the mobilization of individuals and communities in order to improve the access of women of childbearing age to HIV prevention services and to satisfy access to prevention and treatment services for all HIV infections.” the world leaders had pledged to eradicate AIDS by 2030. In this perspective, Côte d’Ivoire has adopted a strategic 2016-2020 plan for the fight against AIDS, focused on achieving the objectives 90-90-90, with a rate of disease regression in the country. However, there is a continuing decline in the HIV prevalence rate from 4.7% in 2005 to 3.7% in 2012.

Hypothesis of the study: The hypotheses are formulated based on the reality that health communication campaigns are almost always implemented in conjunction with other interventions. Therefore, the study suggests that:

H1. Online newspaper is positively effective in providing health programmes and health awareness campaigns

H2. Media health coverage has positive effect to reach the people and disseminate the preventive and awareness message, particular the remote area

H3. Social marketing along with mass media intervention will likely affect social norm and improve health promotion and awareness.

Conceptual framework

Social and Behavior Change Communication: To strengthen the effectiveness of HIV prevention, social marketing, and media awareness campaign is essential. Social marketing is commonly used as an approach to reach vulnerable populations with health products and services. Social marketing ranges from tangible products, to services (voluntary counseling and testing for HIV) and practices, to intangible products (such as knowledge of ways HIV is transmitted). The strengths of the social marketing approach is gaining access to these vulnerable sections of the population, which the Agence Ivoirienne de Marketing Social managed with proficiency and great dedication, focusing on promoting the use of condoms for HIV prevention. The programme also offers pills and hormonal injections through health facilities and pharmacies. However, a large market share of social marketing products is a positive sign of their acceptance.

Research Methodology

Data collection and Procedures: The research designed used the content analysis, which is described as: “A technique for gathering and analyzing the content of text, therefore, Ivorian online newspaper’s health awareness and campaigns, which took place from January 2016 to December 2016, a few keywords had been determined that appear in the headlines, such as “HIV/AIDS and “Mother and Child” awareness campaigns.

An initial set of 34 available articles was examined and content analysed. The coding instrument to carry out the quantitative content analysis, which was developed for analysis of 95 items of online newspaper.
**Inter-Coder Reliability:** Inter-coder reliability is deployed as a component of content analysis, a standard method of summarizing the substance of a set of mediated messages. Two independent coders were used to test the coding instrument. The inter-coder reliability testing was calculated by using Holsti Test Format as follow:

$$\frac{2M}{N_1 + N_2} = \frac{2 \times 480}{1140} = 0.84 = 84\%$$

**Data analysis:** Data was analyzed using Statistical Package of Social Sciences (SPSS); and Chi-Square analysis to answer the hypothesis.

**Results and Findings:** The study used 34 articles on health programs coverage and awareness campaigns provided by online newspaper, KOAC1.COM. While the Budd’s attention score frequency and percentage of health coverage in 2016, it appeared that more articles published in November with (21.1%), while in December with (18.2%), August and October with (12.1%).

The results in table 2, 3 and 4 show the range of frequency distribution, health programme and health campaigns, vulnerable of people affected by the health issue and social and behavior change communication campaigns, respectively reported by the online newspaper articles were content analyzed, using (Yes) and (No) agreement between the researcher and two coders.

**Table 2: Health programme and health campaigns**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Global HIV program</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Phar. products</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Mass Vacc.</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>4</td>
</tr>
</tbody>
</table>

**Table 3: Vulnerable of people affected by the health issue**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Mother and child</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Socio-economic</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Groups in high risk</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>2</td>
</tr>
</tbody>
</table>

Chi-square test with online newspapers’ health coverage and social marketing, the following research question and hypothesis:

**Research Question:** How do social marketing and communications impact community and health awareness campaigns?

**Hypothesis 3:** Social marketing along with mass media intervention will likely affect social norm and improve health promotion and awareness. Measure of relationship and analysis of hypothesis, the $\chi^2 = 2.400$, df = 1, sig. = 0.05 showed that there is an association between online newspaper’s health coverage and social and behavior change in interventions for community activity.

**Table 5: Chi-square test for online newspaper and social marketing**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>2.400</td>
<td>1</td>
<td>.121</td>
</tr>
</tbody>
</table>

a. 4 cells (100.0%) have expected count less than 5. The minimum expected count is .33.

**Conclusion**

Côte d’Ivoire’s progress in mobilizing HIV/AIDS interventions, it appears to be related to the large number of people who is not aware about their HIV status. As the women still much higher than male HIV prevalence in the area of Abidjan, capital city of Cote d’Ivoire.

In the analysis of the health programs and awareness campaigns, however, the aggressive public outreach campaigns and education interventions to target people in high-risk, in particular treatment services, are essential at this stage of the epidemic, as online media has the power to change peoples’ attitudes and beliefs, therefore, the online newspaper can be a key part of preventative actions to disseminate health information among the vulnerable group, as an effective messaging
to reach and educate the public health issues, such as prevention and awareness campaigns of mother-to-child transmission.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** IJRISE Journal Reviewer Committee

**References**


Do Demographics Matter? A Study on Administrative Staff’s Satisfaction Level Towards their High Education Institutions

Lokman Mohd Tahir1, Narina A. Samah1, Sanitah Mohd Yusof1, Mohd Fadzli Ali2, Noor Azean Atan3, M.Al-Muzammil Yassin1

1Associate Professor, 2Lecturer, 3Senior Lecturer, School of Education, Universiti Teknologi Malaysia, Scudai, Malaysia

Abstract

This study investigates administrative staff’s satisfaction level towards their higher educational institutions (HEI). In this study, we compare administrative staff’s satisfaction differences from their demographic profiles: working experiences, age, and gender. A total of 322 administrative staff provided their feedbacks based on three elements of satisfactions which are: satisfied with their knowledge, satisfied with the management process of their HEI and finally satisfied with the escalation or growth of their HEI. The findings reveal that administrative staff were satisfied with knowledge obtained followed by satisfaction on the management of the university. On the other hand, administrative staff of HEI felt that they are least satisfied with the HEI’s escalation. The findings unveil that female and senior administrative staff have much higher level of satisfaction compared to other related age and working experience groups.

Keywords: Satisfaction, administrative staff, Higher Education Institutions.

Introduction

Recognising the necessities for quality higher education, the role of universities and higher education institutions in Malaysia recently have significant roles in ensuring students’ improvement in terms of their socio-economics as part of the national economic planning strategy 1, 2.

In realising the significant role of HEI, the administrative staff also played their essential roles alongside with the academic staff. With their crucial roles in determining the smooth administration of HEI, their roles are indeed essential within management elements such as human resources, financial management, facilities and information technology 3, 4. While working with their HEI, the administrative staff also experienced similar experiences with the academics in how well they engaged with their own HEI which later leads to their satisfaction as indication for their creativity and commitment 5. Operationally, satisfaction is being defined as an individual’s feeling or reaction towards their job 6, 7 which influenced the feeling of distress, absenteeism and increased job performance 8.

Although the role of administrative staff in HEI is significantly essential, there are limited studies that measure their level of satisfaction compared to the academics. To date, only a few studies that measured the administrative staff’s satisfaction such as a study by Jung and Cheolshin (2015) 9 who served with Korean research university and Kipkebut (2010) 10 with administrative staff of private universities in Kenya. In both studies, a few elements which include the administrative staff’s job specification were analysed as predictors for administrative staff’s satisfaction. Additionally, their demographic variables were assumed to play its role as a predictor of administrative staff’s satisfaction. In Khan, Ullah and Jahan (2015)’s 11 study, administrative staff’s satisfaction that worked at universities in Bangladesh revealed that they were satisfied working with their universities and highly associated with their demographics. Based on findings from both studies, it is assumed that sample demographics have significant implications towards administrative staff’s satisfaction which warrants further investigation.

Corresponding Author**
Lokman Mohd Tahir
School of Education, Universiti Teknologi Malaysia, Scudai, Malaysia
e-mail: p-lokman@utm.my
In the context of Malaysian HEI, admittedly, there is a wide gap since not many studies have been carried out that measured their administrative staff’s satisfaction. Notably, previous local studies mostly measured the academics job satisfaction such as studies by Sam et al. (2012) and Sadeghi et al. (2012) from research-based universities in Malaysia. In terms of demographics, it is assumed that demographic variables have strong influence or relationship satisfaction: age, working experience and their gender. Although previous studies elaborated demographics have significant impact on their satisfaction, however the relationship with administrative staff’s satisfaction remains less investigated. Therefore, this exploratory study aimed to identify the administrative staff’s satisfaction towards their HEI’s; secondly, to analyse the differences in administrative staff’s satisfaction based on their demographic profiles of gender, age and working experiences; and finally, to examine whether administrative staff’s demographic profiles have significant influences to their satisfaction towards HEI.

Methodology

Design and sample: Since this study is descriptive in nature, it employed the survey method design, and data were collected from 322 administrative staff from randomly selected HEI. In terms of their working experience, 85 administrative staff had 5 to 10 years’ experience (26.3%) followed by 73 administrative staff who had less than 5 years of experience (22.6 %) and 61 administrative staff who have 11 to 15 years working experience (18.9 %). In addition, 44 administrative staff had 16 to 20 years of experience (13.6 %) with 16 administrative staff had 21 to 25 years of experience working with HEI and another 14 administrative staff had 26 to 30 years of experience and 30 staff had more than 30 years of experience.

Majority of administrative staff that participated in this study aged between 31 to 40 years old (N=109; 33.7%) followed by 101 administrative staff who aged between 21 to 30 years old (31.3%). In addition, another 71 administrative staff who aged between 41 to 50 years old (22 %) and the final age group are 42 administrative staff who aged between 51 to 60 years old (13%). Based on administrative staff’s gender, findings reveal that a total of 130 administrative staff are male staff (40.2%) followed by 192 (59.4%) are female administrative staff.

Instrumentation: This present study employed 23 items which were developed to measure the administrative staff’s satisfaction to their HEI. Overall, the questionnaire consists of two major sections.

In section A, three major items were enquired to administrative staff related to their demographics: age, working experience and their gender. In section B, all 23 items were constructed using the positive expressions and all negative expression items were gone through the reversing process. Items were constructed using a five-point Likert scale: 1 – strongly disagree, to 5 – strongly agree. Empirically, the 23 items within the questionnaire represented with three sub-constructs which are: satisfied with knowledge (2 items), satisfied with the management process (15 items) of HEI and, lastly, satisfied with escalation elements (6 items) of HEI. In constructing the items, previous studies that measured administrative staff’s job satisfaction were denoted such as Cheolshin (2015) and Volkwein and Zhou (2003) studies.

All items were constructed in the Malay language based on the demographics elements of the administrative staff who mostly received their education in the Malay language. In the pilot study, ten selected administrative staff from public university was approached in obtaining their responses on the 23 items. In this study, the measurement of internal consistency was based on the alpha Cronbach values and finding showed that most items internal values were 0.872 which considered as accepted values suggested by Hair et al. (2010).

Results

Measuring administrative staff’s job satisfaction: Results from the survey indicate findings related on the measurement of administrative staff’s satisfaction towards their HEI using descriptive statistics which comprised the mean scores and standard deviations which presented in Table 1 below.

<table>
<thead>
<tr>
<th>Satisfactory Facets</th>
<th>Mean scores</th>
<th>Standard deviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>3.95</td>
<td>0.65</td>
</tr>
<tr>
<td>Management</td>
<td>3.80</td>
<td>0.67</td>
</tr>
<tr>
<td>Escalation</td>
<td>3.75</td>
<td>0.61</td>
</tr>
<tr>
<td>Overall</td>
<td>3.83</td>
<td>0.52</td>
</tr>
</tbody>
</table>

In Table 1, the element of satisfaction of having wide knowledge has the highest mean scores (mean = 3.95; SD = 0.65) followed by satisfaction on the management of the university (mean = 3.80; SD = 0.67) and finally the satisfaction of the HEI’s escalation (mean= 3.75; SD= 0.61). The overall mean score indicated the value of 3.83 (SD = 0.52) which pointed out that administrative staff of the HEI have high satisfaction towards their HEI.
Differences based on administrative staff’s demographic profiles: In addressing the differences in relation to administrative staff’s satisfaction towards their HEI, their demographics: gender, age, and their working experience were analysed. In analysing administrative staff’s gender, t-tests were executed and summarised in Table 2 below.

Table 2: T-test results on satisfaction differences based on administrative staff’s gender

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t value</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>129</td>
<td>3.85</td>
<td>0.70</td>
<td>2.048</td>
<td>0.41</td>
</tr>
<tr>
<td>Female</td>
<td>192</td>
<td>4.00</td>
<td>0.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management process</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>129</td>
<td>3.75</td>
<td>0.81</td>
<td>1.211</td>
<td>0.263</td>
</tr>
<tr>
<td>Female</td>
<td>192</td>
<td>3.83</td>
<td>0.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escalation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>129</td>
<td>3.68</td>
<td>0.63</td>
<td>1.509</td>
<td>0.192</td>
</tr>
<tr>
<td>Female</td>
<td>192</td>
<td>3.79</td>
<td>0.60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < 0.05; N= 322.

Based on the data, it showed that there is no statistically significance difference between male and female administrative staff based in terms of the element of knowledge \( [n = 322( t = 2.048; p = 0.41)] \), management process of their HEI \( [n = 322 \ (t = 1.211; p = 0.26)] \) and lastly the element of escalation of HEI \( [n = 322( t = 1.509; p = 0.19)] \). Comparatively, mean score for female administrative staff are indicated higher than their male counterpart which reflected that female staff has much higher levels of satisfaction towards their HEI compared to male. Therefore, it is concluded that there isn’t any differences based on administrative staff satisfaction based on their gender however, the female administrative staff has higher level of satisfaction towards their HEI compared to the male staff.

Further, we also examine administrative staff’s satisfaction based on their age and working experience with their HEI. For this reason, we employed the one-way ANOVA to compare administrative staff perceptions of their HEI. Based on the findings, there are no significant differences on all three elements on administrative staff’s satisfactions based on their age and working experiences. In terms of administrative staff’s age group, there is no significant differences noted in the element of knowledge \( [N=322(F = .774; \text{ Sig } = .509)] \), management process \( [N=322(F = 2.212; \text{ Sig } = .087)] \), and escalation of HEI \( [N=322(F = .977; \text{ Sig } = .404)] \). Based on the mean scores for age groups, administrative staff aged between 51 to 60 years old has higher mean score compared with other three groups. Thus, it is indicated that the senior administrative staff has higher level of satisfaction towards their HEI. On the contrary, the age group of 41 to 50 years old was revealed as the age group has lower mean score which showed their least satisfaction towards their HEI.

As for administrative staff’s working experiences, all three elements of satisfaction also indicated no significant differences. For instance, for the element of knowledge \( [N=322(F = 1.500; \text{ Sig } = .178)] \), management process \( [N=322(F = 1.434; \text{ Sig } = .201)] \), and escalation of HEI \( [N=322(F = 1.852; \text{ Sig } = .89)] \).

Based on the findings, it is believed that senior administrative staffs have higher level of satisfaction towards their HEI. However, administrative staffs that were at their middle years of service were perceived to have lower satisfaction towards their HEI.

Relationship between administrative staff’s demographic with satisfaction: In identifying the prediction of administrative staff’s demographics towards their satisfaction, regression was performed to analyse how well the demographics predict the staff’s satisfaction.

Table 3: Regression coefficients on HEI administrative staff’s satisfaction

<table>
<thead>
<tr>
<th>Variables</th>
<th>ΔR²</th>
<th>t - value</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>.009</td>
<td>2.204</td>
<td>.028*</td>
</tr>
<tr>
<td>Age</td>
<td>.001</td>
<td>.328</td>
<td>.743</td>
</tr>
<tr>
<td>Working experiences</td>
<td>.000</td>
<td>1.305</td>
<td>.302</td>
</tr>
<tr>
<td>Management process</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>.000</td>
<td>1.299</td>
<td>.195</td>
</tr>
<tr>
<td>Age</td>
<td>.000</td>
<td>.462</td>
<td>.645</td>
</tr>
<tr>
<td>Working experiences</td>
<td>.002</td>
<td>1.194</td>
<td>.233</td>
</tr>
<tr>
<td>Escalation of HEI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>.004</td>
<td>1.524</td>
<td>.129</td>
</tr>
<tr>
<td>Age</td>
<td>.002</td>
<td>1.172</td>
<td>.242</td>
</tr>
<tr>
<td>Working experiences</td>
<td>.003</td>
<td>1.204</td>
<td>.229</td>
</tr>
</tbody>
</table>

*p < 0.05; N= 322.
In Table 3, the regression results showed that there is least influence of administrative staff’s demographics on their satisfaction based on administrative staff’s demographics. However, the regression indicated that the administrative staff’s gender has effects on the administrative staff’s satisfaction related to knowledge element based on the adjusted $R^2$ value which was indicated at 0.009. This indicates that only 0.9 per cent of the variance in administrative staff’s satisfaction was predicted by administrative staff’s gender within the knowledge element [$F (1, 321) = 2.204; \text{Sig} = 0.028$].

**Discussion**

This study was designed to examine whether administrative staff of HEI have high level of satisfaction towards their HEI based on their demographic variables including gender, working experience and their age. Evidently, administrative staff from HEI indicated that they have high level of satisfaction towards their HEI. Based on the findings, it is revealed that administrative staff of HEI seems to be satisfied while working at their HEI. Thus, it is literally proven that administrative staffs of HEI are satisfied working at their HEI with the element of knowledge obtained scored much higher mean scores among the three elements of satisfaction that was investigated. The differences were measured based on demographic variables of gender, age and working experience. Result obtained from inferential t-test indicates that no significance difference in terms of administrative’ gender based on three elements of satisfaction which are the knowledge, management process and escalation of HEI. Even though, inferential t-test showed no significance difference based on gender, mean score for female administrative staff were indicated higher than their male counterpart who reflects that female administrative staff has higher levels of satisfaction compared to male administrative staff at their HEI. Furthermore, we also analysed the significant differences based on other administrative staff’s demographic variables of age and their working experiences. The findings revealed that all two demographics did not show any significant differences based ANOVA results. However, based on the age and working experiences, it is assumed that senior administrative staff which aged between 51 to 60 and being working almost 30 years has much higher level of satisfaction compared to the other age and working experiences groups.

Finally, we also used regression test to measure the significant linkage between administrative staff’s demographic profile comprised of age, gender and working experience. Results confirmed that all demographic variables were weak predictors of administrative staff’s satisfaction in all three elements of satisfaction. Based on the table, administrative staff’s gender within the knowledge element has little significant implication on their satisfaction.

**Conflict of interest:** NIL

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**Ethical clearance:** Done research committee

**References**


Benefits of Breast Milk for Health Care: Analysis from the Islamic Perspective

Normadiah Daud1*, Hamizah Ismail2, Siti Roshaidai Mohd Ariffin3, Rahimah Embong1, Nadhirah Nordin1, Ado Abdu Bichi4

1Faculty of Islamic Contemporary Studies, Universiti Sultan Zainal Abidin, Malaysia, 2Kulliyyah of Medicine, 3Kulliyyah of Nursing, International Islamic University Malaysia, 4Faculty of Education, Yusuf Maitama Sale University, Kano Nigeria

Abstract

Breastfeeding truly gives an enormous effect towards the health of a mother and child. Breast milk contains nutrients which are highly beneficial for an infant’s health and growth. Among other benefits for a baby is it helps to develop the baby’s intelligence, it is very clean and it can save a baby from various diseases. There are lots of explanations in Islam with regards to the important position of breast milk in the life of a child however; there is lack of empirical evidences pointing out the importance of breastfeeding for health care from the Islamic perspective. In view of these the present paper aimed at studying the importance of breastfeeding for both child and mother according to the perspectives of Islam. This research is based on literature review method. Data was collected through documents analysis which consists of turath (traditional) and modern books as well as articles related to breastfeeding. The review revealed the importance of breast milk for a baby’s health; apparently the opinions of scientists are in parallel with the opinions of fuqaha. In fact, fuqaha from Shafi‘i and Hambali sects obliged the feeding of al laba’ which is colostrum to newborn babies. Conclusively, Muslims are made by the Islamic injunctions to believe that breast milk is just an effort to prevent a child and a mother from being inflicted with any diseases. This paper provides an important highlight that the breastfeeding is not only significance according to science but also because it fulfils the syarak requirements.

Keywords: Breast milk, Health Care, Islamic Perspective.

Introduction

Breast milk is the best food for babies especially right after birth until about 6 months old. It contains all the nutrients in the right amount. Breast milk also contains colostrum which helps to fight infections from numerous diseases such as diarrhea, cold and pneumonia. Furthermore, it acts as the first immunization for newborn babies1. The benefits of breastfeeding are also in parallel with Allah’s commandment in surah al-Baqarah verse 233 which advocates mothers to breastfeed their children up until the age of two. In fact there are numerous hadiths and opinions of fuqaha’ (experts in Islamic jurisprudence) and sahabiyat (female companions of Prophet SAW) that, discussed the benefits of breast milk.

Therefore the objective of this research is to study the importance of breast milk from the science perspective while at the same time, analyzing it based on the Islamic perspective. Previous researches especially turath books focused primarily on the significance of breastfeeding based on the Islamic perspectives only. For example, literatures produced by 2,3,4 and many others. They only discussed the concept and advantages of breastfeeding from the Islamic perspectives while breastfeeding from the aspect of science was not clearly mentioned.

In Malaysia there are numerous literatures with regards to breastfeeding. Examples include5,6,7,8,9 and others. These literatures present the benefits of breast milk from the aspect of science, and they advocate
breastfeeding. Analysis based on the Islamic perspectives on the science aspects was not carried out. Therefore, the authors saw a loophole in the previous researches hence this paper will discuss both aspects; the benefits of breast milk based on science and the analysis based on the Islamic perspectives.

Benefits of Breast Milk for Health Care: Some of the benefits of breast milk for babies is it can enhance baby’s brain, it is guaranteed clean, it can save lives and avoid obesity problems among babies and many others. Breastfeeding is indeed closely related to children’s mental health. A group of researchers from Adelaide’s Flinders Medical Center, USA conducted an intelligence test on 32 babies. From that test they found that babies who were breastfed were 40% smarter that babies who drink formula milk. This research proves that DHA (kind of fat acid contained in breast milk that increases baby’s mental development) is really beneficial for baby’s brain development\(^{10}\).

Scientific studies also show that brain ability for babies who are given breast milk is better than other babies. A study showed that breast milk given to babies during the first 6 months is highly beneficial for babies’ intelligence, and babies who were breastfed for less than 8 weeks obtain fewer benefits for their IQ developments\(^{11}\). Therefore, babies who are given breast milk obtain the best nutrition for their brain and nerve developments\(^{12}\).

Other than that, breast milk can save babies lives. This is owing to the fact that most diseases can be avoided with breastfeeding. Breast milk is clean and bacteria-free. Besides, it contains anti-infection agent that can fight numerous infectious diseases. One of the agents is the live white blood cells (leucocytes) that kill bacteria. Meanwhile, antibodies (immunoglobulins) can fight against the infection of regular diseases until the baby is capable of forming his or her own antibodies. This is due to an agent called bifidus factor that helps some special bacteria called Lactobasillus bifidus to breed and fight against bacteria that causes diarrhea. Other than diarrhea, breast milk has successfully fought against normal infections such as eczema, asthma and constipation. Babies who were given breast milk also rarely have ear or respiratory problems as compared to babies who were given formula milk. The nutrients in breast milk may also prevent babies from getting allergies. A research done in Finland showed that breastfeeding protects babies from any allergies from small to adulthood\(^{13}\).

In Mexico, 118 underweight babies were given breast milk or formula milk. This experiment showed that babies who were given formula milk were 13 times more prone to have bowel inflammation such as necrotizing enterocolitis and five times more prone to urinary tract diseases. In addition, they are also nine times more exposed to diarrhea\(^{14}\). Besides controlling diseases, breastfeeding may reduce the risk for a baby to be severely obese at a young age\(^{15}\). There are many researches that showed babies who consume formula milk early after birth are more prone to be obese\(^{16}\).

Benefits of Breast Milk from the Islamic Perspectives: The science world knows that the biggest secret contained in breast milk which makes it so beneficial is the existence of colostrum which forms antibody that preserve baby’s health. This view has actually being dominated by early Islamic scholars. For example, in the Shafi’i sect it is stated that a mother is obligated to feed her child with al laba’ or colostrum which is the first milk that comes out after the delivery. This is because a baby normally cannot live without consuming that first milk\(^{17}\). Similarly, the opinions in Hanbali sect\(^{18}\) also obliged the feeding of al laba or colostrum for newborn babies because it is extremely important for the babies’ lives and usually a baby cannot live without it\(^{17}\). This matter is befitting to qawa’id fiqhiyyah: Harm is eliminated\(^{19}\).

The verity on scientific research which stated breast milk is an agent or catalyst for babies’ intelligence has long been proven in Islamic history\(^{20}\). One well-known event in the Islamic history is the story of breastfeeding story of Imam al-Haramayn\(^{21}\). When he (Imam al-Haramayn) was little he was nursed by a stranger because his mother was sick. His father, upon knowing this, straightaway forced the milk out from al-Haramayn’s stomach. Imam al-Haramayn was only allowed to drink milk from his mother who was a pious and obedient servant to Allah SWT. As a result, Imam al-Haramayn grew up to become a faithful servant of Allah who was brilliant in Islamic knowledge. Imam al-Haramayn would mention this story many times to his audience whenever his speech was interrupted. He said:

This is the leftovers of the milk (from a stranger): From what has been uttered by Imam al-Haramayn, it was clear that he acknowledged that all privileges given by Allah SWT to him was the effect of proper breastfeeding from his mother\(^{21}\). As a lesson, if a mother has no milk then she must find breast milk from another
woman with virtuous character and manners. They are not encouraged to straight away resolve to formula milk when obstacles arise to breastfeed because there is no other food better than breast milk.

A Muslim breastfeeding expert from America had written in her article titled *The Importance of Breastfeeding to the Muslim Child* that breastfeeding will produce babies with higher IQ and more stable emotion. This finding is supported by a child specialist in Turkey in his article *Breast-feeding in Islam*. His 10 years research in child study had proven that breast milk nutrients can increase a baby’s IQ. According to him, breast milk contains a very high taurine. Taurine is one of the amino acid which is extremely crucial for brain development. This fact is more interesting to be studied because taurine content in human’s milk is 30 to 40 times higher than cow’s milk.

Mothers should always increase Qur’an recitations and other ibadah when breastfeeding. This will help the child to absorb all virtues done by the mother during the nursing period. If a mother is incapable of breastfeeding, then she must give the child to a pious, noble and smart woman as a wet nurse. She should never give her child to be breastfed by someone with unknown lineage or religion. It is afraid that the feeding may distort brain development and manners of the baby. This statement is enforced by a *mursal* hadith:

> From Ziyad al-Sahmi he said: Rasulullah SAW forbids from asking dumb women to breastfeed children. (Sunan Kubra, The Book of Marriage, Al-murdi’ al-Hamga’ chapter, Hadith no: 4172)

Verily all diseases and disasters come from Allah SWT to test humans’ faith and to cleanse their sins. Nevertheless, as a servant of Allah SWT with a sound mind, one must make an effort to avoid diseases and find a cure when he falls sick from any diseases. One of the treatments recommended in Islam is by performing injunctions in the Quran and hadith nabawiyyah. One of the methods advocated in Islam to avoid diseases is through the habit of eating for babies through breastfeeding until the age of two. This ruling is stated in Surah al-Baqarah verse 233. According to Mohamad ‘Abduh, breastfeeding affect all aspects including in terms of diseases prevention.

Several studies carried out by researchers that recognized the effectiveness of breastfeeding as a family planning method. Nevertheless, breastfeeding is just an effort by human, if Allah wills it, pregnancy will still occur. This is befitting to His commandment in surah Yasin:

> Verily when He intends a thing His command is “Be” and it is. (Yasin: 82)

Al-Qurtubi suggested, when Allah SWT wills for something to happen, it happens without the need for any help or without any difficulties. Similarly, Allah SWT in His commandment stated that:

> We did not idly create the heavens and the earth and all that lies between them. (Al-Dukhan: 38)

Al-Zuhayli in Tafseer al-Munir, translated this verse as everything the Allah created has its own wisdom and purpose. There is not a creation by Allah which is useless. What is more important is a decree or creation serves as an evidence of Allah SWT’s mightiness and oneness.

Therefore one of the creation and instruction of Allah SWT is the instruction to breastfeed. Among the biggest wisdom is it contributes to the mother’s health. However, when mothers avoided breastfeeding their children, numerous harms will inflict on mothers themselves. Numerous diseases due to failure in breastfeeding may inflict upon the mothers whereas Islam forbids its people from getting involved in things that may inflict harm upon themselves. Islam truly forbids such act as stated in *fiqh* method previously.

Breast milk is the best food; it is clean, halal, nutritious and costless. Nevertheless, those are not the only things desired by breastfeeding mothers. What is more important is breastfeeding is an instruction by Allah SWT which is clearly written in the Qur’an. Therefore, surely mothers who breastfeed their children are not only providing the best food the children but also getting multiple rewards from Allah SWT.

**Conclusion**

From the above discussions, it is prevalent that breastfeeding truly gives a huge impact towards the health of a mother and child. Breast milk contains nutrients which are highly beneficial for an infant’s health and growth. Among other benefits for a baby is it helps to develop the baby’s intelligence, it is very clean and it can save a baby from various diseases such as diarrhea, allergies, *otitis media*, obesity and others. Concurrently, Islam advocates breastfeeding because
not only it gives an added advantage towards the children and the mothers’ physical health as studied by scientists; it also contributes to children’s mental health characters.

Looking at the aspect of the importance of breast milk for a baby’s health, apparently the opinions of scientists are in parallel with the opinions of fuqaha. In fact, fuqaha from Shafi’i and Hambali sects obliged the feeding of al laba’ which is colostrum to newborn babies. This is owing to the importance of colostrum for a baby’s growth and development. This superiority has been greatly emphasized by scientists today that most hospitals even ban the use of milk bottles and formula milk early after birth. Conclusively, as Muslims, we must believe that breast milk is just an effort to prevent a child and a mother from being inflicted with any diseases. This is because breast milk is an Allah’s creation which is amazing and perfect.

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Conflict of Interest: Nil

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Ethical Clearance: Obtained through Research Committee

References


The Importance of Menu Variety Experience for Public Health Sustainability at Higher Education Institution

Sarimah Ismail1*, Normah Kadir1, Arif Kamisan Pusiran2, Irina Safitri Zen3, Aqeel Khan1

1Senior Lecturer, School of Education, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia Johor Bahru, 81310 Skudai, Johor, Malaysia, 2Senior Lecturer, Faculty of Business, Economics and Accountancy, Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia, 3Senior Lecturer, Department of Urban and Regional Planning, Kuliyyah Architecture and Environmental Design, International Islamic University Malaysia (IIUM), Kuala Lumpur, Malaysia

Abstract

The importance of menu variety from the perspective of public health has lacked of discussion in the literature in comparison to the profit perspective of a foodservice business. This paper reports finding of a research on the importance of menu variety for the sustainability of public health at higher education institution (HEI) from students perspective. Direct observation towards food displayed on the buffet counter of the cafeterias and interview sessions with students were conducted to identify attributes of menu variety as constructs for a survey research. Complete set of 375 questionnaires were collected among students as customer of 20 food outlets at 11 cafeterias of the HEI. Validity value of the questionnaire was 0.98, that analysed by Rasch Development Model. Survey data was analysed using descriptive statistics. Overall mean value for menu variety attributes was 1.97 and standard deviation, 0.656, which at the moderate level. This study suggested for the cafeteria food providers, customers and the HEI food authority to ensure high level of menu variety is offered to sustain public health of the HEI, customer satisfaction and long tender period of the cafeterias as a food provider.

Keywords: Menu variety attribute, higher education institution cafeteria, direct observation, sustainability, Research University.

Introduction

Among 20 public universities in Malaysia, five of them have recognized as Research University (RU). The Malaysian Ministry of Higher Education is targeting to increase number of international students from 100,000 in year 2019 to 250,000 by year 2025 across the HEIs to enhance international success and recognition of academic research and training1. The increment number of student intake signs the heavier role of cafeterias at the HEIs as a place of selling foods and as a body to taking care of students health. The big challenges are to fulfil diverse need of the students, to meet the requirement of Hazard Analysis and Critical Control Point and to sustain quality menu variety for public health. The mismanagement in food, plates for serving and washing may cause a severe effect on the public health of HEIs.

Food, service, staff, ambience, price and location are among customer satisfaction determinants of food service found from research conducted across the globe. One of the food attributes that bring the customers to patronize a restaurant/ cafeteria is menu variety. The menu variety has been debated in the literature for decades due to its strong contribution in generating revenue for the restaurant/cafeteria2. However, the important role of menu variety to public health received less attention. Since student intakes are increasing by year (both local and international students), and they are worry about their food intake while they are away from home, therefore, a research was conducted to identify menu variety offered at the HEI for the sustainability of public health.

Corresponding Author**
Sarimah Ismail
School of Education, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia Johor Bahru, Skudai, Johor, Malaysia
e-mail: p-sarima@utm.my
Methodology: A preliminary study was conducted to identify menu variety attributes for survey research constructs. The study was started with serial direct observations toward food displayed on buffet counter of 20 food outlets at 11 cafeterias of a RU. The observations took place at three main meal times of breakfast (from 7.00am to 10.00am), lunch (from 11.00am to 3.00pm) and dinner (from 5.00 to 9.00pm). Data of the observation were written in the field note. This followed by interview sessions with customers of the cafeterias that selected randomly among students of the RU. Interview questions addressed was assisted by interview protocol. Saturation of data showed sample size of the interview was 20 students while the observation took place for three weeks. Findings of the preliminary study found 12 attributes of menu variety. They were variety in terms of daily menu theme, menu type (buffet and a’la carte), international menu, local menu, trendy menu, main food ingredient, balance nutrition, sensory evaluation (food feature/look, taste/flavour and temperature) and cooking method. Those attributes were later on been used as research construct for item development of survey research instrument of questionnaire.

All research instrument have been verified by two senior university lecturers in the field of Food Service Management. Overall validity value of the questionnaire were 0.98 (for item validity) and 0.90 (for individual validity). Complete set of 375 questionnaires were collected among students as customer cafeterias. Data of the pilot study was analysed by Rasch Development Model and assisted by Winstep version 3.72 computer software. Validity value that more than 0.80 is in the range of high validity and the research instrument is suitable to be used for data collecting³.

Result

Among 12 menu variety attributes, three of them were rated at high level (daily menu themes, various ‘buffet’ service menu and menu consists of various nutrients). Seven attributes rated at moderate level were various menu for a’ la carte, international menu, local menu, menu with various cooking method, menu with various main ingredients, menu with various taste/flavour and menu with various look/feature. Two attributes that rated at low level were menu with various temperature and trendy menu (Table 1).

Discussion

The importance of 12 menu variety attributes toward public health are discussed according to sub-themes as below:

(a) Variety of Menu: Realising students having short period of time during peak meal hours of breakfast and lunch, all cafeterias promote menu variety of cooked foods to provide freedom for students to have choice to choose and adopting buffet service to offer fast service and avoiding long queue.

However, those variety of foods were stereotype and repeatedly everyday as well as similar between one food outlet to another. The a’la carte menu only
available late in the afternoon for tea break and dinner. The study also found only small number of food outlets offer trendy menu. Menu with various theme ranging from traditional local menu according to ethnic and culture, different daily theme, a’la carte menu, international menu, pasta, salad, sandwiches, bread, fresh fruit, stew, dairy products, soup and menu for special need like vegetarian with different group of main ingredients to provide holistic balance nutrients are available only at a few cafeterias with very limited choice.

Menu variety was found as a key factor in attracting and reflecting the need, expectation and satisfaction of customers visiting a cafeteria. It affects performance of food service industry. Through menu variety students are able to have variety of nutrient for the body to function correctly and having choice to choose according to their preference. The fulfilling customers’ preference and expectation will make them happy and having possibility for them to repeat purchase through repeat visit. The repeat purchase promises increment in profit.

The students of today require lots of healthy menu variety that consistent with current market trend to satisfy their taste buds. The new trend of food however, requires skilled chef to incorporate quality attributes of a food to produce healthy and well-balanced meals. This study suggests for the cafeterias to employ qualified chef and kitchen staff that equipped with various food knowledge and skills.

(b) Variety of Main Ingredient: Finding of this study showed that although menu offered are variety like having noodles, snack, rice, dessert, salad and vegetables, but most of them were Malay food orientation that sinoname with rice, flour, red meat, fish, chicken and green leafy as well as rhizome-based vegetables as main ingredients. They were cooked with chillie, soya sauce and coconut milk. These make the foods look red and oily, having hot and spicy taste.

Those food ingredients are rich with high calorie nutrients that take long time to digest. Taking high complex carbohydrate, protein, saturated fat and cholesterol food items for long term will lead to obesity, diabetese as well as silent killer of cardiovascular diseases like heart attack and hypertension. Research claimed people who eat the same food over and over again are likely to be less healthy than those who eat a variety of food. Since 80% of students at the RU of study are local students, those fattening food will contribute to the increment of obesity statistics in Malaysia. A study conducted by also found the similar finding that university cafeterias have prepared ready cook food that served at buffet counter but the food choice focuses on Malay ethnic group.

The best diet should have a little bit of everything of main group of ingredient to provide balance diet. The food variety promotes greater bacterial diversity in the gut to keep body weight. Having variety of food choice is seen as marketing strategy to attract customers attention besides awareness that there is no single food contains all of the essential nutrients in the optimum amount as the body need to keep healthy apart from breastmilk for babies. Knowing this, the cafeteria food providers is suggested to sell variety menu with alternate different item in each major groups of food ingredient: fruit, vegetables, grains, low-fat dairy, lean protein and unsaturated fat to provide variety and sufficient nutrients as the body needs. Number of menu that contains of high complex carbohydrate, protein, saturated fat and cholesterol should be replaced with menu with healthier main ingredients like diary products, fruits and vegetables that consist of high vitamin, minerals and fiber.

(c) Variety of Food Taste/ flavour: Majority of students rated food variety sold at the cafeteria at moderate level. The food taste of spicy, salty, sweet, soury are consistent with Malay food taste. Since Malaysia is a multiracial country that consists of three major races which are Malay, Chinese and Indian besides as a RU that having big number of international students, therefore, the cafeteria food providers is required to aware toward the needs of various food taste of Chinese and Indian students as well as international students with various nationality. Thus, menu variety that fulfill the need of these students with heterogenous background should be offered.

The foods sold were also found mixed with artificial food flavour. This study suggests for the cafeteria food providers to use natural flavor that is free from artificial food elements (like artificial additives, preservatives, food coloring, flavor, and genetically modified organism etc.) that may
harm body health. Natural food that is associated with freshness, organic and local produced food is perceived healthier because it is natural from the perspectives the way the food has been grown, how the food has been produces and processed as well as the properties of the final product\(^7\).

In food business, the sensory characteristic of food (the feature/look, taste/flavour, aroma and texture) influences customers choice and making decision either to buy or not to buy the food\(^8\). The sense of taste drives customers appetite and protect them from poisons and steer them towards the right food groups and away from the wrong ones\(^9\). A study conducted by Department of Statistics Malaysia\(^1\) found the effect on taste toward food demand is very strong and high statistically significant. Therefore, understanding why students purchase some foods but not others is the utmost importance for marketing strategy, advertising, attracting the students to repeat purchase and for planning of new menu variety development.

\(d\) Variety of Food Nutrition: Menus variety offered by the cafeterias are loaded with food items that contains of large amount of complex carbohydrate, protein and fat. Some cafeterias sell fresh fruit and healthier salad as an option. However, they are less varied and flavourful. Besides bad eating habit, the domination of unhealthy food available may contribute to weight gain after one year of studies of the students.

Since 95% of student accommodation at the RU are not allow the students to cook, this means the students have to choose the unhealthy food until end of their study period at the university or until end of business tender of the cafeterias with the university. Thus, the cafeterias should provide menu variety for balanced and healthy diet. A balanced, adequate and variety menu provides nutrients for the body to function correctly; for the body organs and tissues works effectively; avoid disease, infection, fatigue poor performance; and protecting human body against non communicable diseases especially obesity, diabetes, cardiovascular diseases, some types of cancer and skeletal conditions. Poor diet lead to body growth and development problem, poor academic performance and persist them with bad eating habit for the entire lives\(^1\)

\(e\) Food Temperature: Understanding the role of temperature in food manufacturing can help to keep the food safe to be eaten and prolong shelf life of the food. However, this study found low rate for serving food at the right food temperature. This situation happened might be because of four reasons. First, many cafeterias displayed dishes that suitable for lunch early in the morning to fulfill the need of customers who taking heavy meal for breakfast (skip lunch meal). The buffet counter that is not fixed with food warmer system to control dishes temperature above 60\(^\circ\)C and the dishes has been left in the room temperature (32\(^\circ\)C) for more than four hours after been cooked will expose the dishes to bacteria like Staphylococcus aureus, Salmonella enteritis, Escherichia coli, Campylobacter to grow. These bacteria grow rapidly and produce heat resistant toxin in ‘Danger Zone’ (between 4\(^\circ\)C and 60\(^\circ\)C).

Second, low awareness of customers toward the importance of right food temperature and negative impact to body health if disobey this guideline. Third, lacking of knowledge and or bad attitude of kitchen staff and cafeteria food providers about this matter until been portrayed into their bad practices. Fourth, Malaysian food is well known with hot and spicy taste. Eating the food at unsuitable food temperature in hot and humid 32\(^\circ\)C atmosphere is not really matter to the customers.

To improve food temperature and keeping the food safe, food thermometer should be used, buffet counter should be fixed with food warmer to ensure foods displayed are above 60\(^\circ\)C and both kitchen staff and cafeteria food providers should be trained about this matter. Health and safety training play big role in influencing good kitchen staff practices\(^1\)

\(f\) Variety of Cooking Method: Different cooking method gives different impact to food in various way: taste, digestion, introduce variety in meals, presentation, texture, aroma, packaging, nutrient, destroy micro-organism, appetite and increase consumption\(^1\). Finding of this study shows the cafeterias applied unhealthy cooking method particularly frying (both deep and shallow frying cooking methods) to cook majority of food items. The deep frying cooking method that using cooking oil provides additional fat to the food and gives negative impact to body health like obesity and heart diseases. The negative impact become worse if the recycle cooking oil is used in other cookings.
Therefore, it is advised for chef of the cafeterias to apply variety of healthy cooking methods like steaming, boiling, stewing, pressure cooking, simmering, poaching, braising, sauteing, baking, roasting, grilling and broiling for cooking. These cooking methods are not only cost effective but also are seen be able to sustain nutritional value of the food cooked.

Conclusion

Menu variety promotes equity between generating revenue among cafeteria food providers and serving healthy food item for the students. Therefore, reliable paths to detect, identify, quantify and monitor quality of menu variety are of great interest for sustainability of public health and cafeteria food business at the RU as well as high reputation as a RU that are not only excellent in learning and teaching, research and development, publication but also excellent in providing cafeterias that offer high quality of menu variety to students. Suggestions for practical implication to improve moderate level of cafeteria service in term of providing menu variety are as follow:

Cafeteria food providers: Practice high intergrity in selling healthy food with both purposes: profit and public health, educate all kitchen staff through proper training on the importance and impacts of menu variety to public health, customer satisfaction and behavioral intentions of repeat purchase. This followed by daily supervision toward staff practices.

University food au thority: Implement rule and regulation on quality menu variety at all food outlets; provide nutrition information, healthy eating tips tailored to the options on campus; having instrument for quality menu variety supervision; regular monitoring toward quality of menu variety at the cafeterias

Students: Increase awareness about their right and responsibility to get healthy and quality menu variety, having knowledge about food that they eat, right eating habit and maintaining healthy diet no matter where they choose to eat.

Conflict of Interest: NIL
Source of Funding: Self Source
Ethical Clearance: Done by Research Committee

References
Spectrofluorimetric Method for the Determination of Rhodamine B in Syrup

Asmiyenti Djaliasrin Djalil1, Bondan Bagus Wijaksono1, Pri Iswati Utami2

1Vice Dean, 2Student, Department of Pharmacy, Faculty of Pharmacy, Universitas Muhammadiyah Purwokerto, Jl. Raya Dukuhwaluh, PO. Box 202 Purwokerto 53182, Indonesia

Abstract

The rhodamine B has been used as a textile colorant. Its use in food is strictly prohibited because of its ability to form carcinogenic compounds. This study describes a method for determining rhodamine B in syrup by a fluorescence spectrophotometry. The method was validated by determining linearity, range, limit of detection, limit of quantitation, precision, and recovery. Five red syrup samples were collected from markets in Purwokerto city, Indonesia. A fluorescent compound was measured fluorometrically at 570 nm ($\lambda_{ex}$, 550 nm). Linear relationship with good correlation coefficients (0.9975) has been obtained in the range of 0.5-2.5 µg/ml, with a detection limit of 0.1436 µg/ml and a quantitation limit of 0.4787 µg/ml. The precision of the method was satisfactory; the relative standard deviation was 0.29%. The method was successfully applied to the analysis of rhodamine B in syrup with good accuracy; the recovery was 102.8%. The result showed that five syrup samples did not have rhodamine B.

Keywords: Analysis method, rhodamine B, spectrofluorometric, syrup, validation.

Introduction

Synthetic dyes have been widely used in textile, food, pharmaceuticals, and cosmetic. On the other hand, toxicity issues caused by synthetic colorants have initiated an intense research especially in food colorants. The color of a food and beverage play essential criteria in a food’s acceptability.1

Rhodamine B (Fig 1.) is a derivative of the xanthene dyes class. It may cause ovarian toxicity and cervical epithelial cell proliferation in the uterus.2-3 Due to the toxic effects of rhodamine B, FDA and many countries have banned it from using in food samples. In accordance with the Regulation of the Ministry of Health Republic of Indonesia and the National Agency of Drug and Food Control, Indonesia currently prohibits its use as food additive.4-6

The food fraud is the act of deceiving consumers with the aim of increasing company profits. FDA has been reported a number of imported food containing rhodamine B, in 2012. There were approximately 82 food products from 11 developing countries.7 In 2018, Saeeds’s group research has successfully identified the presence of rhodamine B in syrup samples sold in Faisalabad, Punjab, Pakistan. Of 75 samples studied, there were 40% syrup containing rhodamine B.8 Therefore, a continuous monitoring of prohibited colorants in food is needed to ensure food safety.

Many liquid chromatography methods were developed for the determination of rhodamine in food, cosmetic, or wastewater samples.9-11 Tatebe’s group research has developed an HPLC method for the simultaneous determination of rhodamine B, pararosaniline, and auramine in processed foods.9 Furthermore, Chiang’s group research has determined that rhodamine B and rhodamine 6G could be separated by HPLC combined with fluorescence detection.10 Although HPLC method provides good sensitivity for determination of rhodamine B, it has its limitation concerning the high price of the instrument.

Thus far, some spectrophotometric method was reported for the detection of rhodamine B.11-15
though UV-visible spectrophotometer is a simple and low cost apparatus than other instrument, the quantitative detection of rhodamine B in several matrixes needs a sample preparation technique. It step takes a long time and a lot of chemicals or solvents.

Rhodamine B is a fluorescent dye. In this research, based on its native fluorescence, a direct quantitative analysis method of rhodamine B in syrup was developed and investigated using spectrofluorometer. The objective of the present study was to detect the presence of rhodamine B quantitatively in syrup samples collected from local market in Purwokerto City, Central Java, Indonesia by spectrofluorometric method.

Materials and Method

Rhodamine B was obtained from Sigma-Aldrich. Stock solution of rhodamine B (10 µg/ml) was in ethanol (Merck). The stock solution was further diluted with ethanol to give five working standard solution with concentration of 0.5, 1.0, 1.5, 2.0, and 2.5 µg/ml. Samples were chosen on the basis of its color like red and pink. All samples were collected from Purwokerto market, selected syrups manufactured in Indonesia. In total 5 samples were purchased from local shops.

A. Optimization of the Optimum Wavelength and Solvent: The rhodamine B standard solution (1.5 ppm) spectral profiles created using a Shimadzu RF-6000 spectrofluorometer at a wavelength of 500-600 nm. The solution was measured by using a two-dimensional fluorescence. The 3D spectrum menu will display the excitation and emissions wavelength optimal. Furthermore, different solvents were observed for the proper detection. The solvents used were aquadest, methanol (Merck), and ethanol. The solvent that provide the highest fluorescence intensity will be used for further analysis.

B. Method Validation: Method validation is a technique used to check that the analytical method engaged for a particular test is suitable for the intended use. The performance characteristics were assessed by evaluating the limits of detection (LOD), limits of quantitation (LOQ), accuracy, and repeatability of measurements. LOD and LOQ were evaluated by the signal-to-noise S/N > 3 and S/N > 10 ratios of each fluorescence signal in the rhodamine B standard solutions. The recovery test was carried out to evaluate the accuracy of the proposed method. This test was performed by using standard additions method. The method involves adding known quantity of standard to the matrix of a syrup sample that did not contain rhodamine B. The rhodamine B standard solution (1 ml, 1.0 µg/ml) was transferred to 10 ml volumetric flask and syrup (3 ml) subsequently added into the flask. Ethanol was then added to the solution to obtain a 10 ml final solution. Another concentration of standard solutions used for the recovery test were 1.5 and 2.0 µg/ml. Repeatability of the method was assessed by analyzing relative standard deviations of rhodamine B standard solution. Fluorescence spectra and intensity measurements were carried out using a Shimadzu RF-6000 spectrofluorometer (Japan). All the standard and sample solutions were measured with an excitation and emission slit width of 5 nm.

Results and Discussion

Syrup is a concentrated beverage with the main components including sugar, water, and flavours. Syrup may have adulterants such as saccharin (synthetic sweeteners) in addition to prohibited synthetic dyes such as rhodamine B and metanil yellow. In our recent research, we analyzed the presence of rhodamine B in red syrup sold in the local market using a simple and rapid spectrofluorimetric without any previous extraction stages. Rhodamine B is known as a fluorescent dye which has a high quantum yield fluorescence. The fluorescence quantum yields (Φf) of rhodamine B is 0.913.16

Determination of optimum detection wavelength aims to increase a sensitivity and efficiency of measurement. The procedure was performed by using an excitation-emission scan (EEM/excitation-emission matrix), also referred to as a two-dimensional fluorescence. The result shows that the optimum excitation wavelength for rhodamine B is 550 nm, whereas the optimum emission spectrum is 570 nm. Fig. 2 displays a 3D fluorescence spectrum of rhodamine B.
The effect of solvent was studied in order to select the most appropriate solvent to increase the intensity of fluorescence. The emission (fluorescence) spectra including intensity, band position, and shape of a fluorophore show changes in organic solvents. Ethanol was found to be the best solvent for rhodamine B proved by its highest fluorescence intensity compared to other solvents as presented in Table I. Therefore, the experiment was performed using ethanol as solvent.

### Table I: Effect of Solvent on the Fluorescence Intensity of Rhodamine B (1 µg/ml)

<table>
<thead>
<tr>
<th>Solvent</th>
<th>λ&lt;sub&gt;ex&lt;/sub&gt; (nm)</th>
<th>λ&lt;sub&gt;em&lt;/sub&gt; (nm)</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquadest</td>
<td>550</td>
<td>570</td>
<td>19600</td>
</tr>
<tr>
<td>Methanol</td>
<td>550</td>
<td>570</td>
<td>8045</td>
</tr>
<tr>
<td>Ethanol</td>
<td>550</td>
<td>570</td>
<td>23423</td>
</tr>
</tbody>
</table>

The performance of the method was evaluated according to ICH guidelines. Different validation parameters was observed include linearity and range, precision, and accuracy.

A series of solutions containing rhodamine B were analysed and the fluorescence intensity were measured. Linear regression of the data was calculated. The fluorescence intensity-concentration plot was establish to be linear over the range of 0.5–2.5 µg/ml. Calibration curve of rhodamine B was drawn in ethanol. Linearity of calibration was good condition (Table 2). The calibration curve’s given in Fig. 3. Furthermore, Table 2 summarizes the calculated linear regression of the data.

### Table II: Performance Data and Analytical Parameters for Rhodamine B Determination

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Performance Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration range (µg/ml)</td>
<td>0.5-2.5</td>
</tr>
<tr>
<td>Correlation coefficient</td>
<td>0.9975</td>
</tr>
<tr>
<td>Slope</td>
<td>16413</td>
</tr>
<tr>
<td>Intercept</td>
<td>6772.2</td>
</tr>
<tr>
<td>LOD (µg/ml)</td>
<td>0.1436</td>
</tr>
<tr>
<td>LOQ (µg/ml)</td>
<td>0.4787</td>
</tr>
</tbody>
</table>

Repeatability was observed through replicate examination at concentration of the 1.5 µg/ml. The six replication of analysis were performance, and the results were presented in Table III.
Table III: Precision Data for Rhodamine B Determination

<table>
<thead>
<tr>
<th>Standar No</th>
<th>Fluorescence Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30708</td>
</tr>
<tr>
<td>2</td>
<td>30771</td>
</tr>
<tr>
<td>3</td>
<td>30651</td>
</tr>
<tr>
<td>4</td>
<td>30802</td>
</tr>
<tr>
<td>5</td>
<td>30618</td>
</tr>
<tr>
<td>6</td>
<td>30842</td>
</tr>
</tbody>
</table>

SD = 0.0884, RSD = 0.287%  

The results of intraday precision were stated in the terms of % relative standard deviation (% RSD). Method precision study confirmed excellent precision of the procedure where RSD below 2%.

Accuracy of the proposed procedure was determined by standard addition method at three concentration levels within the concentration range of 0.5-2.5 μg/ml. Three replication of recovery study were performed at each concentration level. The results of recovery studies were described in Table IV.

Table IV: Recoveries of Rhodamine B from Spiked Syrup Matrix

<table>
<thead>
<tr>
<th>Spiked Level (μg/ml)</th>
<th>Found (μg/ml)</th>
<th>Recovery (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1.024 ± 0.01</td>
<td>102.40 ± 0.96</td>
</tr>
<tr>
<td>1.5</td>
<td>1.54 ± 0.03</td>
<td>99.65 ± 4.25</td>
</tr>
<tr>
<td>2.0</td>
<td>2.13 ± 0.11</td>
<td>106.35 ± 3.48</td>
</tr>
</tbody>
</table>

1Mean ± SD

The recovery ranged from 99.65 to 106.35%. The results gained indication the close agreement between true concentration and the measured at each added standard concentration, representing that the procedure was accurate.

Lastly, the proposed procedure was applied for the analysis of syrup. Five syrup samples were analysed. The results were displayed in Table V. None of samples that were tested was found to contain rhodamine B.

Table V: Analysis of Syrup Using the Proposed Method

<table>
<thead>
<tr>
<th>Sample Syrup</th>
<th>Fluorescence Intensity</th>
<th>Concentration (μg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>-22.434</td>
<td>N.D.¹</td>
</tr>
<tr>
<td>B</td>
<td>-12.817</td>
<td>N.D.¹</td>
</tr>
<tr>
<td>C</td>
<td>-39.879</td>
<td>N.D.¹</td>
</tr>
<tr>
<td>D</td>
<td>-10.548</td>
<td>N.D.¹</td>
</tr>
<tr>
<td>E</td>
<td>-2.292</td>
<td>N.D.¹</td>
</tr>
</tbody>
</table>

¹not detected

Conflict of Interest: NIL

Source of Funding: Self Source

Ethical Clearance: Done by Research Committee

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Heavy Change of Acceptor Contraception Body in Depo Medroxy Progesterone Acetat (DMPA)

Susanti1, Annisa Nurul Chusna2
1Lecturer, 2Diploma student, STIKES Al-Irsyad Al-Islamiyyah Cilacap, Indonesia

Abstract
Depo Medroxyprogesterone Acetate (DMPA) injection contraception is the most widely used contraceptive method. The disadvantages of injectable contraception are increased body weight, amenorrhea, menorrhagia and spotting. The highest side effect of injectable contraception is weight gain. Analysis of differences in body weight before and after using Depo Medroxyprogesterone Acetat (DMPA) injectable contraception. A research design of paired sample tests with a sample size of 55 respondents. The average body weight before using Depo Medroxyprogesterone Acetate (DMPA) injectable contraception was 48.47 kg. After using Depo Medroxyprogesterone Acetat (DMPA) the average body weight was 50.54 kg, with the lowest body weight of 40 kg and the highest body weight of 69 kg. Data analysis using Paired t Test obtained p value = 0.000 < 0.05, meaning that there was a difference in body weight before and during using contraceptive injection of Depo Medroxy Progesterone Acetate (DMPA). Most Depo Medroxy Progesterone Acetate (DMPA) contraceptive sufferers experience weight gain.

Keywords: Injection Contraception, Weight Loss, Family Planning, Depo Medroxy Progesterone Acetate.

Introduction
Many reproductive health issues still need to be studied, not only about reproductive organs but there are several aspects, one of which is contraception. 3-month injection contraception is a popular contraceptive in Indonesia. Injection contraception is a method of contraception through hormone injections and as an effort to prevent pregnancy in women of childbearing age. There are two types of injectable contraception, namely injectable combinations containing injected estrogen and progesterone hormones every 1 month and injections of DMPA (Depo Medroxyproesterone Acetate) containing progestin hormones injected every 3 months1.

Injectable contraception Depo Medroxy Progesterone Acetate (DMPA) is the most widely used contraceptive method. This is because the effective way of working is 30% of pregnancy per 100 women per year. This type of contraception is considered to be easily obtained and used by couples of childbearing age. Injection type contraception is widely used because of its practical, safe, inexpensive, suitable for lactation (breastfeeding) because it does not suppress breast milk production and the rate of failure of injection contraceptive use is less than 1%1.

According to 2 Indonesian Health Profile, the coverage of new family planning participants and active family planning according to the type of contraceptive injection is 49.93% and active acceptors 47.78%. The type of contraception participants of the new Family Planning are the Fertile Age Couples who for the first time use one method or contraceptive after they end their pregnancy. In the 3 Central Java Province Health Profile, the most widely used family planning participants were injection, which was 57.4%. Injectable contraception is one type of contraception that is most widely used by fertile age couples and in the kesugihan area injection contraceptives are the highest choice.

Thus this method has the disadvantage of interrupting menstrual patterns including menorrhagia amenorrhea and spotting, late return of fertility after cessation of use, and weight gain. Weight gain is the
most frequent side effect of injectable contraception. Several studies have suggested that weight gain due to DMPA contraceptive use is associated with increased body fat and an association with appetite regulation. One study found an increase in self-reported appetite by women who used DMPA contraception after 6 months. This can be attributed to the content of Depo Medroxyprogesterone Acetat (DMPA) which is the hormone progesterone, which can stimulate the appetite control center in the hypothalamus, causing an increase in appetite. The results of another study conducted by the University of Texas Medical Branch (UTMB), women who used DMPA contraception on average experienced an increase in body weight as much as 11 pounds or 5.5 kilograms, and experienced an increase in body fat by 3.4% within three years usage.

DMPA injector acceptors in the Kesugihan area are most prevalent in Slarang Village with family planning acceptors of 224 acceptors. Many DMPA injection contraception acceptors said that body weight increased after using DMPA injectable contraceptives. Of the 10 acceptors said they had gained weight after using DMPA injection contraception. Based on this background, the researcher was interested in researching “Analysis of Differences in Body Weight Before and During Using Depo Medroxyprogesterone Acetate Injection Contraception (DMPA)”.

**Method**

Comparative analysis research design, two dependent meanings, is to test the mean difference between 2 data groups. The population in this study were a number of mothers who used Depo Medroxyprogesterone Acetat (DMPA) injectable contraception. Based on data taken by the population of Depo Medroxyprogesterone Acetat (DMPA) injection contraception, 55 respondents. In this study samples were taken using total sampling techniques.

**Results And Discussion**

Based on the results of the study of 55 respondents, the highest age characteristics of Depo Medroxy Progesterone Acetat (DMPA) contraceptive acceptors were at the age of 31-40 years, and the highest duration of use was less than 1 year and the lowest was 3 years.

A. Changes in Body Weight Before and After Using Depo Medroxyprogesterone Acetate Injectable Contraception (DMPA)

The results of the study of body weight in Depo Medroxyprogesterone Acetat (DMPA) injectable contraceptive which is presented in the Fig. 1.

![Fig. 1: Weight Loss of Injectable Contraceptive Acceptors Depo Medroxyprogesterone Acetate (DMPA)](image)

Based on Fig. 1, that of the number of respondents 55 acceptors, 70.90% experienced an increase in body weight. The average body weight at the initial use of DMPA was 48.47 kg, while the average weight after using DMPA was 50.54 kg.

Weight gain has always been a major concern among DMPA acceptors. There is an average weight gain of 0.1 kg at visits 1-3 (first 3 months) and an average weight gain of 1.036 kg at the end of the year. The amount of weight gain is influenced by the percentage increase in body weight after 6 months and the length of use of DMPA injection contraception. Acceptors who experience a 5% increase in body weight in the first 6 months will experience an average increase in body weight of 0.63 kg, 1.48 kg and 2.49 kg after 12, 24, 36 months. While an increase of more than 5% will experience an average increase in body weight of 8.04 kg, 10.86 kg and 11.08 kg. The results of this study illustrate the occurrence of changes in weight, either increasing or decreasing due to consumption of food that is converted into fat and stored under the skin. Nutritional intake also causes weight gain, possibly due to excessive eating patterns that make it easier to gain weight. Or maybe the intake of calories in the body is excessive and does not match the needs that result in weight gain. In addition to hormones and nutritional intake that affect weight gain can also be affected by physical activity. Decreased physical activity can occur due to increasing age which results in less enthusiasm for physical activity. This may occur because of the lack of time and opportunity available. Or maybe an energy intake that exceeds the body’s needs which are usually experienced by people who lack exercise or lack of.
physical activity so that energy entering the body is not burned or used which is then stored in the form of fat which causes weight gain.4.

B. Differences in body weight before and after using Depo Medroxy Progesterone acetate (DMPA) injections (Table 1).

Table I: differences in average body weight before and after use of depo medroxyprogesterone acetate (DMPA) injectable contraceptives

<table>
<thead>
<tr>
<th></th>
<th>Initial weight</th>
<th>Final weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Mean</td>
<td>48.47</td>
<td>50.54</td>
</tr>
<tr>
<td>SD</td>
<td>9.138</td>
<td>9.101</td>
</tr>
</tbody>
</table>

Paired-sample T test: \(df = 54; t = 15.5; p = 0.000\) (0.05)

Based on Table 1 it can be seen that there are differences in maternal body weight before and after the use of DMPA injectable contraception as evidenced by the initial change in DMPA weight is 48.47 kg, while the average after DMPA use is 50.54 kg.

Research results from 6 that there were differences in weight gain in DMPA and Cyclovem injection contraceptive acceptors there was an increase with the results of \(p\) value <0.001. This result was also supported by 7 study that there was a significant increase in body weight after three months \((p <0.01)\) and six months higher in DMPA users than in controls \((p = 0.000 <0.05)\).

Based on research that DMPA injection contraceptive acceptors have more weight than users of combined oral contraceptives and not users of hormonal contraception, DMPA users increase their body weight (+5.1 kg), body fat (+4.1 kg), percent body fat (3.4%), and the ratio of central-peripheral fat (+0.1)4,8. A systematic review found that weight gain with DMPA was not associated with initial weight or BMI in adults but that obese clients or overweight adolescents 4. The acceptors experienced weight gain after using DMPA injectable contraception as much as 57.5%. This is also in accordance with the results of the study of 4 that there is a glucocorticoid-like activity signal, resulting in an increase in appetite after 6 months in the study. In accordance with the results of the study also that there are significant differences in body weight before and after with the results of Paired-sample T test: \(df = 54; t = 15.5; p = 0.000\) (<0.05).

The results of the study9 found evidence of weight gain when using progestin contraception alone. Some significant differences when oral pill methods are compared with no hormonal contraception. This includes studies on oral contraceptives for oral pills, DMPA, levonorgestrel, and implants. Overall, the average weight gain was low for 6 to 12 months, which was less than 2 kg (4.4 lb) in most studies. Weight gain was recorded at two and three years, but the comparison group did not differ much in weight changes. People can gain weight over time regardless of contraceptive use. Appropriate and accurate counseling about typical weight gain can help reduce contraceptive termination because of weight perception.

Side effects of DMPA injection contraception, one of which is weight gain in 12.5% 10 long lasting and reversible agent of fertility control. The objective is to determine the profile of the acceptors, side effects and indication for discontinuation of progestogen-only injectable contraceptives at UCTH, Calabar. This was a retrospective study of the clients who used progestogen-only injectable contraceptives at the family planning unit between 1st January 2008 and 31st December 2014. A total of 1392 clients used the injectable progestogen-only contraceptive out of 5986 total contraceptive users giving the preva-lence rate of 23.3% over the period. Of these, 60.4% of the clients accepted the depot medroxy-progesterone acetate, while 39.6% accepted the norethisterone enanthate. It was mostly utilized by multiparous women, clients with tertiary education and those in their third decade of life. Second- ary amenorrhea was the commonest side effect in 47.7% of the clients. Over the study period, 243 (19.8%). Women who used DMPA experienced an average weight gain of 6.2 kg compared with an average increase of 2.3 kg in the combined oral contraceptives (COCs) group, 2.8 kg with values \((p = 0.02)\) 11. At baseline, the median age was 29 and 30.5 years, and the average BMI was 24.8 and 24.5 kg / m2 in the DMPA group. At 12 months, an increase was observed at the waist and hip circumference in DMPA users and 8/20 of them had a weight gain of 5% (an average of 4.6 kg). And Significant weight gain is caused by hormonal contraception but also because of the age of the acceptor12,13.

**Conclusions**

Depo Medroxy Progesterone Acetate (DMPA) injectable contraceptive acceptors with duration of use between 3 months to 36 months experience weight gain with Paired-sample T test: \(df = 54; t = 15.5; p = 0.000\) (<0.05). Pre-use counseling is very important to
overcome the effects of weight changes that occur in some acceptors of Family Planning so that they become acceptor.

**Conflict of Interest:** NIL  
**Source of Funding:** Self Source  
**Ethical Clearance:** Done by Research Committee

**References**

The Overview of Malaysia HIV Counselling Structure

Nur’ain Balqis Haladin¹, Noor Aireen Ibrahim¹, Azizah Rajab¹ and Yasmin Hanafi Zaid⁴

¹ Senior Lecturer, Language Academy, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Malaysia

Abstract

HIV infection is a chronic disease as there is currently no effective treatment or vaccine which further intensify the psychosocial impacts on HIV patients, their spouse as well as their family. However, HIV transmission is preventable as it is associated with the patients’ behaviour and lifestyle. Therefore, HIV counselling plays a vital role in the prevention and management of HIV transmission. Although studies on the structure of HIV counselling sessions have been done by previous researchers, similar study on the structure of HIV counselling sessions should be done in Malaysia in order to see whether the structure comply with those found in the previous research. Due to the lack of literature on the structure of HIV counselling sessions in the Malaysian context, the need for such research is even more significant in order to contribute to the Malaysian research on HIV. A total of 24 HIV counselling sessions from three government hospitals in Malaysia were recorded, transcribed and analysed. After analysing the data obtained from the audio recorded of HIV counselling sessions, it became apparent that the HIV counselling structure found in this study consisted of different themes which could be distinguished from each other based on the interactional goal each was attempting to achieve in the session and it was evident that the different phases have distinctive interactional structures.

Keywords: HIV counselling, counselling structure, advice giving, information giving.

Introduction

HIV infection is a disease that has hit the world’s population, including the people of Malaysia. To date, there is still no cure or vaccine for this disease. It is, therefore, a challenge in providing services as the demand and the needs of health services will continue to increase¹. As HIV/AIDS is a public health problem, it requires the commitment and cooperation of various agencies from either governments, NGOs, society or individuals. Therefore, the involvement of various sectors in helping people living with HIV are severely needed¹.

The HIV/AIDS committees has approved that the national HIV treatment to be integrated into primary health care level² with the aim to reduce the transmission of infection as well as to improve the health and the productivity of HIV patients. It provides exposure to healthcare professional to HIV patients which could improve their skills in handling cases such as counselling skills, physical examination and reduce the stigma against the HIV patient.

HIV counselling can be defined as a dynamic process of interaction and discussion between a qualified HIV nurse counsellor and a HIV patient who presents with problems associated to HIV with an aim to support the patient to manage these problems effectively and properly². HIV counselling is accomplished to achieve several objectives, which are:

(i) Prevention of infection through promotion of healthy behaviour, lifestyles, and spiritual values.

(ii) Prevention of transmission through modification of risky behaviours and lifestyles.

(iii) Delivery of psychosocial support to HIV patients and their spouse/family to achieve optimum level of quality of life.

Corresponding Author**
Nur’ain Balqis Haladin
Language Academy, Universiti Teknologi Malaysia
e-mail: nurainbalqis@utm.my
(iv) To correct misconceptions pertaining to HIV through health education.

In addition, there are several HIV counselling stages; i) pre-test counselling, ii) post-test counselling, and iii) support/follow-up counselling. Since HIV infection are connected with intense psychosocial impact to patients, their spouse as well as their family, pre-test counselling have to be performed prior to the HIV test. After the confirmation by a supplementary test, the post-test counselling in positive cases should be done without delay. During the post-test counselling, patients should be given the time to comprehend the meaning of test results and to allow ventilation of feelings such as anger, silence, fear, and more. Finally, all cases of positive results should be given follow-up/support HIV counselling. During the follow-up/support counselling, problems can be identified so that further action can be taken.

**Structure of HIV counselling session:** A prominent difference between counselling interactions and medical encounters were that the former were more flexible (Silverman, 1997; Sheon et al., 2010). Past study on therapeutic discourse described the interaction as an artificial structure which is derived from sudden shifts of topics. In HIV pre-test counselling sessions, a flexible structure was also found. It consisted of medical history taking, followed by discussion about sexual matters and then information delivery (Silverman, 1997). Dreaded issues were introduced later on in the session and the session concluded with discussions about the availability of the test result.

On the other hand, other study found that HIV counselling sessions (with men in the USA) consist of several tasks, namely: counselling (client speaks more than the counsellor in one turn), information delivery (risk assessment and health communication), data collection (standard survey regarding risk behaviour required by the particular institution) and sample collection (oral fluid swap and rapid test). These tasks were quantified by mapping when and how often each occurred in the session and it was found that they did not occur in a strict order and when the data collection task was removed from the session, the time the counsellors spent on counselling increased.

It is clear from the research discussed above that order exists in institutional discourses. This is what distinguishes such discourses from everyday talk and informal conversations. This order, however, varies according to the types of encounters as shown in counselling and medical interactions. Such overall descriptions are valuable as they provide an overview and a context for the interactions.

Although studies on the structure of HIV counselling sessions have been done by previous researchers, similar study on the structure of HIV counselling sessions should be done in Malaysia in order to see whether the structure comply with those found in the previous research. Moreover, due to the lack of literature on the structure of HIV counselling sessions in the Malaysian context, the need for such research is even more significant in order to contribute to the Malaysian research on HIV. Hence, it is important for this study to map the structure of HIV counselling sessions which takes place in the Malaysian government hospitals.

**Methodology:** This study takes on a qualitative approach; i) audio recordings of HIV counselling session and the analysis involved examining the pattern of the nature of the HIV counselling sessions. A total of 24 HIV counselling sessions from three government hospitals in Malaysia were recorded, transcribed and analysed. The details of the participants for the audio recordings of HIV counselling sessions is shown in Table 1.

<table>
<thead>
<tr>
<th>Hospitals</th>
<th>No. of HIV nurse counsellors</th>
<th>Working Experience</th>
<th>No. of patients</th>
<th>Gender of HIV patients</th>
<th>Types of HIV counselling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital Melaka</td>
<td>3</td>
<td>More than 5 years</td>
<td>10</td>
<td>Female: 2 Male: 8</td>
<td>Support/follow-up: 10</td>
</tr>
<tr>
<td>Hospital Sultanah Aminah</td>
<td>2</td>
<td>More than 5 years</td>
<td>5</td>
<td>Female: 1 Male: 4</td>
<td>Support/follow-up: 1 Post-test: 4</td>
</tr>
<tr>
<td>Hospital Sungai Buloh</td>
<td>3</td>
<td>More than 5 years</td>
<td>9</td>
<td>Male: 9</td>
<td>Support/follow-up: 6 Post-test: 3</td>
</tr>
</tbody>
</table>
Eight HIV nurse counsellors from the three government hospitals involved in the audio recordings of HIV counselling sessions. These nurses are specialized nurses with more than five years working experience. On the other hand, twenty-four HIV patients involved in both post-test and support/follow-up HIV counselling. With the aim of obtaining an overall mapping of the thematic structure of these sessions, the analysis began by listening to the audio recordings of HIV counselling sessions, reading the transcripts, and transcribing the interactions between the HIV nurse counsellors, the HIV patients and their spouse/family.

**Findings and Discussion:** After analysing the data obtained from the audio recorded of HIV counselling sessions, it became apparent that the HIV counselling structure found in this study consisted of different themes which could be distinguished from each other based on the interactional goal each was attempting to achieve in the session and it was evident that the different phases have distinctive interactional structures. The phases of the HIV counselling sessions audio recorded in this study were mapped along a continuum in which each phase was defined by different colours which refer to different themes/components, developing what is referred to as a “sequence map”.

The analysis carried out on the structure of seven post-test HIV counselling in this study resulted in the emergent of four major themes as shown in Figure 2. These themes were quantified by mapping their occurrence in each post-test HIV counselling session.

![Figure 2. Thematic structure of the post-test HIV counselling](image)

As shown in Figure 2, the thematic sequence found in the post-test HIV counselling structure can be viewed as: i) opening, ii) history-taking, iii) advice and information giving, and iv) closing. Later, the discussion will show that the support/follow-up HIV counselling sessions do not follow the same thematic sequence. For in-depth understanding of the structure of post-test HIV counselling, the researcher identified the percentage of the occurrences of these themes in the post-test HIV counselling sessions as shown in Figure 3.

![Figure 3. The percentage of the occurrences of the themes in the post-test HIV counselling sessions](image)

Similarly, the analysis of support/follow-up HIV counselling also indicates the importance of advice and information giving. Figure 4 provide the findings on the structure of seventeen support/follow-up HIV counselling.
As shown in Figure 5, 72% of the whole support/follow-up HIV counselling sessions was spent on advice and information based on the frequency of the theme during the support/follow-up HIV counselling sessions. The finding is congruent with the analysis of the post-test HIV counselling sessions. This clearly indicates that advice and information giving is not just an important theme in the post-test HIV counselling, but also in the support/follow-up HIV counselling sessions. Therefore, it is worth mentioning that the findings in the current study do not appear to validate the view by past researcher on the need for more HIV-related advice and information for HIV patients as well as their spouse and family.

For an in-depth understanding of the structure of the support/follow-up HIV counselling, the researcher calculated the percentage of occurrences for all the themes found in the support/follow-up HIV counselling sessions as shown in Figure 5.
The structures found in this study further validate previous research\(^4,^5\) that the malleable nature of counselling interactions to a particular structure and varied according to the types of encounters is the prominent difference with the medical encounters. The history-taking in the post-test HIV counselling occurred in the beginning of the HIV counselling sessions which covers the patient’s HIV exposure history which include the date and place of diagnosis, the route of exposure, and how the patient is coping with his/her HIV status. The findings can be supported with a statement\(^6\) that the counsellor should explore and acknowledge the various psychological reactions and concerns of the patient, specifically what the patient plans to do in the short and long term period. In contrast, the history-taking in the support/follow-up HIV counselling occurred toward the end of the counselling session. Since the follow-up patients’ appointments have been arranged, hence, the absence of history-taking at the beginning of the counselling sessions can be justified.

It is worth noting that medication adherence phase occurs right after opening phase in the structure of support/follow-up HIV counselling sessions. Moreover, majority of these patients are on HIV treatment which means that medication adherence is the major concern as past research assert that adherence should be monitored and should be assessed at each clinic follow-up visit as there is an indication that adherence decreases over time\(^9,^{10,11}\). This statement supports the findings of this research whereby HIV nurse counsellors would normally begin their HIV counselling sessions by assessing patients’ medication adherence.

Further analysis of the audio recorded HIV counselling sessions indicated that throughout the post-test HIV counselling sessions, 75% of the whole post-test HIV counselling sessions was spent on advice and information giving, while 72% during the support/follow-up HIV counselling sessions.

**Conclusion**

It is clear from the findings discussed above that order do exists in institutional discourses, particularly in HIV counselling. This is what distinguishes such discourses from everyday talk and informal conversations. The order, however, varies according to the types of encounters as shown in the different order between post-test and support/follow-up HIV counselling. Such overall descriptions are valuable as they provide an overview and a context for the interactions. It is worth mentioning that advice and information giving played key roles in constituting HIV counselling session.
as the percentage of advice and information giving occurrences in HIV counselling are astoundingly high. It is, therefore, believed that it is relevant for further research with the focus on advice and information giving in HIV counselling to be conducted.

Conflict of Interest: No potential conflict of interest was reported by the authors.

Source of Funding: SLAI (KPM)

Ethical Clearance: Done research committee

References


A Systematic Review of Learning Application for Students with Dyslexia

Kee Jiar Yeo¹ and Wai Wai Lim²

¹Professor, ²Student, School of Education, Universiti Teknologi Malaysia, UTM Johor Bahru, Johor

Abstract

Dyslexia is a specific learning disability in reading, writing and spelling which are not linked to intelligence. Learning application can be utilized as a gadget to help students with dyslexia (SwD) in alleviating their difficulties. The purpose of this study is to provide a review on learning applications, evaluation of application usability and effect of the application towards dyslexic’s performance. Twenty articles retrieved from electronic databases on learning application for SwD published between 2012 to 2018 were selected and reviewed systematically. There were seventeen learning applications for dyslexia and five were related to English Language. Children were eager to explore the learning application and enjoyed using it. Most of these studies revealed significant improvement in reading, spelling and writing after using the learning application. Evaluation aspect is beneficial to researchers in developing learning application in future.

Keywords: Learning application; dyslexia; learning disability.

Introduction

Dyslexia is a common learning disability and mainly impairs a person’s proficiency in reading, spelling and writing. It is irrespective of intellectual disability¹, health impairments and behavioral disturbances. Students with dyslexia (SwD) often experience difficulties in accurate word recognition², convert specific letters to corresponding sounds or manipulate the sounds together to form a word ³, read with long pauses or frequently lose directionality in text by missing out lines. Because of these deficits, they always being labelled as lazy, slow and idiot kids in school ⁴-⁵. Thus, it makes SwD often feel frustrated and have a low self-esteem compared to their peers.

Research found that conventional teaching methods may not be effective for SwD⁶. SwD need multisensory technique which involves utilisation of visual, auditory and kinaesthetic sensory components to enhance learning process⁷. Multisensory approach makes learning process more effective and students stay focused for long durations⁷-⁸. Mahidin et.al.⁹ claimed that learning applications which allow SwD apply more than one sensory channel to process the instructions is an efficient gadget to teach SwD. Mobile learning application not only give positive effects on the process of literacy acquisition¹⁰ but also assist SwD to practise reading independently. The purpose of this paper is to review literature on learning applications, evaluation of application usability and effect of the application towards dyslexic’s performances. The finding of this literature review contributes in identifying research gaps for future study.

Methodology: Electronic databases, such as Google Scholar, SpringerLink, ScienceDirect, IEEE Xplore Digital Library, Science Publications and ERIC were used to gather previous studies on learning application for SwD. The papers published between year 2012 to 2018 were searched and downloaded under the keywords [Dyslexia AND Mobile Application], [Learning Disability AND Mobile Application] and [Dyslexia AND Learning Application]. There are 20 articles which fulfilled the criteria adopted and categorised into three themes.

Results

Findings from 20 papers which highlighted learning applications, evaluation of application usability and
effect of the application towards dyslexic’s performance. Seventeen papers discussed the development of learning applications, one on the existing learning application in improving participant’s spelling skills and while the other papers focused on doing research field works before the development of learning applications.

**Learning Application:** Thirteen out of seventeen learning applications focused on dyslexia, two of them focused on both dyslexia and dyscalculia and another two focused on dyscalculia. There were five learning applications in English Language\(^4-5,7,11,12\). Android was found to be the prominent platform used as operating system for the mobile application as most of the young people have a mobile device equipped with this operating system.

Mobile application by Borhan et.al \(^4\) focused on English sight words which were incorporated in short stories, rhymes and song verses in mobile application. Tariq and Latif \(^{12}\) termed as Dyslexia, is characterized by difficulties in various aspects of writing skills making the individuals unable to develop age-appropriate and ability-appropriate functional skills. In Pakistan, lack of dyslexia awareness and remedial education training restrains the remediation of dyslexic children at early stages. There also exist noticeable affordance and accessibility issues concerning the remedial help and assistive technology adoption. In this research, we have developed a mobile learning application for android-powered devices that targets developmental progression and usability requirements of dyslexic children with writing difficulties. Our center of interest was to improve introductory writing skills of dyslexic children along with consistent evaluation of their learning performance to highlight the weak areas of learning process. To achieve this objective, we have designed a Writers Learning Algorithm (WLA discussed the mobile application for improvement of SwD’s fundamental handwriting skills in English Language and Mathematics. Dyslexia Aide (2016) \(^5\) was designed to enhance learning of alphabet, spelling of English words and memory skill. Balakrishnan et.al \(^{11}\) highlighted mobile based multimedia tool improves SwD’s writing and reading skills in English language. Mobile application EasyLexia developed by Roxani et.al \(^7\) were aimed to improve reading skills in English Language, Mathematical skills, short term memory and concentration of children.

**Evaluation of Usability Application:** Findings showed that eight studies focused on application usability, five studies focused on effect of the application towards dyslexics and six studies emphasising on both usability and performance settings. SwD enjoy playing the application and will use the application again for more content \(^13-15\). All the students showed their preference in completing the tests on a mobile device rather than on paper \(^7,16\) and majority of them could stay focussed and interested throughout the session when using the application \(^14,17\).

Respondents were happy with the user interface design, colour and picture in Mr.Read V2.0 developed by Borhan et.al\(^9\). Functions and animations in Dyslexia Aide are simple and children enjoyed using the applications while learning. However, level of interactivity in application of Tariq and Latif \(^{12}\) should be improved as learning effectiveness greatly depends on it. In general, evaluators agreed that Dyslexia Baca is well designed in content and multimedia elements\(^18\). However, the user commented that they only have to find one alphabet in level 2 which is too simple and not standardized in the other levels and new version of Dyslexia Baca is required. Study by Madeira et.al\(^3\) and Risqi et.al\(^{14}\) revealed that smooth animation and nice graphic can engage and attract dyslexics’ attention.

**Effect of the Application towards Dyslexic’s Performance:** SwD were able to spell better with mobile learning application\(^4,15,19\). They could sound out words confidently and improved their reading skill significantly after using mobile learning application\(^4,11,15\). The review of Roxani et.al (2013)\(^25\) showed progress in word recognition and phonological decoding. The mobile application facilitates the perception of the visual layout of the letters by rotational movement function \(^20\). All participants achieved top score in the early words, rhymes and sequences of letters in the words but poor performance in syllables structure of words\(^3\). Results revealed that increase in identifying letter shape, letter-sound, pronouncing syllables and self-efficacy belief after using mobile application \(^21\).

The study by Tariq and Latif \(^{12}\) termed as Dyslexia, is characterized by difficulties in various aspects of writing skills making the individuals unable to develop age-appropriate and ability-appropriate functional skills. In Pakistan, lack of dyslexia awareness and remedial education training restrains the remediation of dyslexic children at early stages. There also exist noticeable affordance and accessibility issues concerning the remedial help and assistive technology adoption. In
this research, we have developed a mobile learning application for android-powered devices that targets developmental progression and usability requirements of dyslexic children with writing difficulties. Our center of interest was to improve introductory writing skills of dyslexic children along with consistent evaluation of their learning performance to highlight the weak areas of learning process. To achieve this objective, we have designed a Writers Learning Algorithm (WLA, Rello et.al 2 and Balakrishnan et.al 11 indicated that learning application has an impact in improving writing skills of SwD compared to traditional method. The article by Ariffin et.al 20 indicated that testing shows positive improvement in addition and subtraction operation question (mathematics) after using Calculic Kids application.

**Discussion and Suggestion for Future:** There are seventeen mobile learning applications were developed from 2012 to 2018. Therefore, future researches need to focus more on design and development of mobile application especially in English Language for SwD. Moreover, the meta-analysis results indicated that the mobile learning application is one of the gadgets to improve reading 4, 11,15, writing 2,12, spelling 4,15,19 and mathematics 20. These findings are consistent with the study that proposed applications enhance the SwD with disciplinary literacy 22, writing 23 and reading 24.

However, there are several limitations across the meta-analysis studies. It included the imprecision of data in the studies due to small sample sizes (below 10) 9. The articles searched from electronic databases might not be comprehensive and excluded some articles published in other languages. In future, the articles should be searched in other languages by using translator, period of published articles should be before year 2012 and used large sample size.

**Conclusion**

The articles were reviewed in three main themes, namely learning application developed, evaluation of application usability and effect of the application towards SwD’s performance. This review provided valuable insight on the current trends pertaining to the use of learning application in helping SwD to gain better learning experiences. The review is also beneficial to researchers in developing effective learning application in future based on the evaluation aspects.

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**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Journal Reviewer Committee

**References**


Diagnostic Outcomes of Pancytopenia after Bone Marrow Examination in Lady Reading Hospital, Peshawar

Huma Riaz¹, Munawar Ali Shah², Taj Ali Khattak³

¹MBBS, DCP (Diploma Clinical Pathology), FCPS (Haematology), Assistant Professor of Haematology, ²MBBS, FCPS (Haematology), Assistant Professor of Haematology, ³MBBS, M. Phil (Haematology), Professor of Haematology, Department of Pathology, Lady Reading Hospital, Peshawar Pakistan

Abstract

Objective: To determine the causes of pancytopenia after bone marrow examination to identify the correct etiopathology in order to help in implementing timely and appropriate treatment.

Study design: Cross sectional retrospective descriptive study.

Place and duration of the study: Haematology unit, department of pathology of Lady Reading Hospital, MTI.Peshawar, from 01.01.2012 to 31.12.2012. Material & Methods; A retrospective analysis of the data of total 181 patients including all ages and both the gender, who presented with pancytopenia and underwent bone marrow examination was performed. Hemoglobin level below 10gm/dl, white blood cell count of less than 4x10⁹ u/l and platelet count less than 150x10⁹/ul was taken as the criteria for pancytopenia. Cell counting was performed by automated cell counter and platelet count was confirmed by peripheral blood film examination. The findings were recorded in a Performa and results were drawn accordingly.

Results: During this study period, 181 patients fulfilled the criteria for pancytopenia. Age of study subjects ranged from 1 to 80 years (mean age 26 years). 102(56.4%) were male and 79 (43.6%) were females; giving male to female ratio of 1.2: 1. Among 181 cases, the commonest diagnosis for pancytopenia after bone marrow examination was Aplastic anemia; with 64(35.4%) cases. Megaloblastic anemia was the second commonest diagnosis with 52(28.7 %).31.2(17.6 %)were diagnosed with acute leukemia which included 20 (11 %) and 12 (6.6 %) cases of Acute lymphoblastic leukemia (ALL) and Acute myeloid leukemia (AML) respectively. Chronic lymphocytic leukemia was diagnosed with 2 (1.1 %) cases. while 4 (2.2 %) cases were diagnosed with Myelodysplastic syndrome (MDS) and 3 (1.7 %) with Plasma Cell Disorder/Multiple Myeloma (MM). 2(1.1 %) cases were diagnosed with bone marrow metastasis. Mixed deficiency anemia was found in 5 (2.8 %) cases while 9 (5 %) cases were found with peripheral destruction. Storage cell disorder (Gaucher’s disease) was diagnosed in 2 (1.1%) cases. 5 (2.8 %) cases were diagnosed with Visceral Leishmaniasis and 1 (0.6 %) case diagnosed with Plasmodium Vivax Malaria.

Conclusion: Aplastic anemia was the commonest cause of pancytopenia, followed by Megaloblastic anemia after bone marrow examination.

Keywords: Pancytopenia, Bone marrow examination, Megaloblastic anemia, Aplastic anemia.

Introduction

Pancytopenia is a very common observation in routine haematological investigation.¹ It is defined as reduction of all the three formed elements of blood (erythrocytes, leucocytes and platelets) below the normal reference range .the patients are suffering from anemia, leucopenia and thrombocytopenia.¹² There are various
causes of Pancytopenia ranging from a mild nutritional deficiency to a life threatening malignancy infiltrating the bone marrow. The etiology of pancytopenia highly varies according to the geographical and genetic factors. The chief clinical manifestations in patients are secondary to the reduction in blood elements, and are commonly in the form of fever, pallor, fatigue, bleeding, weight loss, organomegaly etc.

Establishment of a correct diagnosis is vital for the management and prognosis of that specific disorder. A prompt diagnosis of various causes of pancytopenia is therefore very crucial and always requires a thorough clinical examination followed by base line investigations like complete blood count, peripheral smear and bone marrow examination.

Diagnosis of the underlying pathology in pancytopenia is the real determinant of the future management and prognosis of such patients. Hence, Bone marrow Examination is a highly informative diagnostic test in evaluating the causes of pancytopenia and thus can possibly prevent grave complications and mortality in these patients by early therapeutic interventions.

Different studies are carried out regarding the etiology of pancytopenia worldwide, but due to high variation in the etiological spectrum of pancytopenia according to the geographical distribution, genetic factors and local environmental conditions, the data of the other countries may not be a true representative of our population. Hence this necessitates local studies in our own local setups. This study therefore was conducted to determine the etiological spectrum of pancytopenia in our setup using bone marrow aspiration as a diagnostic tool.

**Materials and Methods**

This is a cross-sectional retrospective descriptive study conducted at haematology unit, Department of pathology at Lady Reading Hospital, MTI Peshawar over a period of 12 months from January 2012 to December 2012. A retrospective analysis of the data of patients who presented with pancytopenia and underwent bone marrow examination, was performed. The study included 181 patients and diagnoses were made based on criteria defined by De Gruchy.

Pancytopenia was reported by automated cell counter (Sysmex). The criteria for diagnosis are: Hemoglobin <10 gm%, WBC count <4 X 10^3/ul and Platelets < 150 X 10^3/ul

Patients with dry tap and with inadequate bone marrow aspirate sample were excluded from the study.

Diagnostic Data of 181 patients were confirmed after detailed microscopic examination of smears of peripheral blood, reticulocyte count and smears of bone marrow with a detailed morphological study of different cells. Mean was calculated for quantitative variables e.g. age. Frequencies and percentages were calculated for qualitative variables like diagnosis and gender. Data was analysed using SPSS version 16.

**Results**

During the period of our study a total of 512 patients underwent bone marrow examination, Out of which 181 patients were fulfilling the criteria of pancytopenia. Bone marrow aspiration examination and trephine biopsy was performed in all the cases.

Study included patients from all age groups and both genders. Age of study sample ranged from 1 to 80 years. There were 102(56.4%) males, and 79 (43.6%) females (Table; 2), with male to female ratio of 1.2:1. Among these 181 cases 52 (28.7%) cases were diagnosed with Megaloblastic anemia, 64(35.4%) cases were diagnosed with Aplastic anemia , while 32(17.6 %)cases were diagnosed with acute leukemia including 20 (11 %) and 12 (6.6 %) cases Acute Lymphoblastic Leukemia (ALL) and Acute Myeloblastic Leukemia (AML) respectively. Storage cell disorder was diagnosed in 2 (1.1%) cases while Visceral leishmaniasis in 5 (2.8%) cases. Malaria was in 1 (0.6%) cases while bone marrow metastasis was diagnosed in 2 (1.1%) cases. In 5 (2.8%) cases diagnosis of Mixed deficiency anemia was made. Chronic Lymphocytic leukemia CLL was found in 2 (1.1%) cases while Plasma cell disorder (Multiple Myeloma)in 3 (1.7%) cases, Myelodysplastic Syndrome (MDS) was diagnosed in 4 (2.2%) cases and peripheral destruction was diagnosed in 9 (5%) cases.

**Table 1: Disease frequency distribution table (n=181)**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Megaloblastic anemia</td>
<td>52</td>
<td>28.7</td>
</tr>
<tr>
<td>Storage cell disorders</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>Visceral Leishmaniasis</td>
<td>5</td>
<td>2.8</td>
</tr>
<tr>
<td>Malaria</td>
<td>1</td>
<td>0.6</td>
</tr>
</tbody>
</table>


Disease Frequency Percentage (%)
---
bone marrow metastasis 2 1.1
Mixed deficiency anemia 5 2.8
Aplastic anemia 64 35.4
Peripheral destruction 9 5.0
ALL 20 11.0
AML 12 6.6
CLL 2 1.1
Plasma cell disorder(Multiple myeloma) 3 1.7
Myelodysplastic syndrome 4 2.2
Total 181 100.0

Table 2: Disease gender wise distribution frequency table (n=181)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>102</td>
<td>56.4</td>
</tr>
<tr>
<td>female</td>
<td>79</td>
<td>43.6</td>
</tr>
<tr>
<td>Total</td>
<td>181</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Discussion

Pancytopenia is a very common haematological finding with a wide spectrum of clinical presentations. Pancytopenia is not a disease entity but a triad of findings in which all three major formed elements of blood (i.e.; red blood cells, white blood cells and platelets) are reduced in number. The severity of pancytopenia and the underlying pathology mainly determine the management as well as the prognosis of the patients. It most often creates a diagnostic challenge to the physician and an appropriate knowledge of accurate etiologies regarding this condition is vital for the management of the patient. Bone marrow examination is of prime importance to establish a diagnoses in the patients presenting with pancytopenia.

The frequencies of the diseases causing pancytopenia highly vary in different studies due to the differences in geographical distribution including nutritional status, genetic differences in population, variety of infections and exposure to bone marrow suppressing drugs.

In our study Aplastic anemia was the commonest cause of pancytopenia (64 (35.4 %) (Table 1). This is in contrast to the previous studies conducted where on the basis of bone marrow examination, the most common cause of pancytopenia was Megaloblastic Anemia , in studies of Khan et al, Isha et al, Varma et al., Kumar et al, Santra et al. Aplastic anemia was reported as the commonest cause of pancytopenia and its frequency ranged from 10% to 52.7% in different studies regarding the outcome of pancytopenia diagnosed on bone marrow aspiration and biopsystudies. In one study done by Singh G and colleagues in 2016, aplastic anemia was seen in 1.1% cases of pancytopenia and was the least common cause of pancytopenia.

The diagnosis of aplastic anemia was made initially after bone marrow aspirate examination which was further confirmed after bone biopsy examination.

The second commonest cause of pancytopenia in our study is Megaloblastic anemia. (Table 1). The incidence of megaloblastic anemia recorded in various studies varies from 0.8% to 32.26% of all pancytopenic patients. In the present study megaloblastic anemia was observed in 52 cases with 28.7 % frequency. Blood films in these cases were showing macrocytosis and hyper-segmented neutrophils while Bone marrow was characteristically showing megaloblastic change in the erythroid lineage. Stainable bone marrow Iron was increased in the bone marrow. These patients were advised strict monitoring of blood counts after therapeutic trials of vitamin B 12 and folic acid. A Study conducted by Memon S and colleagues in 2008 in India showed that megaloblastic anaemia was the commonest cause of pancytopenia followed by aplastic anemia. In another study conducted in 2014 by Prabhala , data of 172 patients presented with pancytopenia who underwent bone marrow examination, was analysed and megaloblastic anemia was found to be the commonest cause of pancytopenia.

Megaloblastic anaemia is found to be common cause of pancytopenia in developing world due to nutritional deficiencies. Usual causes of megaloblastic anemia in our country are chronic inflammatory disorders of the gastrointestinal tract and malabsorption syndromes apart from poor nutrition. Though in our study megaloblastic anemia was still prevalent in a high frequency (i.e.; 28.7%) but aplastic anemia was the leading (i.e; 35.4%) cause of pancytopenia.

Mixed deficiency anemia was observed in 5 (2.8%) cases of pancytopenia in the present study (Table 1). similar findings were observed in a study done by Khan MI et al while in another study done by Singh G and colleagues in 2016 Mixed deficiency anemia secondary to malnutrition was the commonest cause among pancytopenia, and was observed in 27.3% cases.
Similar results were seen in studies by Chandra et al from Delhi and Borelli et al from Brazil. Malnutrition of multiple micronutrients can suppress the normal bone marrow hematopoiesis and thus leads to pancytopenia.

Acute lymphoblastic leukemia (ALL) was found in 20 (11%) cases and Acute myeloid leukemia (AML) was diagnosed in 12 (6.6%) cases (table 1). Together, AML and ALL constitute 17.6% cases of acute leukemia. In a study conducted by Singh G and colleagues in 2016, acute leukemia was found to be the second most common cause of pancytopenia, constituted 18.2% of all the cases of pancytopenia.

Chronic lymphocytic leukemia (CLL) was diagnosed in 2 (1.1%) cases in our study, while 3 (1.7%) cases out of 181 were diagnosed as plasma cell disorder (Multiple Myeloma). Other studies also showed low incidence of multiple myeloma ranging between 0.94% to 4.1%. Bone marrow metastasis was diagnosed in 2 (1.1%) cases in the total 181 cases (table -1).

Myelodysplastic syndrome (MDS) was found in 4 cases at a frequency of 2.2%. MDS as a cause of pancytopenia, reported in few other studies varies in frequency from 0-18%, which is mainly due to variation in environmental factors, genetic and geography.

In our study 9 (5%) cases out of the total 181 were with the diagnoses of Peripheral destruction with normal bone marrow trilineage hematopoiesis (table-1). In a study conducted by ahmad MI et al, 15 (19.7%) patients had peripheral lowering of blood counts. In another study done by Singh G et al in 2016, 9.1% patients had pancytopenia secondary to peripheral destruction. Pancytopenia may be due to splenic sequestration of blood cells or immune destruction of the blood cells.

We had 05 (2.8%) cases diagnosed with visceral leishmaniasis and 01 (0.6%) case with Plasmodium Vivax Malaria among the total 181 cases of pancytopenia. One study showed the same incidence of infective pathology, where plasmodium Vivax Malaria and Visceral Leishmaniasis both were seen in frequency of 1.3% each. Three similar studies done in the past, showed leishmaniasis as cause of infection in 2.8%, 1.2% and 0.67% cases, respectively.

Aplastic anemia, was the commonest etiology of pancytopenia in our setup, followed by megaloblastic anemia and acute leukemia. Education of the general population about nutrition and diet and avoidance of exposure to toxic radiations chemicals, and drugs may help to control and lower the incidence of these diseases and thus reduce morbidity. This study also has shown that through bone marrow examination, a diverse spectrum of diagnoses was made in patients presenting with the single finding of pancytopenia, thus proving the diagnostic significance of bone marrow examination in pancytopenia.

**Conclusion**

Aplastic anemia was found as the commonest diagnosis followed by Megaloblastic anemia in pancytopenic patient in our setup and bone marrow examination is proved to be an important diagnostic tool in evaluating a wide spectrum of diagnoses in patients presenting with pancytopenia. A prompt diagnosis in case of pancytopenia, therefore, can improve the management and prognosis of the underlying disease.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Department Committee

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Perceived Causes of Infertility: Accounts of Infertile Individuals in Kwara South, Nigeria

Iwelumor Oluwakemi S1, Shariffah Suraya Syed Jamaludin2, Babatunde Seun K3

1Doctoral Candidate: Anthropology and Sociology Section, 2Senior Lecturer: Anthropology and Sociology Section, School of Social Sciences, Universiti Sains Malaysia, Malaysia, 3Independent Researcher, Staff Quarters, Landmark University, Omu-Aran, Kwara State, Nigeria

Abstract

Infertility is perceived differently across socio-cultural contexts and studies have shown these perceptions affect the overall management of infertility. This study specifically explored the perceived causes of infertility among infertile married persons experiencing primary infertility in Kwara South, Nigeria. The study adopted a qualitative design. Infertile persons were recruited through snowball sampling technique. Data was collected through semi-structured in-depth interviews of 12 infertile married women and 7 infertile men. The data were analyzed using conventional content analysis with the aid of Atlas.ti 7. Findings showed that infertility is defined as barrenness and childlessness. Sociocultural factors rather than biomedical factors were exalted as primary causes of infertility. These include lifestyle choices or habits, rape, spiritual oppression, witchcraft/sorcery, trial and punishment from God. Understanding these perceptions will enhance the development of culture-specific programs targeted at managing infertility in Nigeria.

Keywords: Infertility; Childlessness; Sociocultural perception; Perceived cause; Nigeria.

Introduction

There is no gainsaying the fact that infertility is both a social and medical problem. Infertility literally connotes a condition of childlessness or a failure to achieve desired pregnancy and/or live-birth. Most studies on infertility in developing nations have focused on the prevalence and biomedical cause of infertility with a view to improving service delivery on treatments and assessment for psychological counseling. While a few have examined public perceptions on the meaning of infertility, empirical examples are scarce of how infertile persons perceive the cause of their situation.

This study explored how married women and men experiencing primary infertility in Kwara South, Nigeria perceives the cause of their situation. This is significant because it provides an avenue to better understand the social causes of infertility as perceived by infertile persons rather than have the perceptions of others imposed on them. This would also go a long way to mitigating some of the discriminatory practices against married infertile persons in Nigeria.

Literature Review: Revealing the cause of infertility in developing nations relies on orthodox healthcare and ethnogynecology 1. Several studies in sub-Saharan Africa have shown that sexually transmitted infections and genital tract infections are the primary causes of male and female infertility 2-5. Though many affirm this, sexual promiscuity is believed to be the significant causal factor, rather than those infections since the latter is understood to be prevalent among the morally decadent in the society6-8.

Sequel to promiscuity, abortion is also culturally perceived in Nigeria as a leading cause of infertility among women. This is premised on the belief that promiscuity increases the chance of one having unwanted pregnancies which often lead to unsafe abortions with severe outcomes. Complications from abortions have been linked to procedures and objects some women use to induce abortion which includes solvent, detergent, alcohol, decoctions inserted into the vagina and other traditional herbs9,10.
Similarly, contraceptives are also thought to cause infertility. While some are believed to be outrightly linked to infertility, overuses of others are thought to disrupt natural functions of the body eventually leading to infertility. This is culturally tied to the belief in predestination. Yoruba people believe that everyone comes to the earth with a definite number of offspring which can be expended through abortions and contraceptive use. Such people can become infertile when they eventually resolve to have children.

The belief in supernatural bases of infertility has different dimensions. Firstly, children are believed to be gifts from God and he gives to whomever he wills and at different times. Thus, while many infertile couples live in denial of their conditions with a hope that they will eventually have children, others see infertility as temporary trial or persecution that will be overcome. Secondly, infertility has been attributed to God’s wrath or punishment from ancestors or deities for violation of cultural norms or wicked acts.

Another dimension is the link between witchcraft and infertility. Infertility is sometimes thought to be inflicted by the wicked in the community and that curses can be placed on individuals or couples to be childless through spiritual powers and evil spirits. Some infertile women are also believed to be witches, who have vowed not to have children by not becoming pregnant, ‘devouring’ the fetus in utero or at birth.

Methodology: A qualitative exploratory research design was adopted to explore the perceived socio-cultural cause of infertility among married infertile persons. The study population consisted of twelve (12) women and seven (7) men experiencing primary infertility, at least two years prior to this study from Kwara South Nigeria. Participants were recruited through snowball sampling technique with the assistance of two (2) gatekeepers. The research instrument was a semi-structured in-depth interview, using an open-ended interview question guide. All interviews were recorded with the approval of participants and ranged from 50 to 110 minutes.

Interviews were done at places chosen by research participants and in their preferred languages. The data were transcribed, arranged in codes, and examined for categories and themes using conventional content analyses with the aid of ATLAS.ti (version 7). Qualitative content analysis was done based on the evaluation criteria suggested by Lincoln and Guba. The University of Ilorin Teaching Hospital Ethical Review Committee gave ethical clearance for the study. All selected research participants gave written informed consent.

Results and Findings

Characteristics of study participants: Infertility from this study is broadly defined as a lack of conception and/or inability to bear a child further described as barrenness and childlessness respectively. All the participants in this study were grappling with primary infertility which studies have shown have greater consequences than secondary infertility. They differ remarkably in age, sex, duration of infertility and religion. Their ages ranged between 24 – 52 years, majority of them were women (12 participants), and the duration of infertility was between 3 – 22 years while the bulk of them (17 participants) were Christians.

Also, a good number of the participants were educated as eleven had university degrees or its equivalent, four had postgraduate degrees and the least educated (two participants) had basic Senior Secondary School Certificates. This affirms the findings of some studies that the prevalence of infertility rises with age and primary infertility could be higher among more educated women. Table 4.1 shows the characteristics of the participants.
Table 1: Information on Study Participants

<table>
<thead>
<tr>
<th>Names* of participants</th>
<th>Sex</th>
<th>Age</th>
<th>Duration of infertility (years)</th>
<th>Religion</th>
<th>Education</th>
<th>Occupation</th>
<th>Monthly income (Naira)</th>
<th>Family type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shade</td>
<td>F</td>
<td>35</td>
<td>11</td>
<td>Christianity</td>
<td>HND</td>
<td>Housewife</td>
<td>-</td>
<td>Monogamous</td>
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<td>BEng</td>
<td>Contractor</td>
<td>200000</td>
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<tr>
<td>Fatima</td>
<td>F</td>
<td>32</td>
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<td>Islam</td>
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<td>Business</td>
<td>100000</td>
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<tr>
<td>Sann</td>
<td>M</td>
<td>36</td>
<td>11</td>
<td>Christianity</td>
<td>BEd</td>
<td>Teacher</td>
<td>45000</td>
<td>Polygamous</td>
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<tr>
<td>Blessing</td>
<td>F</td>
<td>29</td>
<td>4</td>
<td>Christianity</td>
<td>BEd</td>
<td>Housewife</td>
<td>5000</td>
<td>Monogamous</td>
</tr>
<tr>
<td>Ifetii</td>
<td>M</td>
<td>37</td>
<td>12</td>
<td>Christianity</td>
<td>HND</td>
<td>Civil Servant</td>
<td>76000</td>
<td>Monogamous</td>
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<td>Ola</td>
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<td>5</td>
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<td>Moses</td>
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<td>Civil servant</td>
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<td>Entrepreneur</td>
<td>200000</td>
<td>Extended</td>
</tr>
</tbody>
</table>

Source: Researcher’s fieldwork, 2019

*Names have been changed to ensure participants’ anonymity.

**Thematic findings:** The findings of this study reflect participants’ perceptions of the cause of their infertility or reasons for their childlessness rather than their general perceptions of infertility. These causes are grouped into two themes and six sub-themes as presented in table 2

<table>
<thead>
<tr>
<th>Themes</th>
<th>Sub-themes</th>
</tr>
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<tbody>
<tr>
<td>Sociobehavioral causes of infertility</td>
<td>Worldliness, Rape, Modernization</td>
</tr>
<tr>
<td>Spiritual causes of infertility</td>
<td>Trial, God’s punishment, Spiritual oppression</td>
</tr>
</tbody>
</table>

Source: Researcher’s fieldwork, 2019

**Sociobehavioural causes of infertility:** This theme comprises three subthemes: worldliness, rape, and modernization.

**Worldliness:** Many of the participants believe that infertility mostly results from one’s actions or inactions. Thus, infertility could be self-inflicted or manmade. As inferred from the study, worldliness explains lifestyle choices or habits like waywardness, alcoholism, substance abuse, sexual promiscuity, abortion and the use of contraceptives. These were described by many as the cause of their childlessness.

For example, Lola, who has been married for 10 years, attributed her condition to “worldliness”. He stated that “this delay in childbearing is due to my worldliness. I like to enjoy life and I indulged in heavy smoking, drinking and other toxic substances. It has given me low sperm count...this disorder in my body that I have caused myself”. Similarly, Moses, a bittered 50-year-old man who said he could not divorce his wife ascribed his family’s childlessness to his wife’s worldly actions. He claimed that “My wife that is infertile. I did not know my wife was so loose because we were married in the church... I did not have the chance for worldliness like parties and some other things like her and that has been my nature.”
The study also shows that peer pressure could lure some into actions that could lead to infertility. This perception was reiterated by Seun who is in a polygamous marriage. She stated that “I sometimes blame myself for my past wayward life. To be with friends and be trendy, I have had abortions, used contraceptives and other things that will not allow one to get pregnant. Now I know that shameful pregnancy before marriage is better than infertility later in marriage”.

In the same vein, Shade affirmed that “I am the cause of our childlessness but I cannot bring myself to tell my husband. When I was in secondary school I got pregnant and because I didn’t want my parents to know I mixed so many things … to ensure the pregnancy comes out… I was later told by the doctor that my fallopian tubes are damaged that I may never be able to conceive”.

**Rape:** Unlike reports from previous studies, some of the participants believed that rape can lead to infertility. They claimed that violent rape can destroy the uterus and other vital reproductive organs. Stigmatization of rape victims and the silence that accompanies rape incidents were also held as causal factors. For example, Iyanu related the cause of her infertility to rape. She stated that “when I was in primary school I was raped multiple times by a man who happens to be our neighbor but I was too ashamed to tell anyone….no one suspected anything… I was later diagnosed with pelvic inflammatory disease, which has resulted in the blockage of my fallopian tubes. I always blame myself for not disclosing the incident on time to my parents; maybe I would have been treated and saved my life from this horrible situation”.

**Modernization:** Another peculiar finding is the link between modernization and infertility. Some participants like Tunde believed infertility is associated with the destruction of traditional values and practices and the adoption of Western cultures. He stated that “I blame civilization and Christianity. I just married my wife because she is a Christian. We did not follow the traditional means of ascertaining the type of girl she is or the family she comes from…She might be possessed… I think she could be lying and conniving with the doctor to cover the cause since her father is a nurse”.

**Spiritual causes of infertility:** Spiritual causes of infertility describe participants’ perceptions of infertility as resulting from God or supernatural forces. These are often explained as:

**Trial:** Some participants felt they are victims of infertility, as such, they perceived their conditions as life trials. For instance, Fatima stated “I just believe everything that happens to a man is not without God’s knowledge and permission. The common belief is that promiscuous women might be barren either by destroying their wombs through abortion or killing all the children they are destined to have. I married as a virgin and I cannot tell why God has permitted me to be afflicted this way”.

Aminat also reiterated this belief by saying “I see myself as a victim of infertility. Married a virgin I would never have thought I could be infertile. I kept myself so much and all to experience this”.

Another participant, Tunji, who has infertility for 15 years believed that their condition was God’s will since there’s no medical explanation for it.

**God’s punishment:** A number of the participants believed their situations were justified because of their “wayward or promiscuous past”, hence they are receiving the “right punishment for their deeds”. This perception was clearly illustrated by Wale who asserted that “God could have made me infertile because when I was much younger I had girlfriends and two had abortions for me. I believe God is punishing me for those abortions they had. Medically, nothing is wrong with me and I don’t think my wife has any issues. I know the reasons are spiritual”.

**Spiritual oppression:** It must be noted that sociobehavioural factors often overlap with spiritual factors. Some participants believed infertility could result from “the wicked”. For example, Blessing explained that “the wicked might afflict barrenness on the good ones. According to the gynecologists, they have done everything that is necessary to make sure I get a result but none has succeeded. so, I believe the evil ones are at work. Science has done its part it is now left for God to do his part”.

Faith also believed her situation originates from her mother-in-law. She stated that “in my own case my mother-in-law did not want me to marry my husband. I decided to marry him since he is the one I want to marry not his Mom. At a time I started thinking the delay could be from her because she does not like me still. We have tried the medical, the spiritual and I know that at God’s appointed time, it will happen.” Ola who knew her husband had low sperm count also attributed their
infertility to “the works of the world and the wicked” since she has done intrauterine insemination (IUI) twice without success. She worries that she might be “spiritually oppressed”.

These clearly show that infertility is spiritually perceived to be an ‘attack’ or ‘trial for individuals without sin’. Also, most explanations for unexplained infertility are patterned along supernaturalism. Thus, one can surmise that as demonstrated by several studies 4, 11, 17, 20-22, the sociocultural perceptions of the cause of infertility are exalted above medical causes which the participants believed are aftermaths of the former.

**Conclusion**

In Kwara South, Nigeria, female infertility is defined as the failure of a married woman to achieve a pregnancy that will lead to successful childbirth while male infertility is linked to impotence. Although all the participants acknowledged that infertility could result from sexually transmitted infections (STIs) and other bodily disorders, they altogether believed that these results from lifestyle choices and could be linked to the supernatural. Thus, perceptions of the cause of infertility are rooted in the general Nigerian culture. This study has further established that culture and spirituality play a major role in people’s perceptions and explanations of infertility across nations. There is a need to renegotiate these sociocultural perceptions and integrate them into preventive and curative strategies aimed at improving reproductive healthcare in Nigeria.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Department Committee

**References**


The Correlation Between Education and Occupation with the ANC (Antenatal Care) Visit at Nagaswidak Health Care Center Palembang

Resy Asmalia¹, Asmarani Makmun¹

¹Department of Public Health, Medical Faculty of Muhammadiyah Palembang University, South Sumatera, Indonesia

Abstract

ANC (Antenatal Care) is a health service provided for pregnant mothers in order to get healthy pregnancy and baby. Since 2016, in Puskesmas Nagaswidak District, the number of pregnant women was 763. The percentage of K1 is 100% (763 woman), and K4 is 96.2% (734 woman). The aim of this study was to find out whether there is a correlation between mothers’ education and occupation with antenatal care visit at Nagaswidak Health Care Center Palembang. This study applied analytical survey method using Cross Sectional Design. The number of respondents in this study was 76 mothers selected by using accidental sampling method. Data were then analyzed using Chi-square Test. The result of this study showed that from the total of 88 respondents, 51 women (58%) had low education, whereas 66 women (75%) were unemployed, and 63 women (71.6%) regularly had the Antenatal Care Visit. The result of bivariate analysis showed that there was a significant correlation between education (ρ value = 0.019) and occupation (ρ value = 0.010) with the antenatal care visit. Based on the result of this study, the number of regular ANC visits attended by pregnant women was 71.6%, and there was a significant correlation between education and occupation with antenatal care visit.

Keywords: ANC visit, education, occupation.

Introduction

ANC (Antenatal Care) service is a service provided for pregnant women to maintain a healthy pregnancy as well as healthy baby. ANC is an essential factor for pregnant women’s health and is potential to be one of the most effective health interventions to prevent maternal morbidity and mortality¹. In the framework of the Sustainable Development Goals (SDGs), in 2030 the Government targets the maternal mortality rate to be below 70 per 100,000 live births. According to 2012 IDHS report, the number of maternal mortality rate was 359 per 100,000 live births. Whereas, the Government targets that in 2019 maternal mortality rate will be 306 per 100,000 live births by referring the data on maternal mortality rate which is 346 per 100,000 live births² based on 2010 Population Census. Based on the data got from the Directorate General of Public Health, Health Ministry of Republic of Indonesia in 2016, it showed that in general there was an increase in both indicators; K1 and K4 coverage³. This increasing trend indicates an improvement in public access toward health service for pregnant women. Health service coverage for K4 pregnant women in 2015 has met the target of Health Ministry Strategic Plan (Renstra) which was as much as 72%. However, there were still five provinces that had not achieved this target, namely Papua (24.45%), West Papua (30.4%), Maluku (43.88%), East Nusa Tenggara (61.63%), and Central Sulawesi (71.07%)⁴.

Based on District/City Health Office routine reports concerning Maternal and Child Health Program, standardized service coverage for pregnant women had to be given at least four times during pregnancy. In South Sumatra Province, over the past five years,
this also increased by 5%, from 88.6% to 93.21%\(^5\). K1 coverage for Palembang City in 2014 was 99.84%, and K4 was 96.64%. The lowest K1 coverage was in Sako District (98.1%) and the highest was in Gandus Sub-District, Seberang Ulu I, Kertapati, Plaju, Bukit Kecil, Ilir Timur II, and Alang Lebar Alang (100%). The highest K4 coverage, otherwise, was Sako Sub-district (99.79%) and the lowest was in Sematang Borang District (86.33%). In 2015, K1 coverage for Palembang City 2015 was 99.93%, and K4 was 97.41%. The lowest K1 coverage was in SU II Sub-district (99.57%) and the highest was in IB II, Gandus, Kertapati, Bukit Kecil, Ilir Timur II, Kemuning, IT II, Kalidoni and Sematang Borang Districts (100%). Whereas, the highest K4 coverage was in District IT II (99.89%), and the lowest was in Sukarami District (94.93%)\(^6\).

The estimated number of pregnant women in the Nagaswidak Health Care Center working area in 2016 was 763. The percentage of the first visit was 100% (763 pregnant women). Meanwhile, the percentage of the fourth visit was 96.2% (734 pregnant women). The coverage of their visit reflects the health service received by these pregnant women, i.e. by using 10 T principles. The integrated ANC examination standards received by pregnant women consist of weighing, measuring upper arm circumference (LILA), measuring blood pressure, measuring fundal height uteri, calculating fetal heart rate (FHR), determining fetal presentation, giving tetanus toxoid (TT) immunization, administrating blood-added tablets (Fe), doing laboratory test (routine and special), applying case management and effective CIE (Communication, Information and Education)\(^7\).

An understanding of the importance of prenatal care is not influenced by someone’s age, but how she comprehends and understands the given information\(^8\). Improving human resources as well as families’ and communities’ welfare is an effort we can do with the aim of reducing maternal mortality. This can be conducted by improving the quality and providing more equitable access to health services, including developing knowledge and attitudes as well as community healthy lifestyle behaviour. One effort to support this is by providing ANC service which is given properly and as early as possible with the hope that it can prevent maternal and infant mortality as well as improving the quality of maternal resources\(^9\). These findings had triggered the researchers to find out the correlation between education and occupation with the ANC visits at Nagaswidak Health Care Center Palembang.

**Objective:** The objective of this study was to find out the correlation between education and occupation with the ANC visits at Nagaswidak Health Care Center Palembang.

**Methods**

**Literature Search:** The research was conducted at Nagaswidak Health Care Center Palembang on 25 October until 25 December. The study was an observational analytical study applying cross sectional method. The population in this study was all pregnant women who visited Nagaswidak Health Care Center. Additionally, the samples were taken by applying accidental sampling technique using Slovin’s formula, and 88 respondents were taken. The dependent variable in this study was the ANC visits, while the independent variables were the education and occupation.

The inclusion criteria in this study were pregnant women who visited Nagaswidak Health Care Center and were willing to become research respondents. The exclusion criteria for this study were mothers who suffered from chronic diseases. The data of this study were taken from primary and secondary data collected when conducting research on all pregnant women who visited Puskesmas Nagaswidak Palembang during the period of October-December 2017. This research was conducted through a simple interview. If the data obtained were still incomplete, additional data would be taken from medical records and KIA books (Maternal and Child Health) during the period of October-December 2017.

Data processing was conducted through editing, coding and data tabulation. The data analysis used was univariate and bivariate analysis.

**Result and Discussion**

**General Description of Respondents**

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Frequency (Person)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>51</td>
<td>58.0</td>
</tr>
<tr>
<td>Moderate</td>
<td>22</td>
<td>25.0</td>
</tr>
<tr>
<td>High</td>
<td>15</td>
<td>17.0</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 1: Respondent Frequency Distribution based on Education at Nagaswidak Health Care Center Palembang**
Based on the above table, it is known that there were 51 respondents (58%) having low education, and as many as 22 respondents (25%) had moderate educational status. In addition, there were 15 people (17%) having high education.

Table 2. Respondent Frequency Distribution based on Occupation at Nagaswidak Health Care Center Palembang

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Frequency (Person)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed</td>
<td>66</td>
<td>75,0</td>
</tr>
<tr>
<td>Employed</td>
<td>22</td>
<td>25,0</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on the table above, it is known that there were 66 respondents (75%) who did not work, and those who worked were 22 people (25%).

Table 3. Respondent Frequency Distribution based on Regular ANC Visit at Nagaswidak Health Care Center Palembang

<table>
<thead>
<tr>
<th>ANC Visits</th>
<th>Frequency (Person)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irregular</td>
<td>25</td>
<td>28,4</td>
</tr>
<tr>
<td>Regular</td>
<td>63</td>
<td>71,6</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on the table above, it is known that ANC respondents with irregular visits were 25 people (28.4%), and the respondents with regular ANC visits were 63 people (71.6%).

The Correlation between Education Level and ANC Visits

Table 4. Respondent Frequency Distribution based on Education Level and ANC Visit at Nagaswidak Health Care Center Palembang

<table>
<thead>
<tr>
<th>Educational Level</th>
<th>ANC Visit Regularity</th>
<th>Total N%</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regular n%</td>
<td>Irregular n%</td>
<td>51</td>
</tr>
<tr>
<td>Low</td>
<td>19</td>
<td>32</td>
<td>62,7</td>
</tr>
<tr>
<td>Moderate</td>
<td>6</td>
<td>16</td>
<td>72,7</td>
</tr>
<tr>
<td>High</td>
<td>0</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>63</td>
<td>88</td>
</tr>
</tbody>
</table>

Based on the table above, respondents with low education level and irregular ANC visits were 19 people (37.3%), while respondents who had low education but having regular ANC visit were 32 people (62.7%). There were 6 respondents (27.3%) who had moderate education level and made irregular ANC visits, while respondents who had moderate education level but did regular ANC visit were 16 people (72.7%). The respondents with higher education level and always did regular visit were 15 people (100%). Chi-square test results showed that \( \rho = 0.019 \) with the value of \( \alpha = 0.05 \), meaning that \( \rho < \alpha \), thus \( H_0 \) was rejected. This meant that there was a significant correlation between education level and ANC visits.

This is in line with the theory mentioning that someone’s level of education is one of the factors that supports maternal compliance in carrying out ANC examination\(^{10}\). This means that the higher the level of education is, the better the mother’s knowledge about the benefits of ANC will be. Therefore, it has an impact on maternal compliance in carrying out ANC visits.

Table 5. Respondent Frequency Distribution based on Occupation and ANC Visit at Nagaswidak Health Care Center Palembang

<table>
<thead>
<tr>
<th>Occupational Status</th>
<th>ANC Visit Regularity</th>
<th>Total N%</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regular n%</td>
<td>Irregular n%</td>
<td>66</td>
</tr>
<tr>
<td>Unemployed</td>
<td>24</td>
<td>42</td>
<td>36,4</td>
</tr>
<tr>
<td>Employed</td>
<td>1</td>
<td>21</td>
<td>95,5</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>63</td>
<td>88</td>
</tr>
</tbody>
</table>
Based on the table above, respondents who did not work and did not do regular ANC visits were 24 people (36.4%), and respondents who did not work but did regular ANC visit were as many as 42 people (63.6%). Respondent who had a job and did regular ANC visit was 1 person (4.5%), and respondents who worked but made regular ANC visits were 21 people (95.5%). Chi-square test results showed that ρ value = 0.019 with the value of αα = 0.05, meaning that ρ < αα, thus Ho was rejected.

This meant that there was a significant correlation between occupation status and ANC visits. This research is in line with a research conducted by Yolanda Bataha (2016). The results of the Chi-Square test showed that ρ value = 0.03. The value of ρ was smaller than the value of α (0.05). Thus, Ho was rejected which meant that there was a correlation between the education status and regularity of the Antenatal Care (ANC) examination at Ranotana Weru Health Care Center in Wanea Subdistrict, Manado City11. According to Pasaribu (2005), pregnant women who work do not only have a source of income to do an antenatal care, but also are able to interact with other people who understand more about the importance of having a prenatal checkup. Consequently, the mother who works is more aware and willing to have her pregnancy examined12.

This finding is in contrast with Rocha’s (2012) theory which suggests that the busier a pregnant woman is with her work, the less chance the woman gets the antenatal care. Thus, the chances of having her pregnancy checked will decrease. Despite being preoccupied with civil servant work and being private employees, some mothers still do regular antenatal visits13.

Conclusion

Based on the results of the research and data analysis that have been carried out, it can be concluded as follows:

1. There was a significant correlation between education level and ANC visits at Nagaswidak Health Care Center Palembang (ρ value = 0.019).
2. There was a significant correlation between occupation status with ANC visits at Nagaswidak Health Care Center Palembang (ρ value = 0.010).

Conflict of Interest: The authors declare that there is no conflict of interests.

Source of Funding: This study is self-funded.

Ethical Clearance: This study is a literature review so it does not require for ethical clearance

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5. South Sumatera Health Office. South Sumatera Health Profile. 2014.
6. South Sumatera Health Office. South Sumatera Health Profile. 2015.

Sanctioning System in Regulatory Enforcement of Medicine in Malaysia

Nurul Hayati Bohari 1, Abdul Samad Abdul Ghani 2

1Doctoral Student, 2Senior Lecturer, Faculty of Law, University of Malaya, Kuala Lumpur, Malaysia

Abstract

A regulator uses sanction as a regulatory tool to enforce regulations and punish the non-compliant regulatees. Typically, the given sanction by the regulator will be a backfire when the regulatees are not satisfied with the sanction given. This contestation will definitely result in the regulatee’s action against the law and the sanctions will therefore not have any impact on them. However, Responsive Regulation Theory (RRT) has proven that the enforcement pyramid is particularly useful in leading to more compliances, adequate regulatory enforcement and cost-efficiency. The elements of responsiveness in the RRT can lead to the right sanctioning system. Therefore, the aim of this paper is to map the sanctions taken by the Pharmaceutical Enforcement Division (PED) concerning medicine offenses as outlined in the RRT. The method of analysis for this study involved library search of statutory laws or regulation, statistical data, books and annual reports produced by the agencies, and personal communication. This study found that the PED sanctioning system is not in order of the pyramid escalation and a criminal penalty is not reserved as a ‘big gun’ as recommended by RRT. This study also recommends reformation of health policy in Malaysia in regulatory enforcement, enhancement of medicine regulations, expansion of collaboration between the government and businesses and improvement on current awareness programmes to ensure that knowledge given to the regulatees is well comprehended and easily applicable to them. It is suggested that future research should also explore the regulatees response towards enforcement approach.

Keywords: Sanction, enforcement action, regulatory enforcement.

Introduction

Sanctions are an essential part of the regulatory system. People who are sanctioned are always unsatisfied with the given sanction and even members of the Parliament continue to debate and argue for the right sanctioning system to be implemented in the society 1, 2. In promoting norm compliance, a sanction can be defined as a ‘reaction’ triggered due to the infringement of or non-compliance with a norm 3. In the dictionary, sanction is defined as penalty, punishment or fine 4 and the fines will be an ultimate instrument when persuasion and warnings to comply with standards are exhausted Reynaers and Parrado 5. Higher penalties for non-compliance often produce higher levels of compliance 6.

Nevertheless, sanctions can be positive or negative. The success of sanctions should be determined and improved by the agency over time. Responsive Regulation Theory (RRT) relies on the premises that the actions of individual actors are motivated by different factors and interests. A successful regulatory agency is required to have a range of enforcement actions to allow it to deal with doers who are subject to the various motivational factors 7.

A regulator uses sanction as a regulatory tool to enforce regulations and punish the non-compliant regulatees. In European Union (EU), ‘sanctions’ is considered as a restrictive measure and an essential tool. There is a comprehensive range of possible restrictive measures or sanctions that have been imposed by the EU 8, 9. In classical form, sanctions are conceived only as deterrents, and usually in the form of monetary deterrents. Ayres and Braithwaite 7 (1992) have taken a range of sanctions a radical step further.
They argue that regulatory agencies not only require a variety of enforcement mechanisms but also that the enforcement mechanisms must be in order as envisaged in the ‘enforcement pyramid of sanctions’ (Figure 1). Additionally, Macrory also agrees that the system should be less reliant on criminal prosecutions and make greater resolution of other types of sanctions such as administrative penalties or statutory notices.

![Figure 1: The Enforcement Pyramid of Sanctions](image)

According to Ayres and Braithwaite, compliance is most likely to be achieved when a regulatory agency can display an explicit sanction pyramid that contains a diversity of enforcement actions with escalating format as shown in the pyramid in Figure 1 above. The base of the pyramid should include mechanisms that allow the regulator ‘to coax compliance by persuasion’. The following level of the enforcement pyramid may incorporate alternatives such as the issuing of a warning letter. If the warning letter fails to obtain compliance, the following level of the enforcement pyramid may allow for the imposition of a civil monetary or another penalty. The penultimate level of the pyramid may comprise sanctions such as criminal fines and other non-custodial sentences for individuals as well as a temporary plant shutdown or license suspension for bodies corporate. Incarceration for individuals and permanent license cancellation or deregistration for bodies corporate may be at the apex of the pyramid.

The bigger and the more varied the sticks, the bigger the success the regulators will achieve by speaking softly which lessens the sanctions. Through research of articles in the Scopus database, it became apparent that most research on sanctions has been conducted in the EU, Australia, and Brazil. Surprisingly, thus far, no research has been conducted on sanction mapping in Malaysia. Therefore, this paper attempts to firstly map the sanctions and then identify the responsiveness elements in the Pharmaceutical Enforcement Division (PED) through RRT.

**Methodology/Materials:** The qualitative method is employed in this research, focusing on documentary evidence and thematic analysis. This method of research was selected because this study intended to employ a relatively low level of analysis involved narrative materials of regulatory enforcement of medicine. Based on the library search conducted, data were gathered from the statutory laws or regulations related to medicine, statistical books and annual reports produced by agencies through official government websites. In the thematic analysis, the documents were analysed according to identified themes based on sanctions suggested by RRT. Then, the specific sanction was identified in the PED sanctioning system. In this article, the sanctioning system of PED is mapped for the period between 2014 and 2017. Other materials were also used including relevant books and published journals in order to support the analysis and the discussion. Additionally, in this study, personal interviews were also conducted with the relevant officers in charge to obtain further information. All the information was gathered to support and expand the researcher’s knowledge to better and further understand the issue under study with the hope of improving the existing law and sanctioning system.

**Sanction Mapping of Regulatory Enforcement of Medicine in Malaysia:** The framework and systems in regulatory enforcement of medicine are mainly implemented to protect the public interest, particularly for quality, safety, and efficacy of medicines. This medicine prevention governance is integral to health, economic and socio-political sustainability; however, it is well-known that its management is complex and requires coordination across a range of professional bodies and relevant stakeholders’ interests to safeguard the public. In the regulatory arena, laws will be administered by the Courts, independent regulatory commissions or executive agencies. In Malaysia, the agency for regulatory enforcement of medicine is an executive government agency which is Pharmaceutical Regulatory Division (NPRA) and the Pharmaceutical Enforcement Division (PED) which are under the auspices of the principal regulator, namely the Ministry of Health (MOH) Malaysia.
From the regulatory administration above, the regulatory enforcement process is generally taken by PED. Statistical and annual report in 2016 shows that PED is a typical regulatory enforcement agency with Command-and-Control regulation and punitive approach which is merely a policing method. Indeed, the medicine regulatory sanction in Malaysia is more of a legal sanction rather than administrative sanction since the medicine policy leans towards ‘punitive’ regulation. In the inspection activities, the approach of educating, advising and giving verbal warning was also implemented by PED; however, no clear data was collected for this enforcement activity.

In 2017, PED implemented an innovative approach called DiPS. It is an acronym for ‘Didik’, ‘Pantau’ and ‘Serbu’ (or in English ‘Educate’, ‘Monitor’ and ‘Raid’) which is a continuous monitoring plan by PED on selected premises in the hotspot area. This approach is a method to ensure that the non-compliant regulatees comply with the law. The first step in DiPS approach is education and building self-awareness among the seller or owner of the selected premises in the hot spot area. The results of the DiPS approach showed that compliances increased with 63.3% of the premises found to comply with the law.

DiPS approach is a new approach and is starting to be seen as a persuasive method in the regulatory enforcement process. Education in DiPS is an enforcement strategy to create awareness among the stakeholders particularly towards the non-compliance of certain regulatees. The awareness material is distributed to the non-compliant regulatees during inspection or during the operation. However, PED does not implement this persuasive method comprehensively, and there is no escalating process of enforcement as prescribed in the RRT pyramid. DiPS approach is only implemented on selected unlicensed premises in the hot spot area. Other than the DiPS approach on the selected premises, the sanctions are mostly given during inspection or monitoring period where a warning letter or criminal penalty is often the first option. These show that PED does not have any formal application of promoting the persuasive method as envisaged by RRT.

Analysis found that PED applied five among the six sanctions suggested by Ayres and Braithwaite in RRT. In reference to the RRT’s pyramid model, regulatory enforcement of medicine in Malaysia needs to improve on its sanctioning system. The sanctioning system needs to be varied and promote the responsiveness elements. The procedure of the ‘educate and persuade’ method towards non-compliance also needs to be formalised clearly in practice. In relation to non-compliance of licensed sellers, PED issued sanctions in the form of follow-up inspection, warning letter, seizure of the false or illegal products, criminal penalty, license suspension and application of license revocation. Here, the method of persuasion sanction may occur during the ‘follow-up inspection’ period. There is difficulty in deliberating whether a persuasion would be an appropriate regulatory response before considering a warning letter as in the pyramidal type. Thus, it seems that PED has no proper degree of sanction towards the level of infringement as recommended by Ayres and Brathwaite.

With limited sanctions, the considerations on sanctions for non-compliance of the unlicensed seller are far from the RRT’s suggestion. Non-compliance of the unlicensed seller is sanctioned in the form of education, follow-up inspection, seizure of the medicine or pharmaceutical product (during inspection) and criminal penalty application. The illegal product is seized to prevent the crime from happening. Again, criminal penalties (prosecutions) are not reserved as big guns for the worst cases as envisaged by the RRT. Furthermore, PED has no consideration for first-time contravention. From the statistics, the number of products seized during inspection period alleging contravention of provisions is smaller than products seized during the operation period. In 2015, the sanction given through persuasion sanction was 22% compared to 78% of the seized products given criminal penalty sanction.

Additionally, PED sanctioning system is not in order of pyramid escalation, and the criminal penalty is not reserved as a ‘big gun’ as recommended by RRT. According to Responsive Regulation Theory (RRT), the benign big gun strategy is needed to ensure the effectiveness of the enforcement. The element of punitive approach should be at the last process of the regulatory framework. Perhaps the sanctioning system is not in order due to the limited capacity of human and financial resources. The capacity of enforcement officers is not parallel with the number of licensed and unlicensed premises. This situation places a burden on the regulatory work.

Furthermore, PED does not have the power of the civil penalty. In RRT, the application of criminal penalty or prosecution is implemented for the recalcitrant who
refuses to comply even after the civil penalty sanction. In reality, PED’s conduct is based on the power that has been given by law. For the non-compliance of licensed sellers, PED will be sanctioning either through follow-up inspection, warning letter, seizure of the false or illegal products, criminal penalty, license suspension, and license revocation. License revocation is at the apex of the pyramid and can drive the PED as a ‘benign big gun’ (BBG) regulator. In line with RRT, Welsh found that successful regulatory agencies as ‘benign big guns’ are the enforcement agencies with the most infringement cases not in the criminal penalty sanctions at the apex of the RRT enforcement pyramid. Thus, PED needs to strengthen the enforcement tools of the persuasive method.

The deterrent-based strategy is insufficient and needs improvement according to the motivation of the regulatees. Due to the different motivation, behaviour, and attitude, RRT shapes the variety of sanction in a pyramid form. In a pyramid form, several considerations and interventions are involved. Similar to other typical regulatory enforcement, the regulatory only uses one sanction which is criminal penalty. Again, the criminal penalties (prosecutions) are not reserved as big guns for the worst cases.

Malaysia’s medicines regulatory framework is putting in the effort to encourage self-regulation of the regulated parties particularly the interest group (association). According to RRT, the regulatory strategies of enforcement are also in a pyramid form. The strategies need to be in the pyramid form because the individual actors (regulatees) are motivated by different factors and interest. A successful regulatory agency is required to have a range of enforcement alternatives available to allow the agency to administer them to actors who are subject to the different motivational factors. Not all the actors subjected to regulation are driven by the same motivations; this is because while some do so according to the rationality directed to the maximisation of their profits, others are guided by reputation, social responsibility, religious values, adherence to norms, and others.

Conclusion

As a conclusion, improvement in the regulatory enforcement of medicines in Malaysia is needed in administering non-sanctioning compliance tools such as supervising the compliance through inspections, controls, measurement analyses and adopting corresponding matters; calling for a pool of information data; necessitating some of the regulatees for submission of data; providing technical guidelines or directives; and issuing rules and instructions and guiding the regulatees in understanding the law. The government and health policy makers should encourage the regulatees to comply with the law so as to ensure the safety, quality, and efficacy in their practice. The encouragement should not be in the form of just one strategy, but in the form of various strategies. It is hoped that this study would have given some ideas to the authorities on how to develop a better management system in framing the regulatory regime and enforcement specification. This study also recommends the reformation of health policy in Malaysia in terms of regulatory enforcement, enhancement of medicine regulations and improving the relationship between the government and businesses so that these can be easily applied. It is suggested that future study should also explore the regulatees response towards the enforcement approach.

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Conflict of Interest: Nil

Ethical Clearance: Department Committee

References


Eating Disorder, Body Fat Percentage, and Physical Activity Among Sarawak Female National Athletes

Patricia Pawa Pitil*1, Wan Juliana Emeih Wahed2

1Lecturer, Faculty of Sports Science & Recreation, 2Lecturer, Faculty of Art & Design, Universiti Teknologi MARA, Cawangan Sarawak, Kampus Samarahan, Jalan Meranek, 94300, Kota Samarahan, Malaysia

Abstract

Purpose: This study aimed to examine the eating disorder and physical activity in relation to type of sports and body fat percentages among national female athletes in Sarawak (N=150).

Methodology: Eating Attitude Test and Global Physical Activity Questionnaire were employed to measure the eating disorders and physical activity. Anthropometric measurement and body composition (body fat percentage) were obtained.

Results: Moderately active athletes explained higher eating disorders in dieting, bulimia nervosa and food preoccupation. The non-weight sports athletes also exhibited higher eating disorders compared to its counterpart. Younger athletes were at higher eating disorder, but age was not significant in the subscales measured; except for food preoccupation where it was prominent in age 16 to 18 years old. Oral control did not associate with all the independent variables. Some relationships observed between body fat percentage and eating disorder and the subscales. Conclusion: This study highlights interesting findings where the less active athletes and the non-weight sports category athletes exhibit higher eating disorders issues.

Keywords: Body Fat Percentage; Eating Disorder; Female Athletes; National Athletes; Physical Activity; Sarawak Athletes.

Introduction

Eating disorders are irrational behaviours that can consume a person’s life to the point of becoming life-threatening1, 2. They are illnesses that are characterized by irregular eating habits and concern too much on body weight or shape3, namely, anorexia nervosa, bulimia and binge eating. These are unhealthy attitudes towards food4 that could endanger life. Self-induced vomiting is one of the characteristics of the episode of bulimic sufferers, where they experience a binge-purge cycle with extreme overeating on non-nutritious high caloric food5.

Heavier body weight among girls makes them tend to restrict their food intake and felt unpleasant with their body image6 due to worrying about body weight. However, individuals who are absent of eating-related disorders had a lower BMI compared to individuals with eating disorders 7. This could suggest that the bodyweight concern has taken the individual with excess body weight to use a shortcut of losing weight by practising eating disorder.

Physical, psychological and social changes occur substantially during adolescence year. To athletes, some of them perceived that being thin is the indicator of fit3. Thus, in the struggle to look fit, these athletes are prone to practice abnormal eating behaviour. As most studies reported that athletes were more likely to have an eating disorder if compare to the non-athletes, however, the factors that associated with the eating disorders among the female adolescents athletes has not yet established.

The rate of this unhealthy behaviour are greater among adolescent and young women if compared to
men. In Malaysia, disordered eating among female adolescents is alarming. Since an eating disorder has shown to be started in adolescence, early identification is a must among the athletes. Thus, this study aimed to measure the relationship between eating disorder and body composition by physical activity, sports categories and age groups among the female athletes of Sukan Malaysia (SUKMA) Sarawak.

**Methodology:** This study employed a cross-sectional design which focusing on national female athletes in Sarawak who competed for SUKMA aged 21 years old and below. The sample size for the study was calculated ($N = 150$) with added number where the total female athletes’ population who competed in SUKMA for Sarawak was 296 (Table 1).

The Global Physical Activity Questionnaire (GPAQ) was utilized to measure the pattern physical activity which has shown a high reliability and validity. The total physical activity was expressed as metabolic equivalent (MET)-minutes/week. For the anthropometry measurements, the participants’ height was measured and the weight and the body fat percentage were obtained by using Karada Scan Body Composition Monitor Model HBF – 375 (OMRON).

The eating disorder presence among the athletes was assessed by using The Eating Attitudes Test (EAT-26) and reported a high internal consistency. It is comprised of 26 scales of three dimensions; dieting, bulimia and food preoccupation, and oral control. A score greater than 20 has a risk of eating disorder.

**Data analysis:** The data were analyzed by using the Statistical Package for Social Science (SPSS) version 22.0. The Pearson correlation test and Chi-square test was conducted to measure the relationship and association between the variables. An independent sample t-test and one-way analysis of variance (ANOVA) were employed to compare the eating disorder between weight and non-weight category sports, age groups and physical activity. The statistical significant was set at .05 ($p < .05$).

**Results**

As overall, the participants were categorized as very active (3034.91 ± 2489.7 METs-min/week). Majority of the participants were moderately active (110 (73.33%)) and only 40 (26.67%) were very active. There was zero percentage of a low physical activity reported.

The distribution of the participants with respect to eating disorder risk categories was significant different for very active and moderate active categories ($\chi^2 = 23.715$, $p < .05$) (Table 2). There was a significant difference of bulimia preoccupation between the physical activity of the participants ($p < .05$).

**Table 1. Demographics of the participants**

<table>
<thead>
<tr>
<th>Variables</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category of sports</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>28 (18.7)</td>
</tr>
<tr>
<td>Non-weight</td>
<td>122 (81.3)</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>Min = 127, Max = 167 (155.244 ± 9.482)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>Min = 25.40, Max = 88.10 (57.291 ± 17.076)</td>
</tr>
<tr>
<td>Body fat %</td>
<td>Min = 12, Max = 42.40 (28.716 ± 8.248)</td>
</tr>
</tbody>
</table>

The high risks of eating disorders were participants from the non-weight sports category (Table 3). The distribution of the participants with respect to eating disorder categories was significant different for weight and non-weight sports categories ($\chi^2 = 75.54$, $p < .05$). There was a significant different of eating disorder between the weight sports and non-weight sports ($p < .05$). Bulimia preoccupation also showed a significant different between weight sports and non-weight sports ($p < .05$).

**Table 2: Comparison of the eating disorder and the subscales between physical activity**

<table>
<thead>
<tr>
<th>Variables</th>
<th>VA ($M \pm SD$ (n=40))</th>
<th>MA ($M \pm SD$ (n=110))</th>
<th>Total ($M \pm SD$ (N=150))</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating disorder</td>
<td>5.025 ± 2.259</td>
<td>9.327 ± 6.331</td>
<td>8.18 ± 5.856</td>
<td>.001*</td>
</tr>
<tr>
<td>Low risk (n (%))</td>
<td>40 (26.67)</td>
<td>97 (64.67)</td>
<td>137 (91.4)</td>
<td>.001*</td>
</tr>
<tr>
<td>High risk (n (%))</td>
<td>-</td>
<td>13 (8.6)</td>
<td>13 (8.6)</td>
<td></td>
</tr>
<tr>
<td>$\chi^2$ value = 64.145</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dieting</td>
<td>4.842 ± 0.226</td>
<td>4.682 ± 0.704</td>
<td>4.725 ± 0.617</td>
<td>.037*</td>
</tr>
<tr>
<td>Bulimia nervosa</td>
<td>5.783 ± 0.278</td>
<td>4.335 ± 0.697</td>
<td>5.373 ± 0.462</td>
<td>.001*</td>
</tr>
<tr>
<td>Food preoccupation</td>
<td>4.958 ± 0.454</td>
<td>4.064 ± 1.210</td>
<td>4.302 ± 1.133</td>
<td>.001*</td>
</tr>
<tr>
<td>Oral control</td>
<td>4.646 ± 0.265</td>
<td>4.638 ± 1.554</td>
<td>4.640 ± 1.336</td>
<td>.972</td>
</tr>
</tbody>
</table>

*significant level is at .05 ($p < .05$), VA = Very active (> 3000 MET-min/week), MA = Moderate active (699 - 2999 MET-min/week)
Table 3: Comparison of the eating disorder and the subscales between weight and non-weight sports

<table>
<thead>
<tr>
<th>Variables</th>
<th>Wgt (M ± SD) (n=28)</th>
<th>Non-Wgt (M ± SD) (n=122)</th>
<th>Total (M ± SD) (N=150)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating disorder</td>
<td>5.00 ± 2.568</td>
<td>8.909 ± 6.155</td>
<td>8.18 ± 5.856</td>
<td>.001*</td>
</tr>
<tr>
<td>Low risk (n (%))</td>
<td>28 (18.7)</td>
<td>109 (72.7)</td>
<td>137 (91.4)</td>
<td>.001*</td>
</tr>
<tr>
<td>High risk (n (%))</td>
<td>-</td>
<td>13 (8.6)</td>
<td>13 (8.6)</td>
<td></td>
</tr>
<tr>
<td>$\chi^2$ value = 75.54</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dieting</td>
<td>4.876 ± 0.101</td>
<td>4.690 ± 0.678</td>
<td>4.725 ± 0.617</td>
<td>.004*</td>
</tr>
<tr>
<td>Bulimia</td>
<td>5.905 ± 0.153</td>
<td>5.251 ± 0.421</td>
<td>5.373 ± 0.462</td>
<td>.001*</td>
</tr>
<tr>
<td>Food preoccupation</td>
<td>5.060 ± 0.497</td>
<td>4.128 ± 1.167</td>
<td>4.302 ± 1.133</td>
<td>.001*</td>
</tr>
<tr>
<td>Oral control</td>
<td>4.740 ± 0.129</td>
<td>4.617 ± 1.480</td>
<td>4.640 ± 1.336</td>
<td>.369</td>
</tr>
</tbody>
</table>

*significant level is at .05 (p < .05), Wgt = weight sports, Non-wgt = non-weight sports

In comparing the variables by age groups, there were significant different of eating disorder, dieting and bulimia preoccupation (p < .05) (Table 4). There was a significant association between eating disorder and age groups of the respondents ($\chi^2 = 71.555, p < .05$).

Table 4: Comparison of eating disorder and subscales by age groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Age groups (years) (M ± SD)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 12 (n=6)</td>
<td>13 – 15 (n=36)</td>
</tr>
<tr>
<td>Low risk (n (%))</td>
<td>2</td>
<td>27</td>
</tr>
<tr>
<td>High risk (n (%))</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>$\chi^2$ value = 71.555</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dieting</td>
<td>4.180 ± 0.755</td>
<td>4.643 ± 0.613</td>
</tr>
<tr>
<td>Bulimia nervosa</td>
<td>5.778 ± 0.172</td>
<td>5.435 ± 0.389</td>
</tr>
<tr>
<td>Food preoccupation</td>
<td>5.111 ± 0.344</td>
<td>4.667 ± 1.005</td>
</tr>
</tbody>
</table>

*significant level is at .05 (p < .05)

Table 5. Relationship between eating disorder and body fat percentage

<table>
<thead>
<tr>
<th>Variable</th>
<th>r-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating disorder</td>
<td>-.180*</td>
</tr>
<tr>
<td>EAT subscales</td>
<td></td>
</tr>
<tr>
<td>Dieting</td>
<td>-.017</td>
</tr>
<tr>
<td>Bulimia nervosa</td>
<td>-.212*</td>
</tr>
<tr>
<td>Food preoccupation</td>
<td>-.296*</td>
</tr>
<tr>
<td>Oral control</td>
<td>.209*</td>
</tr>
</tbody>
</table>

*correlation is significant at .05 (p < .05)

The eating behavior and bulimia preoccupation were found significant negative relationship with body fat percentage (p < .05), while oral control was significant positive correlated (Table 5).

Discussion

As overall, the athletes were at low risk of eating disorder. However, in comparing by physical activity and category of sports represented, the moderately active and non-weight sports athletes exhibited a high risk of eating disorder. The weight sports are sports which require athletes to compete for certain weight categories. There was strong evidence that eating disorder was more prominent in weight sports category. However, there is a contrast finding in the present study where the high risk of eating disorder was among the non-weight sports athletes. As being found out that the moderately active and non-weight sports athletes were both displayed a high risk of eating disorder, these two variables could link closely. The young athletes’ misconception that being thinner makes them a better athlete could increase
the risk of developing an eating disorder. The pursuit of sporting excellence could encourage these athletes to eat in wrong ways.

The younger athletes exhibited a great tendency for risk of eating disorder in the present study. Those who were less than 12 years old scored higher than others in the eating disorder. The sports experience was less in the younger athletes, thus the exposure or knowledge on eating correctly were lacking. Specialization in one sport at an early age and sudden increases in training volume could be the reason of developing eating disorder.

Dieting behavior was prominent in the moderately active athletes and non-weight sports athletes as compared with their counterparts. Dieting is the behavior of concerning too much on the food intake quantities by avoiding high calorie food and a pre-occupation of being thinner. This finding alerts us that even though the requirement of the non-weight sports does not emphasize much on some weight categories to compete, the athletes might overthink on eating normally. The present study was contradicted with previous study where they supported the statement that obsess neurotic action on diet is related to the commitment in extreme exercise or physical activity to burn-off the calories.

Interestingly, bulimia preoccupation was greater in moderately active athletes and in the non-weight sports athletes. As many people living with bulimia might have normal appearance, the non-weight sports do not actually need to compete in desire weight, but however they might end up having an unpleasant size. Based on the observation, the non-weight sports athletes were much bigger as compare to the weight sports athletes. Thus, this might develop the bulimic incident. These adolescents were in the process of gaining height and weight due to puberty and it could stress this population to accept it and be in denial at the same time on the changes of their body. The conflict of sports acceptance that athletes must be thin and lean-looking forces them to practise unusual eating behaviour. Again, they might think that fitness is related to thinness or such ‘athletic’ eating will improve performance. Furthermore, it was reported that the adolescents would be more likely low in body weight management knowledge and the idea of ‘athletics’ eating might influence these athletes.

Food preoccupation was significant among all the independent variables measured. The moderately active athletes, non-weight sports athletes and age groups of 16 to 18 years old were assumed to put more significant concern on food. Therefore, the athletes could have possibility of bulimia too. As this group put so much thought on food intake and become more serious in their sports training, the fear of storing excess energy from eating normally might put the athletes at the episodes of binge and purge.

Oral control displayed to be not associated with physical activity level, sports category and age groups. It is the behavior resembles eating control and the perceived pressure from others to gain weight. Scores on food preoccupation were significant on all the independent variables measured, and therefore possibly influence the bulimia nervosa behaviour.

In addition, there were significant relationships between eating disorder and the three subscales (bulimia nervosa, food preoccupation and oral control) with body fat percentage of the athletes. This was contradicted with similar study on Malaysian university students. The relationship of eating disorder and body fat percentage was significantly negative. This indicates that the higher the eating disorder, the lower the body fat percentage and vice versa. This finding contrast with a similar study where they found out that body composition and eating disorder was positively correlated. The athletics make up of these adolescents make them exhibit a different finding. As the body fat percentage is high, the bulimia nervosa and food preoccupation were also greater as shown by the significant negative relationships. As reported, dieting practices were more likely among the heavier adolescents in this very study, the binge and purge and thought of foods were more significant in those with higher body fat percentage. For oral control, there was a contradicted relationship revealed. The oral control was positively correlated with the body fat percentage which indicated that, the athletes did not perceived pressure from others to gain weight and controlling of eating was lower even when their body fat percentage was high.

**Conclusion**

In conclusion, the moderately active athletes and non-weight sports athletes were more likely to have higher eating disorders. The strength of the relationships was small between some of the subscales and body fat percentage. Age groups also not associated with any of these eating disorders. It is recommended that coaches should alert on the less vigorous sports athletes and to
the non-weight sports athletes on their eating behavior. Implementing program to improve knowledge of these athletes on healthy eating and eliminate the ‘athletic’ eating should be conducted so that the normal pattern of eating could be developed in the early age of sporting career.

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Conflict of Interest: Nil

Ethical Clearance: Concerned Department Committee

References
Improvement of Ankle Brachial Index (ABI) Using Foot Bath Therapy at a Temperature of 40°C in Patients with Diabetes Mellitus

Nur Isnaini¹, Bekti Nurpri Setiyani²
¹Lecturer, ²Bachelor student, Universitas Muhammadiyah Purwokerto, Indonesia

Abstract

Diabetes mellitus has an impact on increasing blood sugar levels and has a risk of complications of decreased vascularity in the feet which can result in complications in the form of foot ulcers. One of the interventions to facilitate circulation is by therapy of foot soak with a temperature of 40 degrees. Purpose this research to determine the effect of temperature of warm water foot bath temperature 40°C on peripheral blood circulation with Ankle Brachial Index in diabetes mellitus patients in health center 1 cilongok. This study uses a Quasi-experimental method with one group pretest-posttest approach. Sampling with random sampling technique and a total of 38 respondents with DM. Data was taken by observing ABI measurements before and after warm water foot soak with a temperature of 40°C. Analysis of the data using the Kruskal-wallis test with the Man-Whitney test. Based on the results of the Kruskal-wallis test p value of 0.001 (p value <0.05) there is a temperature effect of warm water foot soak on the peripheral blood circulation with ABI. Conclusion is warm water foot baths effectively improve peripheral blood circulation in DM patients.

Keywords: Foot bath, ABI, Diabetes Mellitus.

Introduction

Diabetes Mellitus (DM) is a chronic metabolic disease characterized by high blood sugar due to impaired metabolism of carbohydrates, fats, proteins due to lack of insulin and can cause acute or chronic complications1-2. Complications can include damage to blood vessels, nerves, and other structures, one of which is PAD (peripheral artery disease)7-18. Prevalence of DM patients in the Central Java province of Indonesia is ranked second after hypertension, which is 16.5%5-6.

DM management aims to stabilize insulin and prevent vascular complications and neuropathy1.5 pillars of DM, namely education, diet, exercise, medication and examination of sugar levels9. One of the complications of DM is peripheral vascularization and neuropathy. Efforts to prevent complications of PAD are by soaking warm water or often called hydrotherapy.

Hydrotherapy is a therapy using warm water that is useful for relaxing the body, reducing pain and stiffness in muscles, and producing better sleep. The working principle of hydrotherapy is with a temperature of 40 °C within 20 minutes for one time conduction in which heat transfer occurs from warm water to the body which will cause blood vessel dilation10, 12, 13.

Peripheral blood circulation is assessed using the Ankle Brachial Index (ABI) by counting systolic in the legs (dorsalis pedis artery) divided by systolic in the brachial artery14. ABI is a simple method for evaluating peripheral arterial disease and cardiovascular prognosis. ABI has a high sensitivity and specificity for accuracy in determining the diagnosis of peripheral circulation15-16. ABI examination is a non-invasive gold standard for detecting the presence of peripheral arterial disease (PAD) and is recommended as part of an assessment of individuals at risk for this disease because the impact of PAD can lead to amputation15-18.

Method

This research was conducted at a community health center in Cilongk, Central Java, Indonesia, from March to April 2018. The quasi-experimental method used a
one-group approach with a pre-post-test approach. The sampling technique uses random sampling. The number of samples was 38 respondents with DM. Data was taken by observing ABI measurements before and after the foot of warm water soaking in temperatures of 40 °C. Measuring instruments used are Aneroid and Doppler Tensimeter, while for measuring water temperature using a water temperature thermometer. Data analysis using the Kruskal-wallis test. Collecting data in this study using primary data, the researchers measured systolic blood pressure in both extremities in the brachial area and DM ankle patients before and after therapy with warm foot baths.

Blood pressure measurement is done by asking the respondent to lie in a supine position or as comfortable as possible for about 10 minutes, then the researcher measured the respondent’s blood pressure on the right (brachial) arm then on the left arm using a Doppler vascular device and noted the systolic pressure in each arm. Measurements were made at the right ankle and then left using a Doppler vascular device and recorded systolic pressure on each leg, the results can be interpreted with an ABI value> 1.3 Estimated arterial classification, normal 0.91-1.3, 0.8-0, 9 minor disorders, 0.5-0.79 moderate disorders, and <0.50 severe disorders2.

Results and Discussion

The results of this research are presented in Table 1–3.

### Table 1: Characteristics of respondents based on ages, gender, education and job DM Patient in Community health centers in Cilongok I

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36-45</td>
<td>3</td>
<td>7.9</td>
</tr>
<tr>
<td>6-55</td>
<td>8</td>
<td>21.1</td>
</tr>
<tr>
<td>56-65</td>
<td>24</td>
<td>63.2</td>
</tr>
<tr>
<td>&gt;66</td>
<td>3</td>
<td>7.9</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7</td>
<td>18.4</td>
</tr>
<tr>
<td>Female</td>
<td>31</td>
<td>81.6</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary school</td>
<td>28</td>
<td>73.7</td>
</tr>
<tr>
<td>Junior High school</td>
<td>6</td>
<td>15.8</td>
</tr>
<tr>
<td>Senior High school</td>
<td>3</td>
<td>7.9</td>
</tr>
<tr>
<td>Academician</td>
<td>1</td>
<td>2.6</td>
</tr>
</tbody>
</table>

### Table 2: ABI value before and after foot bath therapy DM Patient in Community health centers in Cilongok I

<table>
<thead>
<tr>
<th>Temperature</th>
<th>ABI</th>
<th>Mean ± Std. Deviation</th>
<th>Min.</th>
<th>Max.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>40°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>Right_pre</td>
<td>0.9395 ± 0.07616</td>
<td>0.82</td>
<td>1.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right_post</td>
<td>1.0803 ± 0.08049</td>
<td>0.93</td>
<td>1.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left_pre</td>
<td>0.9308 ± 0.07663</td>
<td>0.83</td>
<td>1.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left_post</td>
<td>1.0784 ± 0.07258</td>
<td>0.92</td>
<td>1.27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 3: Results of the Kruskal-Wallis analysis

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Variable</th>
<th>N</th>
<th>Median (min.-max.)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>40°C</td>
<td>ABI right</td>
<td>38</td>
<td>0.1400 (0.00 – 0.30)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>ABI left</td>
<td></td>
<td>0.1450 (0.06 – 0.35)</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Average value of the right ABI and left ABI before being given a warm foot soak with a temperature of 40 °C is the right ABI 0.9395 and the left ABI 0.9308. The standard deviation of the right ABI value is 0.07616 while the left ABI is 0.07663. The minimum and maximum values of the right ABI are a minimum of 0.82 and a maximum of 1.14. While the left ABI is a minimum of 0.83 and a maximum of 1.16. After being given a warm water foot soak there is an increase with the average value of the right ABI is 1.0803 and the average left ABI is 1.0784. The standard deviation of the right ABI value is 0.08049 while the left ABI is 0.07258. The minimum and maximum values in the right ABI are minimum 0.93 and maximum 1.27 while the left ABI is the minimum 0.92 maximum 1.27.

At a temperature of 40 °C it was pointed out that the ABI value of the right and left pre-values were the same, which was 0.93. It could be concluded that the perfusion
status was normal extremity. After being given a foot bath the warm water has increased and while the post value on the right and left ABI shows the difference between the ABI values. In the right ABI of 1.08 and the left ABI of 1.07 it can be concluded that the perfusion status of the right and left extremities is normal. ABI values > 1.3 Estimates of arterial classification, 0.91-1.3 normal, 0.8-0.9 mild disorders, 0.5-0.79 moderate disorders, and <0.50 severe disorders 2.

Characteristics Respondens: Based on table 1, the most respondents were 56-65 years old with 24 people (63.2%). Elderly diabetics have a higher risk of impaired circulation in the legs 13-17. The sex of the majority of respondents is 31 women (81.6%), diabetes mellitus is more susceptible to women than men, the majority of respondent education there are 28 people (73.7%) with basic education, the most work is 28 people (73.7%) as housewives.

ABI Values Before and After Warm Water Foot Bath Temperature of 40°C in Diabetes Mellitus Patients: From table 2 the results of research on foot blood circulation in patients with diabetes mellitus the average value of ABI before soaking the foot with a temperature of 40°C on the right ABI is 0.9395 for the left ABI 0.9308 and after doing the foot soak the right ABI value becomes 1.0803 while the left ABI averaged 1.0784. Based on the average results of Table 2 before foot bath therapy, it was shown that some respondents had mild disturbances in the feet. Peripheral blood circulation in patients with diabetes mellitus has a mild disturbance in the form of tingling and pain when walking, this happens because of impaired blood circulation. Atherosclerosis of large blood vessels in the lower extremities (legs) is the cause of the increased incidence of peripheral arterial occlusion in DM patients which is a major cause of increased incidence of gangrene and amputation. ABI value after warm water soak therapy showed that there was a significant increase in the blood circulation of the respondent’s feet. Warm water stimulates the dilation of blood vessels and circulation in the legs 19-20,22.

The difference in ABI values in the intervention group was 40°C in diabetes mellitus patients: Kruskal-wallis test results in table 3, obtained the value of the right ABI and left ABI p = 0.001. Because the p value <0.05, it can be concluded that “there is an influence of four temperatures in ABI”. To find out which groups have differences, a Post Hoc analysis is performed, for the Kruskal-wallis test is the Man-Whitney test. ABI values can indicate the severity of peripheral arterial disease.

Soaking feet with a temperature of 37-39°C temperature is useful in reducing muscle contraction, causing a feeling of relaxation which can treat symptoms of sleep deprivation and infections and circulation disorders 22-23. Hydrotherapy with a temperature of around 40°C within 20 minutes conduction occurs where heat transfer from warm water to the body will cause the enlargement of superficial blood vessels close to the surface of the skin, when the body is too hot, blood flow to the skin increases and superficial blood vessels dilate 16-23.

Main risk factors for PAD formation are very similar to coronary artery disease and include age > 40 years, hyperlipidemia (low-density lipoprotein / LDL cholesterol or low-density lipoprotein / HDL), hypertension, diabetes, and smoking. The results of this study indicate that there are research subjects who have Peripheral Arterial Disease (PAD) as indicated by the ABI value before the intervention of warm water foot baths with a temperature of 40°C and after the intervention the ABI value has increased 23-24. When body temperature becomes low, arterial blood flow decreases and superficial veins are passed. Meanwhile, when the body becomes too hot, blood flow to the skin increases and superficial blood vessels dilate.

Conclusion

Foot bath therapy is recommended for DM patients because it gives a significant effect on the value of ABI

Acknowledgment: A very deep thank you to the respondents who were very cooperative during the study. Thank you also to the research team who helped implement this research. Especially for my guidance students who can work together in conducting this research.

Conflict of interest: NIL

Source of Funding: Self source

Ethical clearance: Done by Research committee

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The Theoretical Model of the Influence of Extraversion Personality and Optimism on Subjective Well-Being by Coping as a Mediator

Nur’aeni1, Asmadi Alsa2, Anizar Rahayu3

1Lecturer Universitas Muhammadiyah Purwokerto, 2Lecturer Universitas Gadjah Mada Yogyakarta, 3Lecturer Universitas Persada Indonesia YAI Jakarta, Indonesia

Abstract
Subjective welfare is one measure of the quality of life of individuals and communities, in addition to economic and social indicators. The hope is that mothers who have children with intellectual disabilities can achieve subjective well-being, so that in accompanying children can optimally meet their needs. But the reality shows that mothers who have children with intellectual disabilities feel disappointed with life in general, the mother feels that the child is a burden on the family. This study aims to examine theoretical model of effect extravertion personality and optimism with coping as mediator to subjective well-being. Subjects in the study were mothers who had children with intellectual disability with the last minimum education junior high school. The data collection instrument consists of subjective well-being scale, coping scale, extroversion personality scale, optimism scale. Structural Equation Model with LISREL program was used as the analysis of research data. The results of the data analysis show that theoretical model of effect extravertion personality, optimism with coping as mediator to subjective well-being is a fit model with the empirical data. The result of hypothesis test shows that there is effect of extroversion personality, optimism with mediation of coping to subjective well-being.

Keywords: Subjective Well-Being, Coping, Extroversion Personality, Optimism.

Introduction
Subjective well-being is a cognitive and affective evaluation of an individual’s life1. According to2 there are two basic components of subjective well-being: life satisfaction as cognitive component and happiness as an affective component. As with mothers with intellectually disabled children, every mother expects to have a healthy and happy child to be able to enjoy life fully without the conditions of disability. The mother who accepts the diagnosis of childhood disability experience difficult emotion3.

The term of intellectual disability in some references is referred as mental retardation, mental deficiency, weak memory, intellectual impairment, subnormal mental, mental disability, mind disability, weak seizure, or idiot. Ref.4 uses terms such as mental retardation, mental deficiency, mental defective, feebleminded. In recent developments to give a more humane appellation, the term intellectual disability is then used.

For parents of children with disabilities, the experience of caring varies based on a number of factors, including the type and severity of disability and whether or not the obstacles are visible to others5. Williams & Wright states that many parents have negative thoughts when they know their children have deficiencies/disabilities, such as guilt and fear of the future. A mother is closest figure to the child, so it is very big responsibility to be a mother with intellectually disabled children3.

The results of interviews with four mothers with intellectually disabled children showed was various problems faced by mothers, ranging from the burden and the responsibility of raising children, feelings of self-blame, anger and anxiety about the future of children, difficulties to control emotions when facing children,
feelings of desperate, being tired of parenting, keeping all deep inside their heart).

The results of interviews indicate that mothers with intellectually disabled children are unhappy, call happiness as subjective well-being that is said to be one measure of the quality of life of individuals and communities, as well as economic and social indicators, but the quality of life is also determined by one’s feelings towards pleasure and displeasure, satisfaction and dissatisfaction. Ref. 9 state that individuals who have high subjective well-being often experience life satisfaction, feel joy, but rarely feel unpleasant emotions.

In order to be prosperous, individuals also need to have a positive attribution to themselves and their lives; therefore the individual needs a way to be able to deal with various events in his life effectively. Some characters of extroversion personality are individual pleasure in establishing relationships with the people around him, being friendly and open and enjoying the relationship. Extroversion personality was found to have a positive relationship with life satisfaction as well as a subjective well-being index.8

Based on the description above, then the problem formulation is “Is the theoretical model of effect extravertion personality and optimism with coping as mediator to subjective well-being a fit model with empirical data?

Method

Research subject: Research subjects in this study are mothers who have intellectual disabled children, biological mother of children who go to SLB (Primary School for Exceptional Children) type C Banyumas and SLB C Purbalingga, Central Java, Indonesia. The number of research subjects was 210 mothers with intellectually disabled children. Research subjects were mothers of students who studied at SLB C Yakut Purwokerto, SLB Kuncup Mas Banyumas, SLB Negeri Purbalingga and SLB Purba Adhi Suta Purbalingga 8.

Research Instruments: There are four instruments used in the research namely; subjective well-being scale, coping scale, extroversion personality scale and optimism scale. The estimation of reliability for coping scale, extroversion personality scale and optimism scale used Alpha Cronbach coefficient while subjective well-being scale used Alpha Stratified coefficient because the scale of subjective well being is multidimensional.8 The coefficient of alpha stratified reliability introduced by Cronbach & McKie is useful for estimating instrument reliability consisting of several subtests.13

The subjective well-being scale is adapted by researchers from SWLS from 14 and SPANE from 15. In this research, a test tool that shows the reliability value was 0.81. Coping is measured using Ways of Coping Scale from 16 that was adapted by researcher. In this research, a test tool that shows the reliability value is 0.863. Extroversion personality was measured using which was adapted by researchers. In this research, a tool test showing reliability value was 0.764. The optimistic scales were compiled by researchers based on the optimism component of 18 which includes indicators of permanence, personalization and pervasiveness. In this research, a test tool that shows the reliability value is 0.697.

Data analysis technique: The data analysis technique used in this research is SEM. The processing is done using Lisrel 8.80 to test the suitability of the measurement model with the available data in the field, whether or not it fits and to test the hypothesis proposed by the researcher. SEM has two main objectives in its analysis, namely to determine whether or not the model fits based on the data held and to test the various pre-built hypotheses.19

Results and Discussion

The result of the model test is obtained by chi square = 48.67, df = 56, p-value = 0.75, RMSEA = 0.00, and CFI = 1.00, NFI = 0.99, NNFI = 1.00, GFI = 0.97, AGFI = 0.94. This means “Theoretical model of effect extravertion personality and optimism with coping as mediator to subjective well-being is a fit model with empirical data. Extroversion personality and optimism play a direct, positive significant coping, also play an indirect, positive and significant effect to subjective well-being through coping. This means that there is a effect of coping as a mediator of extroversion and optimism toward subjective well-being. The theoretical model in this study can be seen in Fig. 1.
The next stage is to test the hypothesis among variables to see the relationship among variables. Hypothesis test results relation among variables both direct and indirect can be seen in Table 1.

Table I: Test results of structural relationships among variables

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Direct</th>
<th>Indirect</th>
<th>Value</th>
<th>t</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect of coping to subjective well being</td>
<td>0.24</td>
<td>-</td>
<td>3.52</td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Effect of extraversion to coping</td>
<td>0.29</td>
<td>-</td>
<td>4.08</td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Effect of optimism to coping</td>
<td>0.26</td>
<td>-</td>
<td>3.84</td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Effect of extraversion personality to subjective well being</td>
<td>0.23</td>
<td>-</td>
<td>3.42</td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Effect of optimism to subjective well being</td>
<td>0.25</td>
<td>-</td>
<td>3.71</td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Effect of extraversion personality as coping mediator to subjective well being</td>
<td>-</td>
<td>0.07</td>
<td>2.72</td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Effect of optimism as coping mediator to subjective well being</td>
<td>-</td>
<td>0.07</td>
<td>2.62</td>
<td></td>
<td>Significant</td>
</tr>
</tbody>
</table>

Based on the results of model tests and hypothesis testing, it can be summarized to hypothesis test results in Table 2. The model test results show that the proposed research model is fit with empirical data.

Table II: Hypothesis test result

<table>
<thead>
<tr>
<th>No.</th>
<th>Hypothesis</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Theoretical model of effect extraversion personality and optimism with coping as mediator to subjective well-being is a fit model with empirical data.</td>
<td>Fit</td>
</tr>
<tr>
<td>2</td>
<td>There is a direct effect of coping toward subjective well-being</td>
<td>significant</td>
</tr>
<tr>
<td>3</td>
<td>There is a direct role of extraversion personality towards the coping</td>
<td>significant</td>
</tr>
<tr>
<td>4</td>
<td>There is a direct effect of optimism towards coping</td>
<td>significant</td>
</tr>
<tr>
<td>5</td>
<td>There is a direct effect of extraversion personality towards subjective well-being</td>
<td>significant</td>
</tr>
<tr>
<td>6</td>
<td>There is a direct effect of optimism to subjective well-being</td>
<td>significant</td>
</tr>
<tr>
<td>7</td>
<td>There is a effect of extraversion personality to subjective well-being mediated by the coping</td>
<td>significant</td>
</tr>
<tr>
<td>8</td>
<td>There is an optimism effect for subjective well-being mediated by the coping</td>
<td>significant</td>
</tr>
</tbody>
</table>

The results of this study are in line with the opinion of who states that coping behavior is related to personality, where extraversion personality is positively correlated with coping to face the situation. This means that the more individuals have the tendency of extraversion personality, the easier he/she faces the problem or the easier he/she uses the coping. The findings of Goldberg, Costa & McCrae , states that people with open personality or extraversion easily and quickly reject or accept the pressure faced, therefore they overcome the problem easily.

Coping used by mothers who have intellectually disabled children allows mothers to be able to adjust to the environment so as to facilitate in achieving subjective well-being characterized by the existence of life satisfaction in general that is accepting the child with intellectual disability sincere and having life satisfaction of seeing the child can be independent.

Another very important finding is coping that serves as a mediator of the extraversion personality towards Subjective well-being. The results showed that extraversion personality has both direct and indirect role to Subjective well-being. It means that the relationship between variables is partial mediation, because the direct effect of extraversion personality to subjective well-being of mothers is greater than coping mediation.

The results showed that mothers who have intellectually disabled children mostly have a tendency of extraversion personality characterized by gregarious, open to others and friendly and easy to socialize use better coping, such as seeking social support in the form of information and support from the family when facing problems or solving problems and considering all the events that occur is a gift given by Him, so that mothers can achieve subjective well-being more easily.

The optimism in this research has a direct effect to coping, it means that optimism has a direct, positive and significant effect to coping. The results showed that mothers with intellectually disabled children who have optimism on their children’s ability is characterized
by the belief in the autonomy and the talent possessed by their child, these will affect the coping used by the mothers when facing the problem.

The results are in line with 24, it is suggested that individuals with high optimism can enjoy critical situations and take advantage of a variety of conditions and become stronger to face challenges. In line with Risinger’s et al. findings, 25, he states that optimism is negatively correlated with denial and escaping trial from problems. The research findings are in line with the findings of 26, stated that there is a high positive and significant relationship between optimism and coping stress.

Optimism in research has an effect to subjective well-being, it means that optimism play directly, positively and significantly to subjective well-being. The results of this study indicate that if mothers with intellectually disabled children have optimism characterized by positive response to recent success, they will experience subjective well-being more easily in the future.

A very important finding is coping that serves as a mediator of optimism toward Subjective well-being. The results of this study indicate that there is an effect of optimism towards subjective well-being with coping mediation. This means that optimism can take an effect on subjective well-being indirectly with the mediator of coping. The result of the research shows that optimism have both direct effect and indirect effect to subjective well-being, so it can be stated that the relationship between variables is partial mediation, because the direct effect of optimism toward Subjective well-being of mothers who have children with intellectual disability is greater than if mediated by coping.

The results show that the effect of optimism to subjective well-being is through coping mediator, because individuals who have high optimism will evaluate themselves positively and finally can control the important aspects of life, so they can get along with the social environment well and see the future with positive expectations and hopes. Individuals are able to deal with various conditions, physically and mentally have strong energy. The findings of 27 stated that optimism can be a positive influence in very powerful situations to influence coping in pressing situations and the overall aspect is needed in achieving Subjective well-being.

The results showed that mothers had optimism characterized by the belief of self-reliance, talent possessed by children using social support coping which was characterized by finding sources of support. The optimistic mother also uses positive reappraisal coping which is characterized by creating positive things happening to her by connecting to the belief that everything that is granted to her is a form of God’s trust. Both coping used by mothers who have intellectually disabled children make them easy to achieve Subjective well-being that is characterized by the satisfaction of life in general.

**Conclusions**

1. Model test is accepted, it means that coping as mediator of extroversion personality effect and optimism to subjective well-being of mother fits with empirical data.
2. This study also confirmed that coping becomes a partial mediator in the results of research and that the extroversion personality take an effect directly and indirectly to subjective well-being and optimism play directly and indirectly to subjective well-being.
3. Optimism is the variable that significantly takes the greatest effect and contributes to subjective well-being, it is followed by extroversion personality and the least is coping.

**Conflict of Interest:** None

**Source of Funding:** Self source

**Ethical Clearance:** Done research committee

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Social Skills for Student Social Anxiety Disorder (SAD) in Elementary School

S. Sriyanto¹*, Tri Na’imah¹, Yudha Febrianta¹, Indri Murniawaty²

¹Lecturer Universitas Muhammadiyah Purwokerto, ²Lecturer Universitas Negeri Semarang, Indonesia

Abstract

This study aims to improve social skills and overcome social anxiety disorders of elementary school students through learning visual thinking strategies. This research uses case study research, with the reason to test the effectiveness of learning strategies for students who experience social anxiety disorder. The study conducted in two schools in Banyumas Regency involving 11 subjects. The results of the study show that visual thinking strategies can improve students’ social skills in terms of working together, interacting, building an optimistic attitude, trying, being realistic, and being able to respect others. In addition, it also reduces the level of child’s anxiety in the form of a graded scale as an indication of subject changes during the process and after learning. The implication of this research is the process of learning in groups and working together will improve students’ social skills.

Keywords: Social skills, social anxiety disorder, visual thinking strategies.

Introduction

Social skills refer to the concept of homo homini socius, which is a group of people who lives to interact with others. Humans are required to be able to overcome all problems that arise as a result of interactions with the social environment and present themselves in accordance with applicable rules and norms. For this reason, each individual is required to master the skills in order to be able to adapt to their environment. At the age of children, the ability to adapt to their environment needs to be developed in order to live normally and healthily in adolescence.

Social skills can be used as a training to reduce the impact of social anxiety on children¹⁴ autism spectrum disorder⁵-⁷, social effectiveness theory⁸ Beidel’s research found that the social effectiveness theory treatment can be an effective treatment, and provide additional benefits to measures of social pressure and social behavior⁹. Psychologically, children’s mental readiness to enter a new environment is a major prerequisite so that their social interactions are not disrupted.

In the era of communication and information technology, social exclusion can occur due to the influence of technology containing a high level of social anxiety⁴. It is proven by a significant increase in social anxiety disorder over the past two decades of a number of students in social studies teaching ¹⁰. Social anxiety disorder (SAD) affects social and academic functions⁸, so this will lead to different responses and interfere with everyday life.

Studies in the United States show that social anxiety disorder are a kind of disorder that is the most suffered by its residents¹¹-¹². Even though it takes place at the top in the type of disorder, efforts to deal with social anxiety disorder are rarely carried out¹¹. From the results of the preliminary study it was reported that there were 25 percent anxiety disorders, while the 13 percent of it were social anxiety disorders¹³. The case of disruption of social interaction in the new environment can give a positive and negative impressions on the child’s psychological development¹⁴. Social anxiety disorder usually appears in children with feelings of anxiety with their social environment, fear of being ridiculed, and afraid of not being accepted by their friends. This anxiety arises when children feel that people will think badly of themselves caused by their inability to work as what is expected or at least equal to others. This disorder can affect one’s confidence and self-esteem as well as disrupt relationships at school¹³,²,³¹.

Corresponding Author**
S. Sriyanto
Universitas Muhammadiyah Purwokerto, Indonesia
email: sriyanto1907@ump.ac.id
Children who experience social anxiety tend to think that everything they do seems to judge them\textsuperscript{15-16}. Therefore, they try to avoid scary social situations in order to avoid negative evaluations of others\textsuperscript{16-17}. One anxiety disorder that is often found in elementary school students in Banyumas Regency is social anxiety disorder. These children usually feel anxious about their social environment, afraid of the judgment of others, afraid of being ridiculed, and afraid of not being accepted by their friends. The basis of social anxiety disorder is fear of being observed. This disorder can affect one’s confidence and self-esteem and disrupt relationships at school.

This study developed the social skills of children with social anxiety disorder using visual thinking strategies learning model, namely learning strategies that rely on the thought process of visual image language, shapes, patterns, textures, symbols\textsuperscript{18}.

The indicators of success were first, students are able to cooperate with the members of the group by providing opportunities to get the same rights and obligations with the aim of accustoming group members to respect each other and have a positive view of other members \textsuperscript{30}. Second, learn to do self-control. Third, gain the habit of expressing opinions and being ready to accept the opinions of others although the opinions are different.

Based on the background, the question that arose was were visual thinking strategies able to improve the social skills of students who experience social anxiety disorder? The aim of the study was to improve the social skills of social anxiety disorder students through learning using visual thinking strategies.

**Method**

This research was a case study because it aimed at testing the learning effectiveness on students with social anxiety disorder. In addition, since the samples only covered social anxiety disorder students, so the researchers assumed that it would be freer to explore the research subjects. It was in contrast to experimental research which is only limited by treatment in a predetermined time \textsuperscript{[13]}.

There were three phases to determine the effectiveness of learning, namely during the learning process, the end of learning, and after learning (follow-up). During the learning process of the subjects, observations were carried out. Interviews were also conducted to find out whether the subject involved himself in engaging and interacting in the group, and working with friends. After the learning was done, the things to consider were attitudes and changes in subject behavior about their confidence to communicate with friends.

The subjects in this study were students who met the criteria set in the subject determination from two schools, namely Rempoah Elementary School and Karangtengah Elementary School in Banyumas Regency, consisting of 11 children. The method of collecting self-report data was in the form of interview (group discussion forums). It aimed to obtain etiological data which were in the form of the problems experienced by the subjects. In addition to interviews, the hierarchical scale model used to determine the level of subject anxiety from 0-100 was the Subjective Unit Disturbance. It is commonly used by Martin & Pear\textsuperscript{19}. Also, this scale was used to dig information from other people, namely parents, teachers, and people close to him. For more, the researchers also used observation to ensure changes in attitudes and behaviors of the subjects after participating in learning and the impacts caused by the treatment.

**Results**

Learning with visual thinking strategies has been proven to improve students’ social skills because these strategies met the criteria required in this study, namely children are able to collaborate with their peers, interact, build an optimistic attitude, try, and be realistic, and be able to respect others. The decrease in the level of children’s anxiety in the form of a graded scale was used as an indication to find out the changes that occurred in the subjects during and after learning process.

In general, the learning process of visual thinking strategies can involve students directly, so it is clearly seen that the learning is student-centered. Meanwhile, the social skills of SAD students increased, and marked by the achievement of the indicators:

a. Students work together in groups, respect each other, respect, and have positive views when learning in groups, give friends the opportunity to take turns when asking and answering questions in group discussion and during the presentation of the results of discussions in front of the class.

b. Performing self-control in the form of reminding friends both in the same group and outside the group, providing a conducive learning atmosphere.
The courage of students in expressing opinions and sharing experiences with friends in groups and teachers when learning takes place. Social skills emphasize students’ ability to communicate orally.

Discussion

Social skills are the ability of one’s life to work together, respect the rights of others and be socially sensitive; learn to do self-control and self-direction; share ideas and experiences with others. Failure to develop social skills can make it difficult for individuals to adjust to their environment, behave anti-socially, cause a feeling of inferiority, and can be excluded from association. This situation can lead to achievement and negative self-activity.

Learning using visual thinking strategies could build children’s confidence in social anxiety disorders, so students dared to interact with their peers. Before this learning model was applied, subjects were more likely to work alone, rarely spoke with their friends, passive in learning, even provided no answer to teacher’s questions. The results of the research of Sriyanto, Febrianta, & Yuwono through the experimental approach show the effect of implementing visual thinking strategies learning on students’ social skills. The changes that occur on their subjects were based on observations showing that the students dare to take the initiative to ask questions, help their friends, want to listen during discussion.

Asrori research, that social anxiety disorder in children can be reduced. By doing so, it can even children’s increase self-confidence and social interaction. Efforts to handle social anxiety disorder can be done through several techniques such as the application of behavioral rehearsal the effectiveness of cognitive behavioral theory therapy can also overcome anxiety disorders. These theories assume that anxiety is obtained through the learning process, namely through conditioning and observational learning. According to the cognitive theory children’s behavior during the process of development needs to get help to establish relationships in accordance with their expectations, so social problems that arise in the perception will be overcome.

The results of this study are consistent with the research of Selimović, et.al. to 1639 elementary school students in Bosnia. Their study shows that the learning process can develop students’ social competencies, although the subjects had different characteristics.

This study is also in line with the result of Iniyani and Listiara’s research that the cooperative learning model can reduce the level of anxiety of students when they are about to face an exam. This learning model is made through structured groups by arranging class according to students’ characteristics, and carrying it out through certain teaching techniques.

Bennis and Naus’s view state that learning to cooperate in the learning process integratedly gives benefits. Meanwhile, Cartwright-Hatton, Tscernitz, Gomersall try to distinguish between children aged 10-11 years who have high and low levels of anxiety. They explain that these children cannot be distinguished from their social skill level. However, objectively children who have a low level of anxiety feel themselves nervous in their social interactions. Based on these statements, the learning process in groups and work together will improve students’ social skills.

Efforts to develop social skills for children with social anxiety disorder are needed since building self-confidence requires consistent stages. Through the learning process, it is hoped that the children will be able to build habituation so as to help themselves to have confidence in their social life. This illustration refers to the five principles of powerful learning that should be mastered by teachers, namely, meaningful, integrative, challenging, active, and value based.

Conclusion

Social anxiety disorder can have an impact on the lives of people who suffer from this condition. Individuals who have social anxiety disorder have limited social relationships, feel helpless, lonely, and even alienated. Anxiety and nervousness are related to certain specific social situations; for example, meeting new people, being the center of attention, being observed while doing something, being called in class, taking an exam, speaking during class discussion. The most common symptoms that children experience are limiting activities, avoiding face-to-face situation, staying behind, and refusing to go to school. One effort to overcome this is through visual thinking strategies learning. Besides reducing social anxiety disorder, these strategies can also improve social skills.

Conflict of interest: NIL

Source of Funding: Self source

Ethical clearance: Done by Research committee
Reference


Therapeutic Intervention of Respiratory Tract Cases in Children

Umi Solikhah1, Siti Nurjannah1, Supriyadi1

1Lecturer, Universitas Muhammadiyah Purwokerto, Indonesia

Abstract

Therapeutic intervention model for cases in the respiratory tract of children is needed to increase lung capacity in cases of respiratory tract disorders. This study aims to facilitate children’s needs in improving respiratory status and reduce the impact of hospitalization. The research used quantitative method. Researchers conducted a quantitative analysis of therapy with respiratory status. Description of variables were analyzed by numerical and categorical variables. This type of therapeutic intervention is the therapy of developing lung capacity with an inflatable type game. Analysis using paired sample t-test to see changes in respiratory status. The results showed respiratory status after the intervention occurred an increase in respiratory status with criteria for decreased respiratory frequency, increased pulse rate, decreased number of children who showed signs of chest retraction, development of nasal lobes and shortness of breath, and use of oxygen. The impact of hospitalization includes fussy children, feeling bored, afraid of health workers, asking to go home, and afraid of action, on average experienced by 23% of children. There are no tamper-tantrum respondents. Inflatable instrument are recommended for implementation of respiratory tract cases in children.

Keywords: Therapeutic, child, respiratory, inflatable instrument.

Introduction

Respiratory tract cases such as acute respiratory tract infection (ARI), pneumonia, bronchitis, bronchopneumonia, asthma; still a major problem in Indonesia. Respiration is needed to provide oxygen to the tissues and remove carbon dioxide. Normal breathing results in optimal lung development and constriction. In cases of respiratory problems, the child feels shortness of breath. Shortness of breath occurs due to insufficient oxygen to the lungs, so that lung development and deflation is not optimal. Activities are needed that can develop lung capacity to the maximum.

The number of respiratory tract cases in children, in the last three months is quite large compared to other cases. In August 2017 as many as 42% (45 cases out of 105 patients), in September 2017 amounted to 21% (33 cases out of 160 patients), and in October 2017 amounted to 20% (26 cases from 128 patients)1. This requires special attention from health workers. The treated child needs the right therapeutic action innovation to be able to provide nursing care that is appropriate to the patient’s needs2,3. Therapeutic interventions can be carried out in the form of games to reduce the impact of hospitalization and in the case of the respiratory tract to develop lung capacity.

The role of nurses here is very important to prevent the emergence of traumatic mechanisms in children both during treatment and after being treated2. The results of Kim and Cho’s research that patients during hospitalization needed nurses by 87%4. Nurses are in addition to patients for 24 hours, so that nursing care is needed by taking into account the principle of a-traumatic care, besides that it is necessary to involve the family during nursing actions, understand communication techniques that are appropriate for children and families, and creatively apply therapeutic games5-9. Therapeutic games should adjust to the child’s case and condition10-13. The availability of tools that support the nurse’s therapeutic activities in the children’s ward is needed.

Corresponding Author**

Umi Solikhah
Universitas Muhammadiyah Purwokerto, Indonesia
e-mail: umisolikhah@ump.ac.id
The aim of this research is to know the impact of applying the respiratory tract case therapeutic game model on children on the respiratory status of children.

**Method**

Total sample of 80 respondents. Quantitative research methods, researchers conducted a quantitative analysis of therapy with respiratory status and assessed the change in the impact of hospitalization qualitatively. This type of therapeutic intervention is the therapy of developing lung capacity with an inflatable type game. Children need to play, therapy that is done by playing will provide happiness for children\(^{14-15}\).

Bi-variable analysis using paired sample t-test to see changes in respiratory status. The impact of hospitalization before and after the intervention is described qualitatively, through client interviews and observation of children. The intervention method was applied to develop lung capacity in cases of respiratory tract in children, with the medium of an inflatable instrument.

**Results and Discussion**

**Respondent Characteristic**

**Table 1: Respondent Characteristic**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (n=80)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parent age (year)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>35.91 ± 6.31</td>
<td></td>
</tr>
<tr>
<td>Min – Max</td>
<td>23 – 51</td>
<td></td>
</tr>
<tr>
<td><strong>Child age (year)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>6.07 ± 3.36</td>
<td></td>
</tr>
<tr>
<td>Min – Max</td>
<td>2 – 13</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>33</td>
<td>41.3</td>
</tr>
<tr>
<td>Low</td>
<td>47</td>
<td>58.8</td>
</tr>
<tr>
<td><strong>Parent gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Man</td>
<td>10</td>
<td>12.5</td>
</tr>
<tr>
<td>Woman</td>
<td>70</td>
<td>87.5</td>
</tr>
<tr>
<td><strong>Job</strong></td>
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</tr>
<tr>
<td>Government</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Non government</td>
<td>27</td>
<td>36.3</td>
</tr>
<tr>
<td>Housewife</td>
<td>52</td>
<td>62.5</td>
</tr>
<tr>
<td><strong>Child gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Son</td>
<td>42</td>
<td>52.5</td>
</tr>
<tr>
<td>Girl</td>
<td>38</td>
<td>47.5</td>
</tr>
<tr>
<td><strong>Diagnosis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asma</td>
<td>12</td>
<td>15.0</td>
</tr>
<tr>
<td>Bronchitis</td>
<td>4</td>
<td>5.0</td>
</tr>
<tr>
<td>Bronchopneumonia</td>
<td>33</td>
<td>41.3</td>
</tr>
<tr>
<td>ARI</td>
<td>30</td>
<td>37.6</td>
</tr>
<tr>
<td>TB</td>
<td>1</td>
<td>1.3</td>
</tr>
</tbody>
</table>

The average age of the respondent’s parents is in the productive age range. In productive age, adults show maturity and creativity in dealing with problems. In this case facing the problem of sick children who are hospitalized. There are still 4 respondents above 50 years old. At that age, parents have sufficient experience in dealing with the problems of sick children, although it does not guarantee they have ever gained sufficient knowledge about the problems faced.

Children at school age are able to receive information, knowledge, and instructions that they can predict\(^5\). In this study is needed because the interventions that are carried out require information in advance according to operational standards, so as to be effective in improving respiratory status.

Parents with higher education, this provides benefits in this study in terms of explanation of information about research procedures. There are more male child respondents. Boys have greater physical endurance to try to blow the tools used to develop lung capacity.

As many as 87.5% of respondents were awaited by their mothers. This shows that maternal attention as a provider of breastfeeding is still the main concern for children’s health, besides father. The mother is the parent who is closest to the child, because the mother is more likely to give the child a direct hug.

Diagnosis of childhood diseases as respondents include asthma, bronchitis, bronchopneumonia, ARI, pulmonary TB. Bronchopneumonia is the biggest case in this study, and ARI is second. At school age, you can start doing more activities outside, consuming unhealthy foods like sauces, cold drinks, and foods with strong spices; making it easier to get respiratory problems. Asthma in children tends to be obtained from family members with similar cases or because of allergens.

**Description of Respiratory Status**

(1) The average RR in the first and second measurements was the same. This shows an increase in respiratory status from RR variables. Normal respiratory is between 20-30 times per minute. If more than 40 times per minute is said to experience breathing difficulties.

After the intervention of the game with an inflatable device, the child experienced a development of lung capacity which was characterized by a decrease in RR up to two times per minute in each measurement.
Two times the measurement of RR decreased from an average of 28 times per minute to 24 times per minute, within 15 minutes of twice the intervention.

(2) The average HR in the first and second measurements is the same as an increase. The first measurement from an average of 89.91 times per minute to 94.07 times per minute, and the second measurement from an average of 89.96 times per minute to 92.90 times per minute. The normal HR in children is between 80 and 90 times per minute.

Increased pulse after intervention, most likely influenced by hospitalization, where children feel worried when intervened by health workers who use uniform\(^\text{15}\). The use of white uniforms can affect child hospitalization\(^\text{16}\). This needs special emphasis, every nursing action in a child needs to be anticipated with the possibility of the child not being cooperative, so that every child who is intervened does happily.

(3) Child patients who use oxygen are 13 children out of 80 children who are sick in their respiratory tract. 67 children do not use breathing equipment despite problems with breathing. There is no difference in the first measurement and there is a difference in the second measurement, which is from 13 children who use oxygen to 3 children who use oxygen.

These results indicate that therapeutic game interventions with inflatable equipment such as balloons can be recommended as interventions for children with respiratory disorders. Oxygen is given to children who show poor respiratory status. Of the 13 children who used oxygen effective after the second measurement. This means that this intervention is not enough just once, it needs to be done at least twice.

### Table II: Description of Respiratory Status

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measurement 1 (n=80)</th>
<th></th>
<th>Measurement 2 (n=80)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>RR (x/minute)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>27.96 ± 4.45</td>
<td>26.01 ± 4.59</td>
<td>26.40 ± 4.27</td>
<td>24.25 ± 4.19</td>
</tr>
<tr>
<td>Min – Max</td>
<td>19 – 42</td>
<td>17 – 40</td>
<td>19 – 40</td>
<td>18 – 38</td>
</tr>
<tr>
<td>HR (x/minute)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>89.91 ± 10.11</td>
<td>94.07 ± 10.49</td>
<td>89.96 ± 8.93</td>
<td>92.90 ± 9.77</td>
</tr>
<tr>
<td>Min – Max</td>
<td>60 – 115</td>
<td>72 – 120</td>
<td>65 - 120</td>
<td>70 – 125</td>
</tr>
<tr>
<td>Oxygenation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
<td>16.3</td>
<td>13</td>
<td>16.3</td>
</tr>
<tr>
<td>No</td>
<td>67</td>
<td>83.8</td>
<td>67</td>
<td>83.8</td>
</tr>
<tr>
<td>Chest retraction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
<td>16.3</td>
<td>11</td>
<td>13.8</td>
</tr>
<tr>
<td>No</td>
<td>67</td>
<td>83.8</td>
<td>69</td>
<td>86.3</td>
</tr>
<tr>
<td>Nasal lobe breathing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
<td>18.8</td>
<td>13</td>
<td>16.3</td>
</tr>
<tr>
<td>No</td>
<td>65</td>
<td>81.3</td>
<td>67</td>
<td>83.8</td>
</tr>
<tr>
<td>shortness of breath</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>14</td>
<td>17.5</td>
<td>13</td>
<td>16.3</td>
</tr>
<tr>
<td>No</td>
<td>66</td>
<td>82.5</td>
<td>67</td>
<td>83.8</td>
</tr>
</tbody>
</table>

(4) *Chest retraction* is one sign of a child who has respiratory problems. Results of chest retraction examination in pediatric patients with respiratory tract disease amounted to 13 children from 80 children who were sick in the respiratory tract. After the intervention in the first measurement, from 13 children to 11 children who still had chest retraction when breathing. While after the intervention in the second measurement, from 11 children to only one child who still had chest retraction when breathing.

Although not many children show symptoms of chest retraction and cannot be generalized, it is sufficient to support that therapeutic game interventions with inflatable equipment such as balloons can be...
recommended as interventions for children with respiratory disorders.

(5) **Nostrils respiration.** Examination of the nasal lobe in pediatric patients with respiratory tract disease is one sign of a disturbance in respiratory status, in the form of nostrils expanding at the time of inspiration, as an effort to maximize the oxygen entering the respiratory tract. Although the number of children who developed their nostrils when breathing only 15 children out of 80 children, the results of the assessment after the intervention in the first and second measurements decreased.

This shows that therapeutic game interventions with inflatable equipment such as balloons can be recommended as interventions for children with respiratory disorders.

(6) **Shortness of breath** is characterized by the use of abdominal muscles during breathing. Shortness of breath occurs due to the body’s efforts to meet oxygen demand in the lungs. Limitations due to narrowing of the respiratory tract, obstruction, there are lenders or secret or foreign objects.

The number of children who experienced shortness of breath after intervention in the first measurement was slightly reduced from 14 children to 13 children. Whereas after the intervention in the second measurement decreased from 13 children to only three children who still experienced shortness of breath. This shows that therapeutic game interventions with inflatable equipment such as balloons can be recommended as an intervention for children with respiratory problems, especially shortness of breath.

The results of the survey on the impact of hospitalization were that the majority of child respondents were calm when hospitalized. The average respondent who experienced the impact of hospitalization was only 23.54%. Calmness of children when treated with an average of 76.46%. This is a positive finding as a result of previous research researchers’ interventions are still applied in the hospital’s children’s room. Management of therapeutic actions and environments supports a reduction in the impact of hospitalization on treated children.

Some things that can reduce the impact of hospitalization include attitudes of health workers, uniforms, environmental comfort, and family support. The impact of hospitalization which previously reached 80% decreased to 23.54%. The tendency of a calm child can be influenced by the calmness of parents accompanying their children who are hospitalized. The attitude of nurses who understand the perspective of child care also has a major influence on the child’s peace.

### Conclusions

Respiratory status after an intervention has increased respiratory status with criteria for decreased RR, increased pulse, decreased number of children showing signs of chest retraction, development of nasal lobes and shortness of breath, and use of oxygen. The impact of
hospitalization includes fussy children, feeling bored, afraid of health workers, asking to go home, and afraid of actions, on average experienced by 23% of children treated from 80 respondents.

Recommendation for this research, every child patient with a respiratory system disorder, applies therapeutic game intervention in the form of an inflatable device to the treated child, so that it is expected to help the healing process of the disease with pleasure. Hospitals, especially children’s wards, provide respiratory tract case therapeutic tool sets for children, so they can improve the quality of care for pediatric patients.

Conflict of interest: NIL

Source of Funding: Self source

Ethical clearance: Done by Research committee

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Mortality Rate and Gonotropic Cycle Serotype Denv-2 Transovarial Transmission through Intratoracal

Isna Hikmawati1,2, Hendro Wahjono3, Martini3, Socharyo Hadisaputro3, Edi Darmana3, Kisdjami Retna Mustika Djati3, Sugeng Juwono Mardihusodo4

1Student, University Diponegoro, Semarang, Indonesia, 2Lecturer, Universitas Muhammadiyah Purwokerto, 3Lecturer, University Diponegoro, Semarang, 4Lecturer, University Gajah Mada, Yogyakarta

Abstract

Transovarial transmission is an important role of Aedes aegypti as an intermediate host. This role is one of the factors dengue virus can survive in nature during interepidemic. DENV-2 transovarial transmission is an important problem because there has been evidence of horizontal transmission of DENV-2 serotypes by vertically infected mosquitoes. The study aimed to determine the mortality rate and gonotropic cycle of serotype denv-2 transovarial transmission through intratoracal in Aedes aegypti mosquitoes. The research method used a quasi-experimental design with the intervention of intratoracal DENV-2 serotype virus infection. The population in this study was Aedes aegypti mosquito female laboratory colony. The results showed a mortality rate of 87.2%, there were differences in the number of gonotropic cycle eggs (p <0.0001) with mean different: 13.5. and infection rate of DENV-2 transovarial transmission is 30-40%. An active role for the community is needed in eradicating mosquito breeding places in each gonotropic cycle.

Keywords: Gonotropic Cycle, DENV-2, Transovarial, Intratoracal.

Introduction

DENV-2 transovarial transmission is an important problem because there has been evidence of horizontal transmission of DENV-2 serotypes by vertically infected mosquitoes1. Transovarial is the transmission of dengue virus vertically from female mosquitoes to its eggs2. Dengue as a vector-borne disease is currently still a major disease problem especially in tropical and sub-tropical regions. The results of the research with cartographic approach estimate that there are 390 million / year of infection due to DHF and 96 million indicate clinical or sub-clinical severity. This disease has infected 70-500 million people/year in more than 100 countries around the world3. CDC (Centers for Diseases Control and Prevention) reported that a third of the world’s population is at high risk of developing dengue fever, especially in the tropics and sub-tropics4. Transovarial transmission is an important role of Aedes aegypti as an intermediate host. This role is one of the factors dengue virus can survive in nature during interepidemic. Aedes aegypti is the main vector and the population in nature is more (92.9%) than the co-vector Aedes albopictus (6.8%) with an infection rate of 0.81%5. The proportion of transovarial events in Kenya between 2013-2014 shows the proportion of 8-11%6. Results of research in India on third and fourth instar larvae showed transovarial infection rates of 35%7.

DHF is still a problem in Indonesia due to the presence of all four DENV-1, 2, 3, 4 serotypes and a high incidence rate in some regions8. The results of the research by Hikmawati, I and Pattima, S showed a CFR of 8.699. The results showed that the Transovarial Transmission Index (TTI) ranged from 39.1%-70%10. Transovarial proportion with four types of serotype by 30,3%11. The results of transovarial in Indonesia showed the positive rates of Aedes aegypti higher than Aedes albopictus12. The results of serotype distribution studies in Indonesia found that the overall proportion of DENV-1 was 9.6%, DENV-2 was 55%, DENV-3 was 29% and DENV-4 was 0.4%13. This study aims to determine the mortality rate and gonotropic cycle of serotype denv-2 transovarial transmission through intratoracal in Aedes aegypti mosquitoes.
Method

Research Design: The design of the study used quasi-experimental.

Sampling and Epidemiological Data Collection

Mosquitoes: The population was female Aedes aegypti mosquitoes free of dengue virus from the laboratory colony maintained at the Laboratory of Parasitology, Gajah Mada University. The number of samples were 86 female mosquitoes.

Virus: The dengue-2 virus used in the study was obtained from a parasitology laboratory, Gajah Mada University.

Intratoracal Procedure: Put 86 Aedes aegypti mosquitoes into a test tube, then put it in a beaker glass that has been filled with ice cubes, after fainting, take one at a time, put it under a microscope and a set of mosquito intratoracal devices, then an injection of ± 2 µ supernatant of the DENV-2 virus each tail (Fig. 1).

Maintenance of Mosquitoes after Intratoracal and Detection of Transovarial: Two-three days after the intratoracal, the mosquito was inserted in a 20 cm³ cage (Fig. 2) to feed the healthy human blood by means of membrane feeding. Mosquitoes are left to lay their eggs and are given cotton every day with sugar water and daily deaths are recorded. After being seen laying eggs, take the resulting eggs and count them with a microscope as one gonotropic egg (G1). The mosquitoes are then given blood back in a membrane feeding to lay eggs as gonotropic 2. The eggs produced from the gonotropic cycle are then hatched until they become mosquitoes as farian 1 (F1). Detection of Transovarial Transmission by Immuno Histo Chemistry (IHC) test.

A. Statistical Methods: Bivariate analysis using independent t test with p value <0.05 to see differences in eggs produced in the gonotropic cycle.

B. Ethical Consideration: The study was approved by the Medical and Health Research Ethics Committee (MHREC) Faculty of Medicine Gadjah Mada University and Dr. Sardjito General Hospital by Number: Ref: KE/FK/0176/EC/2018.

Results

Mortality Rate after Intratoracal: 86 mosquitoes are infectious with intratoracal, death occurred in gonotropic cycles one and two 75. The description of the death of Aedes aegypti after the intratoracal supernatant DENV-2 as in Fig. 4.

Gonotropic Cycles: Gonotropic cycles 1 and 2 in the Aedes aegypti mosquito as the following Table 1.

Table 1: Number of eggs and gonotropic cycle length

<table>
<thead>
<tr>
<th></th>
<th>Mean Different</th>
<th>Standar Deviasi</th>
<th>P value&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Eggs</td>
<td>13,5</td>
<td>20,1</td>
<td>0,0001</td>
</tr>
<tr>
<td>Gonotropic Cycle length</td>
<td>6,7</td>
<td>1,1</td>
<td>0,0001</td>
</tr>
</tbody>
</table>

<sup>a</sup>one sample T test
Transovarial Transmission of Aedes Aegypti Mosquito: The result of transovarial detection of *Aedes aegypti* mosquitoes after intratoracal, the IHC method found an infection rate of 30-40%. As shown in Fig. 5.

![Fig. 5: Transovarial detection with (Immuno Histo Chemistry) Aedes aegypti mosquitoes](image)

**F1 Metamorphosis:** Metamorphosis of egg-larvae (3-19 days), larva-pupa (7-20 days), pupa-mosquito (2-23 days).

**Discussion**

The results showed the mortality rate of 87.2% meant that the intrathoracal infection act only gave a life expectancy of 12.8%. Higher mortality in one gonotrophic cycle than in the second gonotrophic cycle. This is because in the gonotrophic cycle, the content of the supernatant virus is still high, causing a more severe infection which ultimately results in higher mortality. Blood biting/sucking behavior is a parameter underlying the capacity of mosquito vectors in addition to other factors such as population density, extrinsic incubation period and survival. The results of Fouque’s study showed that the survival of female *Aedes aegypti* in French Guiana was on average 0.913. Thus, transmission and endemic patterns of dengue fever are predicted throughout the year. The results of other studies show in urban areas the female mosquito population is lower and this indicates a lower risk of dengue transmission compared to rural areas and slums.

The results of this study indicate that the mean of different gonotrophic cycles is longer (6.7 days) than the normal gonotrophic cycle (3-4 days), this is due to one of the low laboratory temperature factors (20°C-21°C) compared to the optimum average temperature for mosquito development (25°C - 27°C). As it is known that air temperature will affect the metabolic process. At low temperatures the metabolism is slow, affecting egg development. At high temperatures can reduce the size of the larvae so that at the adult level the size of the mosquito becomes small due to high metabolic rate and requires more food intake and more eggs.

Previous research results showed that the duration of the gonotrophic cycle in Wonosobo District averaged 4 days (3 - 5 days) and the average biological cycle length was 10 days (9 - 11 days). The results of previous studies showed that the estimated length of the gonotrophic cycle was different between the rainy and dry seasons, during the rainy season the correlation coefficient was 4 days, at 26.7 ± 1.22 °C, and 3 days in the dry season at 29.8 ± 1, 47 °C. Minimum estimated time to ripen eggs after administration of blood in the 3.5-day rainy season and 3.25 days in the dry season. Research results in Puerto Rico gonotrophic cycles between 3-7 days.

Besides affecting the gonotrophic cycle, temperature can also affect the number of eggs produced. The results of this study show the mean different number of eggs produced by 13.5 fewer than normal production between 100-150 each mosquito without infection. Research conducted by Gloria et al on the effect of temperature on dengue infection shows Extrinsic Incubation Temperature (EIT) and DENV-2 genotype have a direct effect on infection rates and EIT affects infection rates differently in each mosquito population, this shows the effect of environmental interactions on genotypes. These results indicate that the magnitude of the DENV epidemic does not only depend on viruses and mosquito genotypes but also adjustments to interact with local temperatures. The results of Ritadi’s research, et al concluded that the temperature and duration of storage affected the percentage of hatching of *Aedes aegypti* eggs in the laboratory (p = 0.046). The low egg production in this research is likely due to the infection of the DENV-2 virus that enters the mosquito’s body after an intratoracal, so that the mosquito undergoes an inflammation process. An important part to develop and amplify the dengue virus is cells from the salivary and ovarian glands, because for viruses infected by the virus the part shows morphological and histological changes in shape compared to healthy mosquitoes or not exposed to the virus (accentic). Both parts of this mosquito organ look much bigger (swell). The number of eggs produced is influenced by the amount of human blood sucked by female *Aedes aegypti* mosquitoes to ripen their eggs, blood is used for protein intake that is needed to produce eggs. The results of research in Thailand and Puerto Rico estimated that the average Aedes aegypti took 0.76 and 0.63 63 human blood meals per day. The results
of the study concluded that the DENV-2 serotype affects mosquito behavior for motivation to feed (fist feed) compared to avidity (second feed) 23.

The results of this study indicate that vector infectious requires a longer metamorphosis time (12 days) than non-infectious (8 days) from the stage of the egg to adulthood. Siraj’s research, et al. Shows that an increase in temperature can accelerate the epidemic of dengue fever virus, due to the rapid metamorphosis of each generation so that more infections each generation 24.

The proportion of hatched eggs is positively correlated with the immersion temperature. Survival was 30% at 13.2 °C and above 90% at 20 °C, while the development time at low temperatures was 49.4 d at 13.2 °C and 17.7 d at 20 °C 25.

Transovarial transmission in this study showed an infection rate of 30-40% meaning that in 100 Aedes aegypti mosquitoes there were 30-40 infected by DENV-2 through intratoracal. The results of this research clarify the role of Aedes aegypti mosquitoes through transovarials. Research results in Amazon City showed a transovarial infection rate of 46% 26. Population fecundity in mosquitoes infected with DENV-2 was significantly higher than DENV-4, after administering membrane feeding with non-infectious blood for 7 days27. Transovarial phenomena show persistence / maintenance of viral serotypes through intermediate hosts before being transmitted to humans as horizontal transmissions. The results of the study in Colombia showed the presence of dengue virus in larvae in rural areas, all serotypes (DENV-1, DENV-2, DENV-3, DENV 4) were detected in all regions and DENV-1 as the most dominant serotype28. Limitations in this study were not detected in the transovarial transmission of DENV-2 transovarial serotypes via intratoracal, only in the infection rate through IHC test.

Conclusions

The results showed a mortality rate of 87.2%, there was a difference in the number of eggs per gonotrophic cycle (p <0.0001) with mean different: 13.5. The F1 vector infectious metamorphosis takes longer (minimum 12 days) than non-infectious (minimum 8 days) from egg stage to adult and 30-40% infection rate of transovarial transmission of DENV-2 serotype. Vector control through eradication of mosquito breeding sites must be improved considering that the Aedes aegypti mosquito as the main vector of dengue fever has several gonotropic cycles. An active role for the community is needed in eradicating mosquito breeding places in each gonotropic cycle.

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Conflict of interest: NIL

Ethical clearance: Done by Research committee

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Validating the Measurement Model of Problem Solving Strategies and Marital Communication Styles among Secondary School Teachers in Nigeria

Fasasi Lukman¹,², Aqeel Khan³, Adibah Abdul Latif³, Ado Abdu Bichi⁴

¹Student, Senior Lecturer, ²Lecturer, Department of Educational Psychology, FCE (Tech), Asaba-Nigeria, ³School of Education, Universiti Teknologi, Malaysia, ⁴Faculty of Education, Yusuf Maitama Sule University, Kano-Nigeria

Abstract

The aim of this study is to assess the model of problem solving strategies and marital communication styles among married couple in Nigerian. To achieve the purpose a cross-sectional survey design was adopted with a sample of 385 married couple in Kwara state Nigeria. The instruments used are tagged ‘problem solving strategies and marital communication styles Scales’ contained 40 items spread among the 8 sub-constructs, 4 Likert’s type was adopted throughout the scale. The data collected was entered into Microsoft Excel 2016 and SPSS 20 for data cleaning and were filtered to the SmartPLS 3. The data was check for normality using two indicators of as Skewness and Kurtosis. The data analysis was conducted using Partial least square structural equation modeling approaches with SmartPLS 3 software. The measurement models were evaluated by items loading, composite reliability (CR) and average variance extracted (AVE). The results revealed that, the measurement model assessed in this study showed acceptability with validity and reliability tests results presented in the preceding sections. The convergent validity examined through the factor loadings, composite reliability (CR), and average variance extracted (AVE). Thus with the satisfaction of all the measurement requirements, it can be concluded that, the developed problem solving strategies and marital communication styles Scales validated in this study can be used to assess the problem solving strategies and marital communication styles Scales among married teachers in kwara state Nigeria.

Keywords: Problem-solving strategie, smarital communication, validity and reliability, measurement.

Introduction

Domestic violence is pressing issue for divorce. In Nigeria, over 65 per cent of educated women and 55 per cent of low income women are subjected to domestic violence ¹. Domestic abuse and fatal cases of spouse violence are global phenomena. According to the United Nations, 38 percent of murders of women worldwide are committed by their male partners, and partner violence is the most common type of violence against women, affecting 30 percent of women globally ². In parts of the third world generally and in West Africa, in particular, domestic violence is prevalent and reportedly justified and condoned in some cultures. For instance, 56% of Indian women surveyed by an agency justified wife-beating on grounds like; bad cook, disrespectful to in-laws, producing more girls, leaving home without informing spouse, among others ³. It was also shown that 25% of women in Dakar and Kaolack in Senegal are subjected to physical violence from their spouses and that very few admit that they are beaten. The reports also revealed that a law passed in the Senegalese penal code punishing domestic violence with prison sentences and fines is poorly enforced due to religious and cultural resistance. In Ghana, spousal assaults top the list of domestic violence ³.

In Nigeria, reports revealed high level of violence against women ⁴,⁵ while reporting the Immigration and Refugee Board of Canada, stated that around 20 percent of Nigerian women experience physical, sexual...
or psychological violence from a spouse. Spousal abuse is particularly common in polygynous families and polygyny is practiced widely in Nigeria. added that more female had experienced physical violence compared with males in Nigeria. added that large number of cases in the Nigeria customary courts is related to domestic violence against women and a tendency of 60% increase may occur yearly. reported that marriage counsellors have attributed this development to lack of fear of God, intolerance, lack of problem solving and effective communication, incompatibility, increased social and economic pressures on family. It is argued that these changes in family life have weakened family bonds and the quality of relationships within families which in turn threatens societal growth and development.

The Nigeria goal on marriage relationship is to have a stable and functional family system where integrated citizens can be produced for the overall development of the nation. In order to ensure this, in 2012, Nigeria as a nation joined other world nations at the London Summit of Global Family Planning Vision 2020 aimed at giving support to couples’ right to freely make decisions on number of children to have, when to have and whether to have for a better living. The larger society can only plan its affairs to achieve meaningful development when all families are properly planned. However, on a daily basis, many families’ day-in day-out are dissatisfied with their marital life due to lack of problem solving skills as well as communication styles. In today’s world, there are many ways through which couples interacts with each other, they can interact by singing, dancing and playing together without any difficulty. However, dispute, divisions and sometimes violence may arise when they discuss family issues that are deep. This kind of situation is pointing to a defect in human interaction process.

In marriage, however, whether there is effective communication or not, conflict is bound to occur between couple and this may result from varying factors. This necessitates for problem-solving skills between couple. These are special communication skills that could help partners in resolving their areas of differences and satisfy their interest without been cheated or taken advantage of another. According to problem solving strategies and effective communication styles are potent tools in putting conflict at bay.

Methodology: This study is descriptive research with a plan data collection and analysis using cross-sectional survey design to validate the developed Measurement Model of Problem Solving Strategies and Marital Communication Styles. The goal is that, the fully developed and validated scale can be used to assess the Problem solving Strategies and Marital Communication styles among Secondary school teachers in Kwara state Nigeria.

Problem solving strategies and Marital Communication styles: The instrument tagged ‘Problem Solving Strategies and Marital Communication Styles Scales’ were developed by the researchers following the established procedures in the literature. The scale contained 40 items spread among the eight (8) sub-constructs (4 in Negotiation Styles and 4 in Marital Satisfaction). Four points (4) Likert’s type was adopted throughout the scale. i.e SD= Strongly Disagree; D= Disagree; A= Agree; SA= Strongly Agree.

Participants: The participants were the 385 married couple drawn from mostly secondary school teachers as defined in the study’s population in Kwara state Nigeria. The distribution of the participants include male and female

Data Collection: The consent of the respondents was sort by providing them the informed consent form designed. After obtaining the consent of the respondents, the scale was administered to the selected sample by the researchers; the participants’ responses were coded, scored and used as data in this study.

Data Analysis: The questionnaires checked were next entered into a design spreadsheet file using Microsoft Excel 2016 where the responses were filtered for scoring into a single dataset. Finally, the data were transferred to SmartPLS 3 to create dataset appropriate for the software for further analysis. The two indicators of assessing normality namely Skewness and Kurtosis were used to assess the normality of the data set as recommended by. The measurement models were all assessed using some set of indicators. The measurement models were evaluated by items loading, composite reliability (CR) and average variance extracted (AVE)

Results: To identify the level of significance of areas of Problem Solving Strategies and Marital Communication Styles components; measurement models of each of the eight sub-constructs of Negotiation Styles and Marital Satisfaction were developed. These models were presented in the following subsections
Measurement Model of Problem Solving Strategies: The Measurement model of the Problem Solving Strategies construct was evaluated by items loading, composite reliability (CR) and average variance extracted (AVE). Items loading of at least 0.7 showed satisfactory indicator reliability for the measurement model. The item/factor loadings of the 20 items measuring 4 sub-constructs of Problem Solving Strategies were assessed as first order constructs. The initial measurement model is presented in figure.

Figure 1: Initial Measurement Model of Problem Solving Strategies

Based on the analysis results the first order constructs, the 20 items measuring the problem solving strategies through 5 sub-constructs showed loadings 0.7 and above except for item PS4, PS6 AND PS8 which showed loadings index of 0.346, 0.174 and 0.217 respectively (see Figure 1). Consequently, these items with low loadings were dropped to form the valid measurement model used in the construction of pooled measurement model. The model was assessed again and all indicators showed acceptable loading. The loading output after omitting distortion trait from the measurement model is presented in Table 1.

Table 1: Summary Measurement Model of Problem Solving Strategies

<table>
<thead>
<tr>
<th>Construct Sub-Constructs</th>
<th>Item</th>
<th>Factor Loadings</th>
<th>AVE</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Solving Strategies</td>
<td>Compromise Strategies</td>
<td>PS1</td>
<td>0.98</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS2</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS3</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS5</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Avoidance Strategies</td>
<td>PS7</td>
<td>0.96</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS9</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS10</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Domination Strategies</td>
<td>PS11</td>
<td>0.92</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS12</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS13</td>
<td>0.93</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS14</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS15</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Submission Strategies</td>
<td>PS16</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS17</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS18</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS19</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS20</td>
<td>0.89</td>
<td></td>
</tr>
</tbody>
</table>
Similarly, all the 4 sub-constructs achieved a satisfactory reliability with the composite reliability (CR) of more than 0.7, an indication that, the CR for the measurement model is above the recommended minimum value of 0.7, as presented in the Table 1. Thus, the outcomes specify that the items represent the constructs with adequate reliability and internal consistency. Convergent validity assessed through investigating average variance extracted (AVE) value; in cases where constructs have an AVE value equal or greater than 0.5, convergent validity is acceptable. Table 1 shows that, all sub-constructs in the problem solving strategies have AVE ranging from 0.5 and above. This exhibits that the proposed measurement model had satisfactory convergent validity.

**Measurement Model of Marital Communication Styles:** The Measurement model of the Marital Communication Styles construct was evaluated by items loading, composite reliability (CR) and average variance extracted (AVE). Items loading of at least 0.7 showed satisfactory indicator reliability for the measurement model. The item/factor loadings of the 20 items measuring 4 sub-constructs of Marital Communication Styles were assessed as first order constructs. The initial measurement model is presented in Figure 2

![Figure 2: Measurement Model of Marital Communication Styles](image)

Based on the analysis results the first order constructs, the 20 items measuring the marital communication styles through 5 sub-constructs showed loadings 0.7 and above except for item MC1, MC4, MC7, MC10 and MC12 which showed loadings index of 0.19, 0.19, 0.17, 0.20 and 0.31 respectively (see Figure 2). Consequently, these items with low loadings were dropped to form the valid measurement model used in the construction of pooled measurement model. The model was assessed again and all indicators showed acceptable loading. The loading output after omitting distortion trait from the measurement model presented in Table 2

<table>
<thead>
<tr>
<th>Construct Sub-Constructs</th>
<th>Item</th>
<th>Factor Loadings</th>
<th>AVE</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marital Communication Styles</td>
<td>Mutual Avoidance Styles</td>
<td>MC1</td>
<td>0.968</td>
<td>0.964</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MC2</td>
<td>0.975</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MC3</td>
<td>0.903</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mutual Discussion Styles</td>
<td>MC4</td>
<td>0.938</td>
<td>0.953</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MC5</td>
<td>0.909</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MC6</td>
<td>0.952</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mutual Expression Style</td>
<td>MC7</td>
<td>0.962</td>
<td>0.941</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MC8</td>
<td>0.930</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MC9</td>
<td>0.954</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MC10</td>
<td>0.715</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mutual Blame Styles</td>
<td>MC11</td>
<td>0.847</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MC12</td>
<td>0.902</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MC13</td>
<td>0.857</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MC14</td>
<td>0.885</td>
<td>0.928</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MC15</td>
<td>0.748</td>
<td></td>
</tr>
</tbody>
</table>
Similarly, all the 4 sub-constructs achieved a satisfactory reliability with the composite reliability (CR) of more than 0.7, an indication that, the CR for the measurement model is above the recommended minimum value of 0.7, as presented in the Table 2. Thus, the results specify that the items represent the constructs with adequate reliability and internal consistency. Convergent validity assessed through investigating average variance extracted (AVE) value; in cases where constructs have an AVE value equal or greater than 0.5, convergent validity is acceptable. Table 2 shows that, all sub-constructs in the problem solving strategies have AVE ranging from 0.5 and above. This exhibits that the proposed measurement model had satisfactory convergent validity.

Discussions and Conclusions

The Measurement Model of Problem Solving Strategies and Marital Communication Styles among married couple in Nigerian were assessed for different validity and reliability evidences. Based on the review of the instrument and empirical assessments, a series of statistical analyses were conducted to established validity and reliability evidences of the scale. Generally, the measurement model assessed in this study showed acceptability with validity and reliability tests results presented in the preceding sections. The convergent validity examined through the factor loadings, composite reliability (CR), and average variance extracted (AVE)\(^{12,15}\).

Internal consistency of the constructs was measured using composite reliability (CR)\(^{16}\). For CR, 0.70 is the threshold criterion\(^{17}\) and all the latent variables involved in this study exceeded the threshold criterion. Moreover, the convergent validity of the constructs was assessed by assessing the factor loadings as well as the average variance extracted (AVE). According to\(^{18}\), the factor loadings are acceptable between 0.6-0.7 for social science studies. Likewise, the AVE value above 0.5 suggests an adequate convergent validity\(^ {14,19}\). All the latent variables involved in this study were having factor loadings and AVEs above their recommended levels. All validity and reliability tests confirmed the validity of the model. This indicates that a valid and appropriate model is presented in this study and the estimation of parameters within the structural model to be developed using this measurement model can also be valid. Thus with the satisfaction of all the measurement requirements, it can be concluded that, the developed Problem Solving Strategies and Marital Communication Styles Scales validated in this study can be used to assess the Problem solving strategies and Marital Communication styles among secondary school teachers in Nigeria.

Despite the significance of this study, there are some limitations as well. For instance, this study did not include the content validity process through which the selected dimensions have been included in the study. In addition, since, it was conducted under the context of Nigerian married couple, but it did not examine the differences among the married couple. Thus, to overcome the above study’s limitations, this study recommends describing the process of content validity in details through which the researchers can select specific dimensions of Problem Solving Strategies and Marital Communication Styles. Moreover, this study strongly recommends the future studies to collect data from different types of respondents.

Conflict of Interest: Authors declared there is no conflict of interest

Ethical Clearance: Obtained through Research Committee

Funding: Self

References


Validation of Anxiety, Life Satisfaction and Social Media Addiction Scales using Rasch Measurement Approach

Ramatu Muhammad Maiwada¹, Aqeel Khan², Adibah Abdul Latif²

¹PhD Student, ²Senior Lecturer, School of Education, Universiti Teknologi Malaysia (UTM), Johor Malaysia.

Abstract

The aim of this study is to assess the validity of Anxiety, Life Satisfaction and Social Media Addiction scales (TELSMAS). To achieve the purpose a cross-sectional survey design was adopted with a sample of 150. Rasch Measurement was adopted to validate the items. The instruments contained 56 items spread among the 3 constructs. The data collected was entered into Microsoft Excel 2016 and Winsteps for the Rasch Analysis. The scale was evaluated through content validity with experts, construct validity with Rasch fit and outfit statistics and Reliability. The results revealed that, the scale has substantial content validity with Kappa value of 0.86, and acceptable reliability values of 0.99 (Anxiety), 0.95 (life Satisfaction) and 0.96 (social media addition). Similarly, the scale satisfied the condition of unidimensional for the Rasch validation. However, 14 items overall failed to satisfied the condition to be certified as valid and therefore completely deleted form the scale (5 in Anxiety and 9 in Social Media Scale). Thus, with the satisfaction of measurement requirements by 42 items, it can be concluded that, the developed TELSMAS validated in this study can be used to assess the level of anxiety, life-satisfaction and social-media addiction among school students and other vulnerable groups.

Keywords: Validation, Anxiety, life Satisfaction, Social Media, Scale.

Introduction

In every human society from time immemorial, individuals develop through stages of life and educational attainment; they encounter problems, challenges and conflict situations. These individuals also need to develop value systems, make decisions, set goals and work towards them¹. The success or failure of the individual especially with regards to educational attainment depends on a number of factors such as anxiety, life satisfaction and relationship with peers and interaction with environment, among others²,³,¹⁹-²¹. Accordingly, the capabilities and attributes of social media have the potential to enhance learning and education, when those tools are used for specific objectives and learning. However, when a general use of social media use that is unrelated to specific academic goals or objectives is considered among students, the results have tended to be negative⁴,⁵,²²-²³.

In contrast to fear, anxiety involves a more general or diffused emotional reaction beyond simple fear that is out of proportion to threats from the environment. Anxiety is defined by⁶ as ‘a complex psychological and behavioural state. Opined that anxiety, an emotional state of a human during life is both life-saving and also causes many problems in the mental life of human beings⁷. Therefore, in terms of the internal struggles, man uses expressions such as anxiety or worry.

Life satisfaction is the subjective, cognitive and conscious judgement of an individual’s overall quality of life based on his or her own standards. It is the rational aspect of subjective well-being and it can behave as an indicator, predictor, mediator and moderator of positive development⁸. Life satisfaction is a crucial indicator of subjective well-being and research implies that measures of life satisfaction can be used to indicate levels of happiness. Previous research suggests the value of life satisfaction in attaining optimal mental health and as a factor in many life outcomes⁹.
Social media is a broad categorical term for technologies that facilitate user sharing, content creation, and information exchange within online communities or networks. Specifically, social media platforms can be defined as technologies, “that allow the creation and exchange of user generated content”\textsuperscript{10}. This definition includes tools that allow users to easily create new content, including blogs (e.g., WordPress), micro-blogs (Twitter, Tumblr, YouTube), and video conferencing (e.g., Google Hangouts, Skype, Facetime)\textsuperscript{11}.

This study considered the importance of these psychological constructs as well as the need to assess them in every individual life. Thus, it is imperative to assess psychometric properties of the develop instrument used in measuring the phenomenon.

**Methodology**

This study is descriptive research with a plan for data collection and analysis using cross-sectional survey design to validate the developed anxiety, Life Satisfaction and Social Media Addiction Scales.

**Participants:** The participants in this study were senior secondary schools’ students in Sokoto state of Nigeria. A sample of one hundred and fifty (150) senior secondary schools’ students participated in the study. The sample size comprises male and female in the five selected schools. Sample size of at least 100 is considered as a reasonable number to participate in a study\textsuperscript{12}.

**Description of the Instrument:** The instrument for this study are constructed and validated is questionnaire and students’ performances as measured by their mock aggregate examination scores in key subjects. The instruments titled ‘Test Anxiety, Life Satisfaction and Social Media Addiction Scale (TELSMAS)’ were divided into four (4) sections; A-D. Section A contain information about the respondents Demographic Information, Section B contained items to measure students’ level of Anxiety Sub-scale, section C contained items to measure students’ level of Life-Satisfaction, section D contained items measure students Social Media Addiction, sect. All the three (3) scale were adapted.

**Test Anxiety Inventory:** This section of the instruments contains items to measure students’ level of anxiety of the respondents. The adapted instrument was modified to suit the current research on a new closed ended with Likert-Type scale. The TAI consists of 20 items rated on a 4 point Likert scale.

**Students’ Life Satisfaction Scale:** This section of the instrument contains items to measure students’ level of life-satisfaction of the respondents. The instrument was developed by\textsuperscript{8} and proposed to be adopted in this study it is a closed ended with Likert-Type scale. It is a seven-item measure of students’ life satisfaction. The SLSS asks students to indicate the extent to which they agree with statements about their life on a 5 point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

**Social Media Addiction Scale:** This section of the instruments contains items to measure students’ level of social media use of the respondents. The instrument was developed by\textsuperscript{13} and is proposed to be adapted in this study. Social Media Addiction Scale is a 5-point Likert type scale which consists 29 items.

**Data Collection:** To achieve the construct validity and the reliability of the questionnaire the scale was administered to the sample of experienced students selected in Nigeria. Prior to the field administration of the instruments for validation purpose a number of processes were followed which include content validation by experts, identification of target population for the pilot study selecting appropriate sample, administration of the draft instruments and reliability analysis as reported.

**Analysis:** To examine the internal consistency reliability of the research instruments in this study, the data collected from the administration were used to conduct test of reliability of the instruments using Rasch Measurement procedure. The data obtained were analysed using WINSTEPS 3.72.3\textsuperscript{14}.

**Results:** To determine the validity and reliability of the Anxiety, Life Satisfaction and Social Media Addiction scale Rasch procedure were used to analyse the data, the results are presented in this section

**Content Validity:** An instrument is said to be valid if it essentially measures what it is intended to measure. The content validity of the TELSMAS was first assessed by two (2) experts at the school of education Universiti Teknologi Malaysia, thereafter, the research submitted to some selected experts in the field of guidance and counselling and measurement and evaluation at the Usmanu Danfodio University, Sokoto in Nigeria. The detail information of the content experts is presented in Table 1.
Table 1: Background information of the content experts

<table>
<thead>
<tr>
<th>SN</th>
<th>Expert</th>
<th>Qualification</th>
<th>Academic Rank</th>
<th>Field of Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Expert A</td>
<td>PhD</td>
<td>Professor</td>
<td>Guidance &amp; Counselling</td>
</tr>
<tr>
<td>2.</td>
<td>Expert B</td>
<td>PhD</td>
<td>Professor</td>
<td>Guidance &amp; Counselling</td>
</tr>
<tr>
<td>3.</td>
<td>Expert C</td>
<td>PhD</td>
<td>Senior Lecturer</td>
<td>Guidance &amp; Counselling</td>
</tr>
<tr>
<td>4.</td>
<td>Expert D</td>
<td>PhD</td>
<td>Senior Lecturer</td>
<td>Measurement &amp; Evaluation</td>
</tr>
</tbody>
</table>

The experts validated the instruments in terms of clarity of language, ambiguity of the statement, relevance to the topic and appropriateness of the items. After scrutinizing the instruments some constructive suggestions and corrections which were made by the experts were effected before producing the final draft of the instruments for pilot testing. Additionally, the ratings provided by these experts were used to compute the inter-rater reliability using Kappa statistics (see Table 2). The questionnaires have adequate content validity with the modified Kappa of 0.86 for all the three sub-scale.

Table 2: Kappa Statistics

<table>
<thead>
<tr>
<th>SN</th>
<th>Sub-scale</th>
<th>Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Test Anxiety</td>
<td>0.92</td>
</tr>
<tr>
<td>2.</td>
<td>Life Satisfaction</td>
<td>0.85</td>
</tr>
<tr>
<td>3.</td>
<td>Social Media Addiction</td>
<td>0.85</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>0.86</td>
</tr>
</tbody>
</table>

Reliability (Internal Consistency): The Rasch Measurement approach was used to estimate the reliability of the TELSAQ. The reliability coefficient of the scales in both person and item based on relevant standards has excellent person, item as well as adequate internal consistency reliability. Summary presented on Table 3 showed that, person sample used in the Test is large enough to confirm the item difficulty hierarchy of the test items.

Table 3: Summary Statistics

<table>
<thead>
<tr>
<th>SN.</th>
<th>Reliability</th>
<th>Test Anxiety</th>
<th>Life Satisfaction</th>
<th>Social Media Addiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Item Reliability</td>
<td>0.95</td>
<td>0.99</td>
<td>0.96</td>
</tr>
<tr>
<td></td>
<td>Item Separation</td>
<td>4.6</td>
<td>8.19</td>
<td>4.08</td>
</tr>
<tr>
<td>2.</td>
<td>Person Reliability</td>
<td>0.76</td>
<td>71</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>Person Separation</td>
<td>1.79</td>
<td>1.8</td>
<td>2.54</td>
</tr>
<tr>
<td>3.</td>
<td>Cronbach Alpha</td>
<td>0.84</td>
<td>0.73</td>
<td>0.72</td>
</tr>
</tbody>
</table>

The reliability coefficients presented in Table 3 revealed the item reliabilities of 0.99, 0.95 and 0.96, with corresponding Cronbach Alpha of 0.84, 0.73 and 0.72. These parameters were considered satisfactory reliability because according to a Cronbach’s alpha scale greater than 0.70 is acceptable for the internal consistency reliability of the items and can therefore be accepted for research purpose.

Construct Validity

Unidimensionality: In validating the research instrument, the TELSMAS. The alignment of the items to the constructs can be identified using unidimensional characteristics. Two (2) indicators; the raw variance explained by measures (RVEM) and unexplained variance in the first contrast (UVFC) can be used to detect unidimensionality using PCA. The results of Rasch residuals to check unidimensional characteristics of the test items is presented in Table 4.

Table 4: Summary Statistics

<table>
<thead>
<tr>
<th>SN</th>
<th>Sub-Scale</th>
<th>Raw variance explained by measures</th>
<th>UVFC</th>
<th>Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Test Anxiety</td>
<td>57.0%</td>
<td>14.2%</td>
<td>59.8%</td>
</tr>
<tr>
<td>2.</td>
<td>Life Satisfaction</td>
<td>64.3%</td>
<td>11.3%</td>
<td>60.8%</td>
</tr>
<tr>
<td>3.</td>
<td>Social Media Addiction</td>
<td>41.8%</td>
<td>10.8%</td>
<td>41.8%</td>
</tr>
</tbody>
</table>

The result presented in Table 4 showed that the unidimensional nature of the TELSMAS and confirmed further whether the items are measuring Test Anxiety, Life Satisfaction and Social Media Addiction. The raw variance explained by measures are 57.0%, 64.3% and 41.8%. The rule as provided by is that, for an instrument to achieved unidimensionality, it requires the minimum of raw variance explained by measures (RVEM) of 40% and unexplained variance in the first contrast (UVFC) to be less than 15% to fully established that, the TELSMAS is unidimensional and no substantial secondary dimension seem to exist within the data.

Model fitness Statistics: Based on the Rasch model analysis various tests were used to identify error responses labelled as ‘outliers’ or ‘misfit’ as these are commonly referred terms used in psychometrics. As the name suggests ‘misfit’ refers to the estimates that do not fit into the overall model fit. According to the Rasch, model fit is determined by examining the misfit indices revealed by the Outfit Mean Square (MNSQ) measures, the Outfit Z Standard (ZSTD) estimates as well as the Point Measure Correlation indices.
According to the variance is larger for well-targeted observations and smaller for extreme observations. In this study the Outfit MNSQ (+1.05) shows acceptable variances within the responses because the accepted value of this fit statistic is close to 1. Outfit MNSQ measures are more susceptible to extreme responses compared to Infit MNSQ measures. Thus, to maintain any item in a test is should satisfy the following conditions as provided by PTMEA CORR is positive and not 0, INFIT and OUTFIT MNSQ index fall within the acceptable range i.e., 0.7 ≤ MNSQ ≤ 1.3 and the ZSTD values fall within acceptable range of -2.0 ≤ Z ≤ 2.0.

Misfit items in Test Anxiety Scale: Based on the item map (Figure 1), there are 5 items, 4 of the items are higher than the most able student and 1 of the items is easiest even to the least abled respondents. The items are A11, A12, A15, A16 and A1. To decide whether to omit them from the scale or maintain to be use in the next administration, the indicators of fit were investigated i.e., Point Measure Correlation (PTMEA CORR), INFIT Mean Square (INFIT MNSQ) and OUTFIT Mean Square (OUTFIT MNSQ). The result shows that, all these 5 items have very low PTMEA CORR close to zero. Thus items 11, A12, A15, A16 and A1 were deleted from the final instrument.

Misfit items in Life Satisfaction Scale: The investigation on the life satisfaction scale shows that, all the 7 items in the scale have acceptable fitness statistics. Thus all the 7 items are retained in the final draft of the scale.

Misfit items in Social Media Addiction Scale: Based on the item map (Figure 2), there are 12 items higher than the most able respondents out of which 9 items have out of range and unacceptable fitness indices. After careful investigation of the fit statistics in terms of Point Measure Correlation (PTMEA CORR), INFIT Mean Square (INFIT MNSQ) and OUTFIT Mean Square (OUTFIT MNSQ). The result showed that, all these 9 items have poor fitness indices. Thus items SM11, 16, 19, 20, 21, 22, 23, 24, and 26 were completely eliminated from the final instrument.

Conclusion

Several studies showed that, anxiety, life-satisfaction and other life events in the present day such as social-media contributes immensely in learning and many other life events in the present day society especially among youth in schools at different levels. Investigating the level of anxiety, life satisfaction and social media usage as well as their effect to learning is believed to assist in addressing several disturbing trends especially in the academic achievement of students at different level. This study provides the validation report of Test Anxiety, Life Satisfaction and Social Media.
Addiction Scale (TELSMAS). The validated TELSMAS with the revealed validity parameters is can be used as a standardized measure to assess the level of anxiety, life-satisfaction and social-media addiction among school students and other vulnerable groups.

Conflict of Interest: Authors declared there is no conflict of interest

Ethical Clearance: Obtained through Research Committee

Funding: Self

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Psychological Happiness and Meaning of Life among Students of King Khalid University Saudi Arabia

Ziyad Al-Tarawneh¹, Nashaat Baioumy², Rahimah Embong³, Roslan Ab Rahman², Ado Abdu Bichi⁴

¹Graduate Student, ²Senior Lecturer, ³Associate Professor, Faculty of Islamic Contemporary Studies, University Sultan Zainal Abidin, Terengganu, Malaysia, ⁴Lecturer, Faculty of Education, Yusuf Maitama Sule University, Kano Nigeria

Abstract

The present study aimed to explore the level of psychological happiness and its relationship to the meaning of life among students of the preparatory year at King Khalid University in Abha city in Saudi Arabia. The study followed the cross sectional survey design. The measure of Psychological happiness and meaning of life were used to collect the relevant data. The tools were applied to a sample of 300 students aged between 18 and 20. Findings revealed that, there were no statistically significant differences in the respondent level of the meaning of happiness due to the variable of the academic track, evidenced by the increase in the value of (t) calculated at (0.783, p>0.05), and there were no significant differences in the respondent’s views regarding the level of the meaning of happiness due to the academic track variable as evidenced by the increase in the value of (t) calculated at (0.256, p>0.05). The results also showed a statistically significant correlation between the level of meaning of life and psychological happiness (α<0.05). The study recommended the inclusion of concepts and Strategies to develop happiness and the meaning of life in the curricula of university students, and hold workshops for students and teachers for training them on methods and strategies to achieve happiness and create positive meanings for life among university students.

Keywords: Psychological happiness, meaning of life, university students.

Introduction

The 21st century is the era of positive psychology and subjects such as psychological happiness and the meaning of life are important concepts of positive psychology, because of the many positive effects on the compatibility and psychological health of the individual. I think that the term happiness was included in 1973 when researchers attempted to study many demographic, social and personal characteristics. In order to know the factors that lead to a sense of happiness; where Psychologists focused on happiness through its connection to satisfaction of needs, gradually from the minimum physiological needs to the higher needs of self-realization; because man seeks to achieve his important goals in order to feel happy and achieve a good life when meets the requirements of security and belonging, independence and self-assertion, achieving higher one depends on external factors surrounding, family, society, economic, political, and learning aspects¹.

The Meaning of life has recently become one of the concepts that have acquired since the last century the interest of scientists and researchers in the field of psychology and mental health and in many categories and qualities in society, where he cares about the human and its value, life, satisfaction and self-esteem in the sense of his life, and the role that he can performance in life².

In this sense, the study of the meaning of life is considered a relatively recent study in the field of medicine, public health, psychiatry, psychology and education, and the increasing interest in the sense of life and the desire to reduce the negative effects of disease and disability reflected the maximum aspirations of workers in these fields. The concept of the meaning of life is one of the modern concepts in the Arab world³.

Corresponding Author**
Rahimah Embong
University Sultan Zainal Abidin, Terengganu, Malaysia
e-mail: rahimahembong@unisza.edu.my
The sense of loss of happiness and the meaning of life on the individual brings more suffering and psychological strikes, where the individual in this situation is a victim of despair, frustration, anxiety and indifference. Its impact is not only limited to psychological or social aspects, but also affects the academic aspects.

The university stage represents a critical stage in human development, as it is the most developed stage characterized by physiological and psychological changes that can generate many pressures and conflicts in the individual. Like other members of the community, university students face many pressures, making them vulnerable to negative emotions and despair because they are unable to satisfy their needs and achieve their goals, especially in light of the pressures and difficulties of modern life. This indicates a state of confusion in their lives.

Hence, the problem of the current study emerged when the researcher noted that many students in the preparatory year dissatisfied with their lives and academic paths and do not enjoy life for the absence of meaning and the will. In the preparatory year at King Khalid University, students suffer from psychological problems, especially the problem of low happiness and the meaning of life which have a great impact on mental health. In the paucity of studies, because presently there is no Saudi study on the relationship between the level of psychological happiness and the meaning of life among students in the preparatory year in Saudi universities.

In the light of the research problem, the following hypotheses were raised and tested in this study, thus:

Hypothesis 1: There is no significant correlation between the meaning of life and psychological happiness among the preparatory year students at King Khalid University.

Hypothesis 2: There is no significant differences in the level of psychological happiness of students with respect to academic track and academic achievement.

Hypothesis 3: There is no significant differences in the meaning of life among students with respect to academic track and academic achievement.

Material and Methods

The current study cross-sectional survey design to examined the relationship of psychological happiness in the meaning of life in for a sample of students in the preparatory year at King Khalid University of Saudi Arabia. The participants were the 300 preparatory year students at King Khalid University in Saudi Arabia in the academic year 2018/2019, aged between 18-20 selected using simple random sampling technique.

The instruments were (1) Psychometric measure of happiness: The Oxford scale, Arabization by which is composed of 29 items. The items were modified to suit the preparatory year students in Saudi society. (2) A measure of the meaning of life, prepared by the researchers consisting of 60 items constructed to suit the sample. Both the scales were on 5 point Likert scale.

The instruments were validated by experts and were pilot tested to confirmed the construct validity and reliability of the scale. Based on the result of the pilot testing and reliability analysis, the two instrument attained adequate validity and reliability evidence with internal consistency reliability of 0.870 and 0.92 for the Psychometric measure of happiness and measure of the meaning of life respectively.

The validated instruments were administered to the sample of 300 preparatory university students of King Khalid University in Saudi Arabia directly by the researchers with the help from research assistance. Prior to the data collection an informed consent form was given to the respondents to obtain their consent. The responses collected were scored entered and used as data in this study.

The data Collected were summarized in an excel 2016 file and prepared it in the SPSS 25 format. The analyses were carried out using Descriptive and inferential statistics. Mean standard deviation were used to summarized the data. Pearson Product Moment Correlation, Independent t-test and ANOVA were used to address the research hypotheses. All the statistical tests were conducted at 0.05 level of significance.

Results and Discussions

The result of this study as explained in the preceding section has been obtained and presented using Descriptive and inferential statistical analyses. The results are presented in table 1 to 8 in the following headings.

Descriptive statistical analysis for data: The descriptive statistics of frequency and percentage showed the distribution of the study respondents. The
distributions showed that, in line with the respondents’ Academic track, 150 (50%) of the students were in Health track and Engineering track respectively. In relation to Academic Achievement, the distribution showed that, 70 (23.3%) were from the low achievement, 144 (4%) were from the medium achievement and 86 (28.7%) were from the high achievement class.

**H01:** There is no significant correlation between the meaning of life and psychological happiness among students at King Khalid University.

The Pearson Product Moment Correlation Coefficient (r) to test the above stated hypothesis is presented in Table 1 at 5% level of significance.

**Table 1: Psychological Happiness and Meaning of Life**

<table>
<thead>
<tr>
<th>Test Variables</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>r-cal</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological Happiness</td>
<td>300</td>
<td>3.76</td>
<td>0.42</td>
<td>0.815**</td>
<td>298</td>
<td>0.000</td>
</tr>
<tr>
<td>Meaning of Life</td>
<td>300</td>
<td>3.68</td>
<td>0.38</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results presented on Table 1 showed the relationship in psychological happiness and meaning of life with the r-value of 0.815 and p-value of 0.000, tested at 0.05 level of significance and degree of freedom of 298 is positive and significant (0.484>0.05). Therefore, the null hypothesis is rejected.

**H02:** There is no statistically significant differences in the level of psychological happiness of students with respect to academic track.

The independent sample t-test to test the above stated hypothesis is presented in Table 2 at 5% level of significance.

**Table 2: Difference in psychological happiness (academic track)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t-cal</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Track</td>
<td>150</td>
<td>3.78</td>
<td>0.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meaning of Life</td>
<td>298</td>
<td>0.783</td>
<td>0.434</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Track</td>
<td>150</td>
<td>3.74</td>
<td>0.44</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results presented on Table 2 showed the mean difference in psychological happiness scores of Health Track and Engineering Track with the t-value of 0.783 and p-value of 0.434, tested at 0.05 level of significance and degree of freedom of 298 is not significant (0.484>0.05). Therefore, the null hypothesis is accepted.

**H02:** There are statistically significant differences in the level of psychological happiness of students with respect to academic achievement.

The test of ANOVA to test the above stated hypothesis is presented at 5% level of significance. The results showed the F statistics (297) = 6.983 and p value= 0.001, α = 0.05 for psychological happiness. The result of the analysis reveals that the mean psychological happiness scores of respondents based on their Academic Achievement are significantly different (p-value < 0.05). The null hypothesis which says there is no significant difference in terms of Academic Achievement on psychological happiness is rejected. Thus, it is not clear where the difference exists within the three groups. A multiple comparison (Turkey post-hoc-test) presented on Table 3.

**Table 3: Post-Hoc-Test**

<table>
<thead>
<tr>
<th>(I) Achievement</th>
<th>(J) Achievement</th>
<th>Mean</th>
<th>SD</th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Average</td>
<td>3.84</td>
<td>0.48</td>
<td>-.12014</td>
<td>.05866</td>
<td>.125</td>
</tr>
<tr>
<td>High</td>
<td>Average</td>
<td>3.63</td>
<td>0.38</td>
<td>.09163</td>
<td>.06594</td>
<td>.382</td>
</tr>
<tr>
<td>Average</td>
<td>Low</td>
<td>3.72</td>
<td>0.29</td>
<td>.12014</td>
<td>.05866</td>
<td>.125</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
<td>3.63</td>
<td>0.38</td>
<td>.21177*</td>
<td>.05795</td>
<td>.001</td>
</tr>
<tr>
<td>High</td>
<td>Average</td>
<td>3.72</td>
<td>0.29</td>
<td>-.09163</td>
<td>.06594</td>
<td>.382</td>
</tr>
<tr>
<td>Average</td>
<td>Average</td>
<td>3.84</td>
<td>0.48</td>
<td>-.21177*</td>
<td>.05795</td>
<td>.001</td>
</tr>
</tbody>
</table>

A Tukey post hoc test result as presented in table 3 above revealed that, that there is a statistically significant difference in psychological happiness between Average and High achievement (p = 0.001). However, there were
no significant differences in psychological happiness between other groups

**Ho3:** There are statistically significant differences in the meaning of life among students with respect to academic track.

The independent sample t-test to test the above stated hypothesis is presented in Table 4 at 5% level of significance.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Sex</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>t-cal</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Track</td>
<td></td>
<td>150</td>
<td>3.69</td>
<td>0.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Track</td>
<td></td>
<td>150</td>
<td>3.68</td>
<td>0.40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results presented on Table 4 showed the mean difference in meaning of life scores of Health Track and Engineering Track with the t-value of 0.256 and p-value of 0.789, tested at 0.05 level of significance and degree of freedom of 298 is not significant (0.789 > 0.05). Therefore, the null hypothesis is accepted.

**Ho3:** There are statistically significant differences in the meaning of life among students with respect to academic achievement.

The test of ANOVA to test the above stated hypothesis is presented in Table 5 at 5% level of significance.

<table>
<thead>
<tr>
<th>Test Variables</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>3.371</td>
<td>2</td>
<td>1.686</td>
<td>12.560</td>
<td>.000</td>
</tr>
<tr>
<td>NPE Utilization Within Groups</td>
<td>39.856</td>
<td>297</td>
<td>.134</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>43.228</td>
<td>299</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results as shown in Table 5 show the F statistics (297) = 12.560 and p-value = 0.000, α = 0.05 for meaning of life. The result of the analysis reveals that the mean meaning of life scores of respondents based on their Academic Achievement are significantly different (p-value (0.000 < 0.05). The null hypothesis which says there is no significant difference in terms of Academic Achievement on meaning of life is rejected. Thus, it is not clear where the difference exists within the three groups. A multiple comparison (Turkey post-hoc test) presented on table 6

<table>
<thead>
<tr>
<th>(I) Achievement</th>
<th>(J) Achievement</th>
<th>Mean</th>
<th>SD</th>
<th>(I-J) Mean Difference</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Average</td>
<td>3.58</td>
<td>0.37</td>
<td>.25029*</td>
<td>.05169</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>3.73</td>
<td>0.39</td>
<td>.09945</td>
<td>.05811</td>
<td>.233</td>
</tr>
<tr>
<td>Average</td>
<td>Low</td>
<td>3.83</td>
<td>0.30</td>
<td>-.25029*</td>
<td>.05169</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>3.73</td>
<td>0.39</td>
<td>-.15084*</td>
<td>.05107</td>
<td>.014</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
<td>3.83</td>
<td>0.30</td>
<td>-.09945</td>
<td>.05811</td>
<td>.233</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>3.58</td>
<td>0.37</td>
<td>.25029*</td>
<td>.05169</td>
<td>.000</td>
</tr>
</tbody>
</table>

A Tukey post hoc test result as presented in Table 6 above revealed that, that there is a statistically significant difference in meaning of life between Average and low achievement (p = 0.000), it also exists between Average and high achievement. However, there were no significant differences in psychological happiness between other group
Conclusions and Recommendations

The findings from this study revealed a very interesting phenomenon at King Khalid University, Saudi Arabia among preparatory year students. First, a positive relationship exists between psychological happiness and meaning of life which is a clear indication that students who know the meaning of life are the happiest among the preparatory year students at the King Khalid university.

Secondly, the findings revealed that, the psychological happiness of students in Health Track and Engineering Track are similarly and therefore in respective of students’ academic track, their level of happiness is homogenous. Similarly, going further another important revelation was that, the psychological happiness of students from different achievement level were similarly, however, there was difference in psychological happiness between Average and High achievement groups.

Thirdly, the findings revealed that, the meaning of life score among students in different academic track are not significantly different. Meaning the students understanding of meaning of life at King Khalid University Saudi Arabia were almost the same for all the groups. Moreover, the meaning of life for preparatory year students at King Khalid University Saudi Arabia was similar among the different class of achieving students. However, difference exists in meaning of life between Average and low achievement.

Overall these findings are consistent with that of 8,9 whose findings established the long standing discussions on the relationship between happiness and meaning of life. Thus the study also led credence to the scholarly, stands and conclusions10.

Based on the findings and discussions above, it is recommended that:

(a) More attention should be paid to develop the aspects of psychological happiness and the meaning of life in preparatory university students as it has revealed to have an important position developing positive psychological health for university students

(b) The curricula be enhanced especially in psychology to relate the content more with happiness and the meaning of life

(c) Workshops and training be organised for university students on psychological happiness and the meaning of life.

(d) More studies should be conducted in the area of positive personality characteristics of University students.

Conflict of Interest: Authors declared there is no conflict of interest

Ethical Clearance: Obtained through Research Committee

Funding: Self

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The Influence of Larvitraps Modification as the Monitoring of Aedes Aegypti Larvae Existence at the Area of Rajabasa Indah Health Center Technical Implementation Unit

Ayu Rizky1, Khoidar Amirus2, Agung Aji Perdana2

1Pinang Jaya Health Center Bandar Lampung, 2Faculty of Public Health Malahayati University

Abstract

Dengue fever was acute fever disease that could cause the death and caused by four distinct virus serotypes and genus Flavivirus. One of method in restraining Aedes was using larvitraps type (used plastic bottles, used bucket, PM Trap) which had been modified. The primary data on 2018 was obtained Dengue fever case which was equal to 154 larvae on larvitraps type on to plastic bucket as much 63,96% larvae. The research aimed to know the Influence of larvitraps modification as the monitoring of Aedes aegypti larvae existence at the area of Rajabasa Indah Health Centre Technical Implementation Unit.

This research used quasi experiment design with non-randomized pretest-posttest control group design. The research subject was Aedes aegypti larvae. Larvitraps was made of used plastic bottles, used bucket, PM Trap and closed with gauze. Larvitrapswas filled out by water on the third type of larvitraps. The research location was Rajabasa Raya, Gedung meneng and Nunyai Sub district. The research sample as many 18 houses decided by using cluster sampling. The data analysis of univariate and bivariate was with Mann-Whitney and Kruskal Wallis method.

The research result showed that Aedes larvae which had been trapping during the research was 154 larvae with 146 larvae spread on larvitraps inside the house and 89 larvae outside the house. The average Aedes larvae which had been trapping on used plastic bottles larvitraps type was 51,18 larvae, 63,96 larvae on plastic bucket and 48,36 larvae on PM Trap, there are differences between the types of larvitrap used plastic bottles and plastic buckets and between plastic buckets and PM Trap (p value <0.001). It was suggested for society to be able to use larvitraps type of plastic bucket as an easy, cheap and productive vector restraint.

Keywords: Aedes, used plastic bottles; plastic; PM Trap (Post Mosquito Trap); larvae existence.

Introduction

Dengue fever is a chronic fever that can cause death and it is caused by four serotype viruses and gunus flavivirus, RNA Virus from Flaviviridae genus. One of the risk factor of Dengue fever is its quick spreading in inner city area, the advancement of public mobilization and transportation, and/or the failing of birth control system that can possibly make this into Extraordinary Condition KLB (extraordinary case)1. Thus, the researcher wanted to inform one of the tools that can be easily and simple to be implemented called ovitrap. The material for this trap is mainly from plastic precisely using a used plastic bottle, bucket and PM Trap (Port Mosquito Trap). By using this tools it is able to reduce the mosquitoes density and reducing the occurrence level of dengue fever2. Ovitrap has been developed worldwide to monitor the spread of Dengue Fever Larvae3. There are also other advantages in using ovitrap than other traps of the same type: it is cheap and easy to use, because of the component that can be made independently by utilizing used items that can be easily found in domestic house, such as used can, a piece of bamboo or wood and water. Besides, of the simplicity, ovitrap is also very easy to maintain and clean the tool. Ovitrap only need to replace the water within the container...
every week and to brush the inner side of the container\(^4\). Research conducted by Hamzah & Basri (2016), suggest that the most successful ovitrap to trap the larvae is the plastic bucket type with over 12 larvae (66.76%), then followed by PM trap (Port mosquito Trap) as much as 10 (55.56%) and the lowest is the used plastic bottle by 3 (16.67%) from each ovitrap installed\(^5\). Every decade, the total cases of DBD in yearly average reported to WHO kept increasing exponentially Meanwhile, Dengue fever in recorded in Technical implementation Unit (UPT) Public health clinic of Rajabasa Indah in 2015 the rate of Dengue fever cases is recorded up to 43 cases, on 2015-2016 the case number of dengue fever increased to 117 cases and on 2017 dengue fever case reach 61 cases. The number of Dengue larvae free number (ABJ) in 2016 reach (85%) and in the year of 2017 the ABJ increase to (86%). Furthermore, the numbers of PE in 2015 reach 59 cases of Dengue Fever, on 2016 the number of PE is increased to 94 cases of Dengue fever and again in 2017 the number of PE reach 62 Dengue fever cases. Because in Technical implementation Unit (UPT) Public health clinic of Rajabasa Indah source of the problem is in the density of population. Thus, the importance of monitoring is to create an indicator of the larvae whereabout.\(^6\) There are varieties of method to monitor the larvae; for example: egg survey, larvae survey and mosquito survey. The monitoring agenda is by surveying the larvae by installing larvitrap, it is considered effective to detect the whereabout of the \textit{Aedes sp} larvae in a region or even in the lower level. From this research it is expected to identify whether there is an effect on modifying the larvitrap as a method to monitor the existence of \textit{Aedes aegypti} larvae in Technical implementation Unit (UPT) Public health clinic of Rajabasa Indah.

**Methods**

The research is conducted in Technical implementation Unit (UPT) Public health clinic of Rajabasa Indah, Bandar Lampung. The time frame of the research started on this June to July 2018, while the installation and positioning of 36 larvitrap was installed for about 14 days and positioned within indoor and outdoor of the house, every day the installed larvitrap will be observed to count the number of the trapped larvae. This research will implement quasi-experiment design with non-randomized pretest-posttest control group design.\(^7\) The subject of this research is \textit{Aedes aegypti} larvae. Larvitrap made from used plastic bottle, plastic bucket, \textit{PM Trap} and closed with gauze. Larvitap then filled with clear water to the larvitraps. The location of this research is in Rajabasa Raya Urban Communities, Meneng and Nunyai Building. The research samples are 18 houses determined by using cluster sampling. The data analysis will be analyzed by univariate and bivariate using Mann-Whitney dan Kruskal-Wallis method. The data collection about the larvae location will be assisted with enumerator that has basic in environment health.

**Results**

Table 1. The frequency of distribution based on the urban communities, Larvitrap types, Number of larvitrap installed and the placement position in Technical implementation Unit (UPT) Public health clinic of Rajabasa Indah

<table>
<thead>
<tr>
<th>Urban Communities</th>
<th>Larvitrap Types</th>
<th>Larvitrap Installed</th>
<th>Larvae numbers after 14 days of larvitrap installation</th>
<th>n</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rajabasa Raya</td>
<td>Used Plastic Bottle</td>
<td>14</td>
<td>1 inside position 1 outside position 2</td>
<td>2</td>
<td>0,28%</td>
</tr>
<tr>
<td></td>
<td>Plastic Bottle</td>
<td>14</td>
<td>51 inside position 19 outside position 70</td>
<td>70</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>\textit{PM Trap}</td>
<td>14</td>
<td>0 inside position 1 outside position 1</td>
<td>1</td>
<td>0,14%</td>
</tr>
<tr>
<td>Gedung Meneng</td>
<td>Used Plastic Bottle</td>
<td>12</td>
<td>0 inside position 0 outside position 0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Plastic Bucket</td>
<td>12</td>
<td>44 inside position 37 outside position 81</td>
<td>81</td>
<td>13,5%</td>
</tr>
<tr>
<td></td>
<td>\textit{PM Trap}</td>
<td>12</td>
<td>0 inside position 0 outside position 0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Nunyai</td>
<td>Used Plastic Bottle</td>
<td>10</td>
<td>0 inside position 0 outside position 0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Plastic Bucket</td>
<td>10</td>
<td>50 inside position 29 outside position 79</td>
<td>79</td>
<td>15,8%</td>
</tr>
<tr>
<td></td>
<td>\textit{PM Trap}</td>
<td>10</td>
<td>0 inside position 0 outside position 0</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>
Table 2. The Wilcoxon test result of used plastic bottle, plastic bucket and PM Trap in indoor and outdoor of the house Technical implementation Unit (UPT) Public health clinic of Rajabasa Indah

<table>
<thead>
<tr>
<th>Larvitrap Types</th>
<th>n</th>
<th>Median (minimum-maximum)</th>
<th>Average ± s.b.</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used Plastic Bottle in indoor of the house</td>
<td>18</td>
<td>0 (0-1)</td>
<td>0,06 ± 0,236</td>
<td>0,317</td>
</tr>
<tr>
<td>Used Plastic Bottle at the outdoor of the house</td>
<td>18</td>
<td>0 (0-2)</td>
<td>0,17 ± 0,514</td>
<td></td>
</tr>
<tr>
<td>Plastic Bucket in indoor of the house</td>
<td>18</td>
<td>0 (0-51)</td>
<td>8,06 ± 16,962</td>
<td>0,128</td>
</tr>
<tr>
<td>Plastic Bucket at the outdoor of the house</td>
<td>18</td>
<td>0 (0-29)</td>
<td>4,72 ± 9,541</td>
<td></td>
</tr>
<tr>
<td>PM Trap in indoor of the house</td>
<td>18</td>
<td>0 (0-0)</td>
<td>0,00 ± 0,00</td>
<td>0,317</td>
</tr>
<tr>
<td>PM Trap at the outdoor of the house</td>
<td>18</td>
<td>0 (0-1)</td>
<td>0,006 ± 0,236</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. The result of Kruskal-Wallis analysis Used Plastic Bottle, Plastic Bucket and PM Trap in Technical implementation Unit (UPT) Public health clinic of Rajabasa Indah

<table>
<thead>
<tr>
<th>Larvitrap Types</th>
<th>n</th>
<th>Median (minimum-maximum)</th>
<th>Average ± s.b.</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used Plastic Bottle</td>
<td>36</td>
<td>0 (0-2)</td>
<td>0,11 ± 0,398</td>
<td>&lt; 0,001</td>
</tr>
<tr>
<td>Plastic Bucket</td>
<td>36</td>
<td>0 (0-51)</td>
<td>6,39 ± 13,668</td>
<td></td>
</tr>
<tr>
<td>PM Trap</td>
<td>36</td>
<td>0 (0-1)</td>
<td>0,03 ± 0,167</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Larvitrap type (Used Plastic Bottle, Plastic Bucket and PM Trap): The average from this research, suggest that most of the larvae trapped within the installed larvitrap (plastic bucket) are around 10 larvitraps in Nunyai urban communities 10%. While within the other installed larvitrap (used plastic bottle) the larvae trapped in 14 installed larvitrap in Rajabasa Raya Urban Communities 0,28% and within the (PM Trap) the larvae trapped within 14 installed larvitrap in Rajabasa Raya urban communities 0,14%. The finding is inline with Hamzah & Basri, (2016), that the most ovitrap trapping larvae can be found within bucket plastic which is recorded on having 12 larvae trapped (66,76%), then PM Trap (Port Mosquito Trap) for about 10 larvae trapped (55,56%) and the lowest is used plastic bottlefor about 3 larvae trapped (16,67%) from each ovitrap installed. Plastic bucket can be used for detecting Aedes mosquito and to exterminate its’ larvae. In addition, according to Roeberji, et al (2017), the result of the observation suggest that each larvitrap wcolored black will have a preference for about 79,6%, higher than bright colored larvitrap 70,4%.

Placement Position: The average esult of the conducted research, shows that the average placement position (indoor of the house) is around 146 larvae (1,35%) larger than the outdoor of the house about 89 larvaees (0,82%). The result of the research conducted by Sayono (2011), OI KPN in indoor of the house declined consistently from 60,5% to 36,4% via post intervention. Overall, OI delined to 20,5%. This shows that the placement position (indoor of the house) affecting the larvae positions. Because indoor of the house has 90% more Aedes aegypti mosquitoes residing in the dark area. Research conducted by Lau, et all (2017), ovitrap index (OI) Aedes larvae has highest number within the urban concentrated area (average OI = 90,97%), followed by residential area (69,70%), village (65,45%) dan rural area (52,63%).

Larvae location: In average from the research conducted, shows that the average type of the larvitrap (plastic bottle, plastic bucket and PM Trap) most of the larvaees were trapped in plastic bucket 63,96%, followed by used plastic bottle 51,18% and then PM Trap 48,36%. The result of the analysis using Krusal-Wallis between larvitrap types (used plastic bottle, plastic bucket, and PM Trap) shows that the p value is significant at 0,001 (α < 0,05), based on the analysis Ho is rejected dan Ha is accepted. Thus, there is a difference in average between larvitraps. The result of the research proofs that there is an effect in monitoring the larvae location with used plastic bottle, plastic bucket and PM Trap.

The difference between used plastic bottle in indoor and outdoor of the house: The used plastic bottle in indoor and outdoor of the house has been observed for about 14 days and there is a sign of the location of the
larvae inside the larvitrap with this type. Based on the research there is no distinctive difference between the larvae location between used plastic bottle in indoor or outdoor of the house. Meaning that the data retrieved from calculating the ovitrap indeks is the number of the larvae in the used plastic bottle in indoor and outdoor of the house has similar number and no differences to be found.

The difference between plastic bucket in indoor and outdoor of the house.

The plastic bucket in indoor and outdoor of the house has been observed for about 14 days and there are signs of the larvae location in it. The result of the research shows that there is no distinctive difference between the larvae location between plastic bucket in indoor or outdoor of the house. Meaning that the data retrieved from calculating the ovitrap indeks is the number of the larvae in the plastic bucket in indoor and outdoor of the house has similar number and no differences to be found.

The difference between PM Trap in indoor and outdoor of the house: PM Trap in indoor and outdoor of the house has been observed for about 14 days and there are signs of the larvae location in it. The result of the research shows that there is no distinctive difference between the larvae location between used PM Trap in indoor or outdoor of the house. Meaning that the data retrieved from calculating the ovitrap indeks is the number of the larvae in the PM trap in indoor and outdoor of the house has similar number and no differences to be found.

The difference of the larvae location on larvitrap types (Used plastic bottle, Plastic Bucket and PM Trap): The ovitrap installation in this research has been conducted for 14 days because like any other mosquito around the Aedes sp mosquito gone through perfect metamorphosis phase, which ordered in egg-larvae-pupa-mosquito. The egg, larvae and pupa stage is on water. Usually the egg will hatch itself in ± 2 days after the egg submerged underwater, the larvae stadium runs for about 6-8 days and the cocoon stage last 2-4 days. The result of the research suggest that in Technical implementation Unit (UPT) Public health clinic of Rajabasa Indah most of the larvae trapped in larvitrap plastic bucket type 63,96%, plastic bottle 51,18% and PM Trap 48.36%. It can be concluded that the larvitrap types that trapped the larvae plastic bottle, plastic bucket and PM Trap. While in between group of plastic bottle and PM Trap there has been no distinction of the larvae position. Thus, the most larvae trapped in larvitrap plastic bucket type than plastic bottle and PM Trap.

Conclusion

The effect of modifying the larvitrap, the distinction of used plastic bottle, plastic bucket and PM Trap and there is no effect of placement position as the position monitoring of Aedes aegypti larvae. So, it is recommended to use an effective plastic bucket for larvae traps and reduce the incidence of dengue fever in Technical implementation Unit (UPT) Public health clinic of Rajabasa Indah.

Acknowledgement: Note of gratitude will be appointed to Technical implementation Unit (UPT) Public health clinic of Rajabasa Indah who as supported the researcher in the clearance process, the respondents that give their permission in placing the larvitrap for 14 days in their indoor and outdoor of the house that is critical for the research and also not to mention the enumerator tea who has supported the researcher in the sampling process.

Conflict of Interest: Taken from national and political unity body of the city Bandar Lampung.

Ethical Clearence: Self

Source of Funding: Nil

References


A New Risk Calculation Method for Tuberculosis (TB) based on Decision Tree and Artificial Neural Network

Monisha Ghosh Srabanti1, Eko Supriyanto1,2,3* and Muhammad Nabil Mohd Warid1

1School of Biomedical Engineering and Health Sciences, Faculty of Engineering, 2Advanced Diagnostics and Progressive Human Care Research Group, 3IJN-UTM Cardiovascular Engineering Centre, Universiti Teknologi Malaysia, Johor, Malaysia

Abstract

Tuberculosis is a bacterial infection that affects the respiratory system and may lead to the death of lung cells. In this study, a novel equation based on Decision Tree and Artificial Neural Network application was developed to calculate the risk percentage of tuberculosis. Retrospective data was input in a conventional equation based on the classification of tuberculosis risk factors. Existing methods for disease risk calculation can only predict the odds of contracting the disease, and some are based on population. Therefore, in this study, a new risk prediction method is proposed, where the risk percentage can be calculated as long as the risk factors are known. The risk factors are categorized into three groups, which are Low-, Middle-, and High-energy levels. The calculation is based on a Decision Tree and Artificial Neural Network. Artificial Neural Network was applied for output verification of the novel conventional equation. The limitation of this study is that only common risk factors have been considered. It is recommended that future studies also include other risk factors for better and more precise results. Based on the results of this study, it can be concluded that the proposed method is better than other methods because it takes into account disease risk factors.

Keywords: Tuberculosis, Risk Factors, Decision Tree, Risk Calculation, Artificial Neural Network.

Introduction

Tuberculosis (TB) is an infectious disease caused by tubercle bacillus, also called Mycobacterium tuberculosis. It causes an estimated 2 million deaths per year1. Common signs and symptoms of TB include a bad cough that lasts for 3 weeks or longer, chest pain, weakness or fatigue, coughing up blood or sputum, weight loss, chills, fever, loss of appetite, and night sweats.

There are five stages involved in TB bacterial infection. It begins with inhalation of the bacteria, followed by bacterial multiplication, T-cell activation, tubercle formation, cavitation, and tubercle breakdown2.

In this study, a new method, which includes a novel equation to calculate the risk percentage of tuberculosis, was developed. Artificial Neural Network was applied to verify the output of the equation. The risk percentage was detected by focusing only on the risk factors. The initial weightage value for the calculation was taken from other studies on this disease.

There are other methods that have been developed with a similar objective, but these did not completely focus on risk factor. Some existing methods are unreliable because they use the number of exposed and unexposed people to the disease and do not rely on risk factors. Other methods have been based on risk factors but the results were presented in odd ratios instead of percentages. The new equation developed in this study allows the assessment of the disease in terms of risk percentage. Real-time analysis of the data can also be observed due to the application of a machine learning method.

Corresponding Author**
Eko Supriyanto
School of Biomedical Engineering and Health Sciences, Faculty of Engineering, Universiti Teknologi Malaysia, Johor, Malaysia
e-mail: eko@utm.my
The risk factors of TB are divided into three levels in this study (Table 1), which are Low-energy, Medium-energy, and High-energy risk levels.

**Table 1. Risk factors of TB**

<table>
<thead>
<tr>
<th>Energy level</th>
<th>Risk factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-level energy</td>
<td>• Young and old people&lt;br&gt;• Gender&lt;br&gt;• Family history of TB</td>
</tr>
<tr>
<td>(LEL)</td>
<td></td>
</tr>
<tr>
<td>Middle-level energy</td>
<td>• Diabetes (Haemoglobin level),&lt;br&gt;• Malnutrition (Albumin level)&lt;br&gt;• People with lung disease&lt;br&gt;• HIV</td>
</tr>
<tr>
<td>High-level energy</td>
<td>• Alcohol consumption&lt;br&gt;• Tobacco consumption&lt;br&gt;• Polluted area&lt;br&gt;• Being in contact with a patient who has TB</td>
</tr>
</tbody>
</table>

**Methods**

The dynamic calculation method in this study is based on a Decision Tree and machine learning. The system consists of a database, rule input, and output (Figure 1). The initial database was gathered from 20 subjects. The data included the risk factors that have been classified into three groups i.e. LEL, MEL, and HEL, as described above (Table 1). A conventional Decision Tree was used to develop the new equation, while the ANN algorithm was used to calculate the risk of disease in percentage. A datasheet was created in Microsoft Excel, and the whole system implemented using MATLAB software. The output from previous studies involving risk prediction models was also verified in this study.

**Figure 1. Methodology block**

Figure 2 shows the Decision Tree model developed in this study. It shows the correlation of the risk factors and percentages, which are the risk weightage of a person having TB. This will be used in the calculation directly, according to certain conditions.

**Figure 2. Decision Tree model for TB**
Environment-related risk factors (HEL) have a very huge impact on the disease. In this case, heavy smokers, people with high alcohol consumption, and people who have a high exposure to pollution have greatly increased chances of contracting TB\(^3\)\(^-\)\(^6\).

Lack of immunity is related to malnutrition, which is calculated from the level of albumin and haemoglobin. The level of malnutrition is inversely proportional to the level of albumin and haemoglobin. As people with active TB can infect others, lack of immunity is also considered a factor.

Population in a low geographical status area is usually more likely to be exposed to TB, because of the probability of this area to being exposed to pollution\(^2\)\(^-\)\(^9\). In this study, the geographical factor was not considered as a direct input. On the other hand, pollution was considered as a passive input as part of the geographical factor.

A study showed that males have a higher probability of contracting TB\(^1\)\(^0\)\(^-\)\(^1\(^1\)\(^\)\(^2\). The study also shows that males have a higher rate of exposure to the disease compared to females. A previous study showed that young people had a higher rate of TB exposure. Due to bad health conditions, very old people also have a higher chance of getting TB\(^1\)\(^2\).

Studies have also shown that there is a relationship between age and gender\(^1\)\(^1\)\(^-\)\(^1\(^3\). The studies show that the young and middle-aged people having a higher chance of contracting TB. They also show the influence of gender, where males have a higher rate of getting TB compared to females.

From a study on family history, females at all ages showed a higher incidence of previous contact, ranging from over 30% in those under 15 years down to 17% in those over 40\(^2\)\(^,\)\(^3\)\(^,\)\(^1\(^2\)\(^,\)\(^1\(^3\). It is thought that the wider opportunities of exposure to infection in the female population is due to domestic reasons. Nursing duties might also be an important factor.

Haemoglobin levels have high predictive value of the incidence and mortality rate of TB\(^7\). Increased severity of anaemia is associated with exceptionally high rates of TB, especially during long-term antiretroviral therapy (ART)\(^8\)\(^-\)\(^9\),\(^1\(^4\). In this study, haemoglobin level is considered normal when it is above 11 g/dL.

The risk of TB increased with the number of households in the compound, and with the number of persons in the household who have had TB in the past. The risk of TB was also found to increase with smoking, with a significant dose-response trend according to duration of smoking, as well as with alcohol intake and drug use.

In industrialised countries, TB is classically associated with poor living conditions. There have been a few studies conducted in poor countries to investigate the effect of socio-economic factors on TB. Some of the studies found that the risk of TB was higher in poor living areas.

**Rule/algorithm using conventional equation:**

\[
\text{GENDER [F(1*0.1) or M(3*0.1)]} + \text{ AGE [(20≤Age≤35)*0.2 or (age>49)* 0.2 or (age * 0.1)]} + \text{ FAMILY HISTORY [(NO=0) or YES, If M(1*0.1); F(2*0.1)]} + \text{ MALNUTRITION [Haemoglobin output + Albumin output + polluted area output * 0.2]} + \text{ BEING TOUCH WITH TB PATIENT [Number of months * 0.1]} + \text{ Lack of IMMUNITY [Polluted area + alcohol consumption + smoking * 0.3]} = \text{TB RISK}
\]

Input of risk factors: Albumin < 2.1 g/L (Not healthy), Haemoglobin < 11 level (Not healthy), Smoking = number of cigarettes, Alcohol = mL (1000ml=1L), Polluted area = %, Initial weightage = %.

The number of males that have TB is 3 times higher than females; therefore the input was set to 3 for males and 1 for females, and then multiplied with the weightage. Young people aged between 20 to 35 years old, and older people aged more than 59, are also at risk of having TB more than other ages. The weightage for these two age groups was therefore set higher than the rest. The lack of immunity was represented using the “AND” condition. The inputs were associated with the “AND” condition in the equation. Tobacco smoking, passive smoking, and indoor air pollution from biomass fuels have been implicated as risk factors for tuberculosis (TB) infection, disease, and death\(^6\).

After developing the conventional equation, a datasheet with an initial 20 subjects was created. This is the retrospective data, which was applied with the Artificial Neural Network (ANN) using MATLAB software. The datasheet was then loaded in the workspace as input and output, and the system was trained using the machine learning method. As there are 10 inputs (risk factors for the disease), 10 neurons were chosen for each factor. For each factor, an individual hidden layer was selected. The system was then trained by assigning the
input as input data and output as target data. ANN then produced the final output.

**Results and Discussion**

Table 2 and 3 shows the data input for the 20 subjects using the equation developed in this study. There are 10 inputs and 2 outputs. One of the outputs is the final risk percentage, while the other is the immunity output (a lower value of immunity output is favourable). The input for alcohol consumption was limited to 3 L. Age limit was set to 100 years, while pollution was limited between 0%–100%.

From the result, we can see that there are different ranges of output. Individuals with a risk percentage of more than 50% are advised to consult a medical professional for check-up, while individuals with a very high risk percentage are advised to monitor their health and start treatment immediately after being diagnosed by the doctor. Individuals with a risk percentage below 20% can be considered within the normal range but are advised to maintain a healthy lifestyle and good health.

The ANN produced the output according to the machine learning method. Table 4 shows the results after 20 subjects were input into the system, and the output provided by the ANN.

The results show that most of the output for the conventional method has almost zero errors, while some of the output had errors that were due to the small number of subjects. In this system, the calculation time was set to only 6 seconds. It is assumed that the result will show zero errors if the calculation time were set to 1000 seconds.

### Table 2: Risk calculation using the developed equation in this study

<table>
<thead>
<tr>
<th>Case No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Age (years)</td>
<td>30</td>
<td>25</td>
<td>50</td>
<td>40</td>
<td>80</td>
<td>20</td>
<td>55</td>
<td>45</td>
<td>40</td>
<td>90</td>
</tr>
<tr>
<td>Family History</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>8</td>
<td>5</td>
<td>12</td>
<td>11</td>
<td>4</td>
<td>8</td>
<td>5</td>
<td>12</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Albumin (g/L)</td>
<td>2.1</td>
<td>1.5</td>
<td>0.3</td>
<td>0.8</td>
<td>2.1</td>
<td>2.1</td>
<td>1.5</td>
<td>1.5</td>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td>Polluted Area (%)</td>
<td>10</td>
<td>70</td>
<td>50</td>
<td>60</td>
<td>85</td>
<td>30</td>
<td>70</td>
<td>60</td>
<td>60</td>
<td>90</td>
</tr>
<tr>
<td>Being in contact with TB patients</td>
<td>0</td>
<td>12</td>
<td>3</td>
<td>0</td>
<td>12</td>
<td>0</td>
<td>12</td>
<td>12</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>No. of cigarettes smoked</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>0</td>
<td>25</td>
<td>50</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>Alcohol (mL) (Limit up to 1 L)</td>
<td>30</td>
<td>0</td>
<td>15</td>
<td>0</td>
<td>25</td>
<td>5</td>
<td>0</td>
<td>1000</td>
<td>0</td>
<td>2000</td>
</tr>
<tr>
<td>Output Immunity</td>
<td>0.144</td>
<td>0.378</td>
<td>0.63</td>
<td>0.108</td>
<td>1.683</td>
<td>0.648</td>
<td>0.126</td>
<td>23.87</td>
<td>0.108</td>
<td>66.91</td>
</tr>
<tr>
<td>TB</td>
<td>6.61</td>
<td>7.35</td>
<td>11.4</td>
<td>4.23</td>
<td>19.7</td>
<td>4.92</td>
<td>13.1</td>
<td>29.9</td>
<td>5.13</td>
<td>87.2</td>
</tr>
</tbody>
</table>

### Table 3. Risk calculation using the developed equation in this study

<table>
<thead>
<tr>
<th>Case No.</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
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<td>3</td>
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<td>3</td>
</tr>
<tr>
<td>Age (years)</td>
<td>15</td>
<td>25</td>
<td>70</td>
<td>90</td>
<td>10</td>
<td>35</td>
<td>25</td>
<td>25</td>
<td>40</td>
<td>55</td>
</tr>
<tr>
<td>Family History</td>
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<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>8</td>
<td>5</td>
<td>12</td>
<td>11</td>
<td>4</td>
<td>5</td>
<td>12</td>
<td>14</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Albumin (g/L)</td>
<td>2.1</td>
<td>1.5</td>
<td>2</td>
<td>0.8</td>
<td>2.1</td>
<td>2.1</td>
<td>1.5</td>
<td>3.6</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
<td>Polluted Area (%)</td>
<td>0</td>
<td>70</td>
<td>100</td>
<td>60</td>
<td>85</td>
<td>15</td>
<td>80%</td>
<td>50%</td>
<td>60%</td>
<td>65%</td>
</tr>
<tr>
<td>Being in contact with TB patients</td>
<td>0</td>
<td>12</td>
<td>0</td>
<td>9</td>
<td>12</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>No. of cigarettes smoked</td>
<td>5</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>50</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Alcohol (mL) (Limit up to 1 L)</td>
<td>0</td>
<td>1000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3000</td>
<td>15</td>
<td>50</td>
<td>3000</td>
<td></td>
</tr>
<tr>
<td>Output Immunity</td>
<td>0</td>
<td>2.898</td>
<td>39.78</td>
<td>0.108</td>
<td>0.153</td>
<td>0.027</td>
<td>86.54</td>
<td>0.63</td>
<td>0.972</td>
<td>71.6</td>
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<tr>
<td>TB</td>
<td>1.76</td>
<td>9.87</td>
<td>53.9</td>
<td>19.2</td>
<td>3.17</td>
<td>7.53</td>
<td>92.3</td>
<td>6.25</td>
<td>5.2</td>
<td>84.7</td>
</tr>
</tbody>
</table>
Table 4. ANN output

<table>
<thead>
<tr>
<th>Subject</th>
<th>Conventional Equation output</th>
<th>ANN output</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>6.708</td>
<td>5.99891</td>
<td>0.70909</td>
</tr>
<tr>
<td>2.</td>
<td>7.254</td>
<td>12.07026</td>
<td>-4.81626</td>
</tr>
<tr>
<td>3.</td>
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<td>11.48226</td>
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<tr>
<td>4.</td>
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<td>4.344215</td>
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<td>5.</td>
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<td>19.75273</td>
<td>0.044269</td>
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<tr>
<td>6.</td>
<td>5.120</td>
<td>5.127495</td>
<td>-0.0075</td>
</tr>
<tr>
<td>7.</td>
<td>13.102</td>
<td>12.989</td>
<td>0.013003</td>
</tr>
<tr>
<td>8.</td>
<td>30.04</td>
<td>15.61054</td>
<td>14.42946</td>
</tr>
<tr>
<td>9.</td>
<td>5.132</td>
<td>5.148386</td>
<td>-0.00839</td>
</tr>
<tr>
<td>10.</td>
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<td>16.</td>
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<tr>
<td>17.</td>
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<tr>
<td>20.</td>
<td>84.822</td>
<td>84.80754</td>
<td>0.014458</td>
</tr>
</tbody>
</table>

Conclusion

This study began with the identification and classification of TB risk factors. A new equation for risk calculation was developed and then verified using ANN and basic analysis performed to verify the method. Machine learning application showed some variance in the output, which is due to the number of factors and the adjusted weightage.

One of the differences between the method in this study and previous studies is that the risk percentage was determined via calculation. The most common risk factors were chosen for input in the calculation so that the result would be easily understood even for non-medical personnel. For future recommendations, after this method has been established, other risk factors should also be considered such as HIV and diabetes\textsuperscript{16}, marital status, and air intake, could be taken into account. This should increase the accuracy of the calculation, which can then be more reliable for public use. Besides the risk percentage of tuberculosis, the risk percentage of other diseases could be calculated as well.

In this study, although the Decision Tree was more accurate than ANN, ANN can be more accurate if the number of training data were increased. The results show that, based on the retrospective data, the newly developed method in this study is better than other existing methods.

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Conflict of Interest: The authors declare that there is no conflict of interests.

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Ethical Clearance: This study does not require ethical clearance.

References


Safety Critical Element Methodology in an Oil and Gas Company

Deddy Fernando WH¹, Zulkifli Djunaidi¹, Mila Tejamaya¹*,
¹Department of Occupational Health and safety, Faculty of Public Health, Universitas Indonesia, Depok, Indonesia

Abstract

Barrier systems are used to protect humans and assets from hazards. These barrier systems may be classified as either active or passive barrier systems, and as physical, technical or human/operational barrier systems. Safety Critical Elements (SCE) are part of these barrier systems to protect against major hazardous events such as fire, explosions, collisions, etc. SCEs prevent, control, mitigate and facilitate safe evacuation from the identified major hazards. However, there is no clear methodology to define which systems or equipment are SCE and what to do after SCEs are declared.

This study aimed to develop a specific methodology for implementing SCEs in an oil and gas company. The methodology involved risk assessment, major hazard scenario development, SCE identification, establishing a performance standard, developing maintenance, inspection and testing plans, implementing assurance activities and, finally, issuing a key performance indicator.

The results of this methodology can provide guidance for defining SCE systems and equipment and what to do after these SCE systems are established.

Keywords: Barrier system, Safety Critical element, Major accident.

Introduction

The petroleum industry is facing risk from major accidents, i.e., accidents with major consequences, that can cause multiple fatalities and/or massive oil spills (¹). Many concepts, programs and assessments have been developed to reduce risk to personnel, assets and the environment from these hazards. Safety Critical elements (SCEs) were specifically developed to protect against major hazards. SCEs form barriers to protect personnel, the environment and assets from a major hazardous event. SCEs prevent, control, mitigate and facilitate safe evacuation from the identified hazards. SCEs are defined as those parts of an installation or an operational organization whose failure could cause or contribute substantially to a major accident (²). These

barrier systems may be classified as either active or passive barrier systems and as physical, technical or human/operational barrier systems (³) Because SCEs play an essential role in assurance activities (maintenance, inspection and testing), SCEs must be in place to continuously demonstrate that they remain fit for their purpose during an installation’s entire life.

To implement SCEs for a vast inventory of assets and activities, management efforts should focus on the installation elements that are the most critical to safety, with the objective of minimizing the risk of a major accident hazard (MAH). These critical elements should be designated as SCEs.

Systems and equipment that are designated as SCEs should be treated differently than other systems and equipment. The critical nature of SCEs means that their maintenance must be the highest priority, ranked above that of any other system or equipment. SCEs’ performance must meet required standards, and SCEs should be monitored using dedicated indicators. These processes should be implemented in any company that designates SCEs.

Corresponding Author**
Mila Tejamaya
Department of Occupational Health and safety, Faculty of Public Health, Universitas Indonesia, Depok, Indonesia
e-mail: tejamaya@ui.ac.id
This study focused on SCE methodology. After defining SCEs, a step-by-step implementation process is discussed. There is little research that specifically discusses the methodology of SCEs. Most research has focused on barrier management systems; SCEs are part of these systems, such as the PETROMAKS Innovation project found in SINTEX report A 26845. Gasco company is a leading oil and gas producer in the UAE that has published a methodology for SCE implementation, but this is the only paper that discusses SCE methodology.

**Methods**

The proposed methodology was developed as a guideline to implement SCEs. This research involved a literature review and an observational process. As stated above, there are few sources specifically related to SCEs, as most studies discuss barrier management, of which is SCEs are part.

Gasco company has published an example method in the *Society of Petroleum Engineers* (SPE) journal. In this method, the identification of SCEs is not integrated into the guidelines. The equipment or systems that are defined as SCE have been previously defined⁴. DNV proposed that risk assessment is part of SCE implementation⁵, since this step covers hazard identification, risk analysis and risk evaluation.

The implementation of SCEs should start with identifying hazards that have major consequences. These major hazards are identified and their risks are assessed through risk assessment and major risk register. These steps are mandatory and are a main reason why SCEs are needed.

**Risk Assessment, Major Scenario Development, SCE Identification**

Risk assessment is intended to identify, establish and describe barrier functions and to specify the properties of an individual barrier’s elements⁶. In this paper, risk assessment specifically refers to risks that are generated by flammable, toxic and/or explosive substances. These risks concern personnel, the public, the environment and the integrity of the installation.

Gasco company implements risk assessment to identify major hazards; appropriate measures are developed separately and are not included in the SCE methodology. DNV proposed that identifying SCEs should be done via risk assessment. This step is important, since identified major hazards have serious consequences and specific SCEs against these hazards should be established.

Below is a list of scenarios (Typical) for Major Accident Hazards in offshore and onshore platforms. This list is taken from output studies such as Hazard identification (Hazid), Major Accident Hazard Register, dropped object study, ship collision study, etc.

- Platform Impairment
- Dropped Objects
- Fire & Explosions
- Generic failure: corrosion, vibrations, erosion, mechanical failure, weld defects
- Human Error
- Liquid carryover due to control valve failure
- Overpressure
- Pollution
- Segregation of drain system
- Ship collision
- Vent blockage

**Establishment of performance standards:** A performance standard is a statement that can be expressed in qualitative or quantitative terms, as appropriate, of the performance required of a safety critical element in order to ensure the safety and integrity of the installation⁷.

Once the key safety equipment or systems have been identified as SCEs, it is necessary to define the functions required to perform and confirm whether the actual equipment and systems can consistently and continuously perform these functions. That process is defined in the performance standard.

According to the Health and Safety executive report (safety case, 2005), safety critical elements should be verified through a suitable scheme. This scheme should be dependable and effective when required and perform as intended⁷. DNV strongly proposed that performance standards should be established for safety critical elements⁷.

**SCE Assurance Means:** SCE assurance activities must be designed to continuously demonstrate that SCEs remain fit for their intended purposes during their entire service life. This process will confirm that the SCE requirements are being met and that the results are recorded and assessed. SCE procedures should be continuously improved as part of a Plan-Do-Check-Act (PDCA) process.
SCE Key Performance Indicator: Key Performance Indicators (KPIs) are used to monitor SCEs’ integrity. The measured results should be tracked against a performance indicator target. Tolerability levels for the degree of acceptability performance against those indicators should also be set. An Action Plan is needed in case there are any issues that may affect SCEs’ integrity.

It is recommended that facilities determine which barriers are most critical for managing major incident risk then select suitable leading and lagging KPIs for each critical barrier⁸).

Results

The proposed methodology for SCEs is illustrated below.

Safety Critical Element Methodology: Risk Assessment → Major Scenario Development → SCE Identification → Performance Standard → Maintenance, Inspection & Testing Plan → Assurance Activities → Integrity KPI


Performance Standard Assurance Process, SCE Assurance, SCE Key Performance Indicator: Define SCE Functional Requirement → Define SCE Design Assurance → Define SCE Operational Verification → SCE Measuring Point → Maintenance Plan → Operational Integrity Assurance & Verification → Develop Integrity Reporting → Execute SCE action plans

Discussion

Risk assessment, SCE Identification & Major Hazard scenario Development Process: First, risk assessment is used to identify any risk that is associated with major hazards. A major hazard is defined as any hazard that generates a consequence level of 4 to 5 to people, the environment and assets. The risk is then ranked using a risk matrix. The risk matrix may differ from one company to another. In this case, the risk matrix was a 5x5 table.

Preliminary risk assessment is for conservatively establishing a scenario to be studied in detailed risk analysis. Two methods are commonly used for preliminary risk assessment: simplified method and rigorous method. Detailed risk analysis reconfirms the risk associated with the major scenarios identified in the preliminary risk assessment. The main tasks of this step are to quantify the frequency of events and hazards outcomes, estimate probabilistic damage and present the scenario risk results of the risk matrix.

Risk evaluation is implemented to assist the decision-making process based on the results of risk analysis. This step involves comparing the level of risk with the acceptance criteria. A risk register, or Major risk register (specified for risks related to major hazards), should be created. This register contains a summary of the results of the risk assessment for all identified major risks, as well as a list of all existing risk reduction measures related to major risk.

Table 1. Typical Risk Matrix 5x5

<table>
<thead>
<tr>
<th>Level</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Level 2 Risk (Tolerable if ALARP)</td>
<td>Level 2 Risk (Tolerable if ALARP)</td>
<td>Level 1 Risk (First Priority)</td>
<td>Level 1 Risk (First Priority)</td>
<td>Level 1 Risk (First Priority)</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Level 3 Risk (Acceptable)</td>
<td>Level 2 Risk (Tolerable if ALARP)</td>
<td>Level 2 Risk (Tolerable if ALARP)</td>
<td>Level 1 Risk (First Priority)</td>
<td>Level 1 Risk (First Priority)</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Level 3 Risk (Acceptable)</td>
<td>Level 3 Risk (Acceptable)</td>
<td>Level 2 Risk (Tolerable if ALARP)</td>
<td>Level 2 Risk (Tolerable if ALARP)</td>
<td>Level 1 Risk (First Priority)</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Level 3 Risk (Acceptable)</td>
<td>Level 3 Risk (Acceptable)</td>
<td>Level 3 Risk (Acceptable)</td>
<td>Level 2 Risk (Tolerable if ALARP)</td>
<td>Level 2 Risk (Tolerable if ALARP)</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Performance Standard Establishment and Assurance: Performance standards are key technical requirements to be met by SCEs to ensure they effectively operate on demand, perform as expected and can survive incidents. Performance standards include all the controls that are needed to verify SCEs’ integrity, as well as the minimum performance that should be maintained for each control point through operational and verification activities.

The three criteria of functionality, availability and survivability should cover these main activities:

1. Functionality: To define SCEs’ main functions based on related documents, such as internal documents or any related standards
2. Availability: To ensure the availability of SCEs by maintaining their reliability, which includes managing equipment obsolescence, defining a spare parts’ policy and expediting the procurement process
3. Survivability: To review integrity and design in order to keep SCE’s functions during an emergency

SCE Assurance activities, Maintenance/Inspection & Testing Plan

There are two ways to perform assurance activities: assurance design and assurance operation. Equipment should be checked against the initial design; this can be done through external standards, company standards, codes, etc.

After checking the design, the assurance operation should be done. Operational verification consists of compiling the means of assurance operations for all SCE controls (Functionality, Availability and Survivability). This should be performed during daily normal operations and maintenance/inspection. Operational verification consists of onsite and offsite verification. On-site verification activities include visual checks, function tests, performance tests and preventive maintenance. Off-site verification activities include reviewing related reports (e.g., maintenance reports and inspection reports), work scheduling, stock material availability and data sheets.

SCE Key Performance Indicators: The indicators that can be used to monitor SCEs’ performance include:

- Failure of SCE during tests
- SCE Maintenance Backlog
- SCE Inspection Backlog

Below are the equipment or systems identified as SCEs in the oil and gas industry. They are divided into 4 groups: prevention elements, control elements, mitigation elements and evacuation elements. These main functions are used as barriers against major accident hazards as mentioned in METHODS.

1. Prevention Elements
   - Collision avoidance system: Navigational aids, Fog Horn
   - Structural Integrity: Jacket
   - Process Containment Integrity: Pressure Vessel & Large Storage Tank, Pipework, Exchangers
   - Pipelines and riser integrity: Pipeline & risers
   - Relief systems: Relief valves/PSV
   - HVAC Systems: HVAC systems and fire dampers
   - Ignition Prevention Systems: Flame Arrestors
   - Crane and lifting equipment: Powered Cranes
   - Corrosion Prevention and monitoring: Corrosion monitoring, corrosion inhibitor

2. Control Elements
   - Flammable Gas Detection: Fixed point Gas Detectors, Fixed acoustic leak detectors, Smoke Detectors
   - Fire Detection: Flame Detectors, Fusible loops
   - Fire and gas control system
   - Emergency isolation: ESD system, ESD valves
   - Riser/pipeline ESDV’s
   - Reservoir isolation & containment: Well control facilities, Down hole safety valves
   - Emergency depressurization: Blowdown valves

3. Mitigation Elements
   - Fire pumps
   - Firewater systems: Diesel day tanks, Deluge system, Firewater monitors, Hydrants
   - Portable/trolley mounted extinguishers: Hose Reels, Portable fire extinguishers
4. Evacuation Elements
- Alarm & Public address systems
- Emergency lighting
- Lifeboat
- Liferafts
- Maintained power supplies
- Means of escape to sea
- Personnel protective equipment
- Rescue & recovery facilities: Emergency Response, Rescue Vessel

Conclusions

The present study was aimed at developing a methodology to implement safety critical elements (SCEs), specifically in an oil and gas company. This study involved risk assessment, major development scenario, SCE identification, establishment of performance standards, maintenance, an inspection and testing plan, assurance activities, and a report in the form of a Key performance indicator (KPI).

Applying this method can lead to clear definitions for all equipment/systems defined as SCEs and help ensure these SCEs remain fit during the whole life of an installation.

Acknowledgment: The authors would like to acknowledge the help of Mila Tejamaya and Zulkifli Djunaidi from the University of Indonesia while preparing this paper. We also acknowledge personnel from PT X for their valuable advice in developing this model.

The authors certify that they have no affiliations with or involvement in any organization or entities with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

Conflict of Interest: The authors declare that there is no conflict of interests.

Source of Funding: This study is self-funded.

Ethical Clearance: The authors declare there is no need of ethical clearance in this study.

References
5. Veritas DN. DNV-OSS-121 Classification Based on Performance Criteria Determined from Risk Assessment Methodology. 2011; Available from: www.dnv.com
Linkage Model of Brand Equity and Word of Mouth Toward Purchase Intention in Surgery Speciality Hospital Ropanasuri Padang, Indonesia

Nurmaines Adhyka¹, Ratni Prima Lita² and Rima Semiarty¹

¹Department of Public Health, Medicine Faculty, ²Department of Management, Economics Faculty, Andalas University, Padang, Indonesia

Abstract

Introduction: In order to achieve effective and efficient organization in a hospital, the management team must ensure that the hospital continues to dominate in a highly competitive market. It has been established that brand equity and word of mouth play an important role in influencing patients’ purchase intentions. The aim of this study was to evaluate the association between the dimensions of brand equity and the effect of word of mouth on customer purchase intentions in the health sector.

Method: The survey method was used to collect data from 115 patients without national coverage at the specialist surgery hospital, Ropanasuri Padang, in Indonesia. Convenience sampling was used to choose the patients, and a cross-sectional design was also implemented. Hypothesis testing was performed using structural equation modeling.

Results: This study demonstrates that brand awareness, brand association, perceived quality, and brand loyalty are important dimensions in building brand equity. In addition, brand equity and word of mouth were found to have a significant impact on patients’ purchase intentions in hospitals.

Conclusion: These results provide an insight into the importance of building strong brand equity dimensions in the highly competitive hospital services market.

Keywords: Brand equity; hospital; purchase intention; word of mouth.

Introduction

In today’s world, the paradigms relating to hospital organization are completely different to what they were, and the hospital is no longer simply a service organization. In effect, the evolution of technology has transformed hospitals into profit-oriented business entities¹. In order to achieve dominance in an increasingly competitive market, hospitals need to offer high-quality, competitive services ². One way to win in the market is to maintain the company brand by promising the value that consumers expect for a product (brand equity).

Strengthening brand equity starts from the consumers’ awareness of the brand (brand awareness) and their tendency to remain loyal to brands they know. The next step is consumers’ behavior in associating a brand with a product and differentiating that product from its competitors (brand association)³. The results of this association will establish the consumers’ perceptions of brand quality (perceived quality), and their loyalty will emerge if the perceived quality accords with their perceptions⁴. Marketing communication is formed on the basis of customers’ experiences and willingness to recommend the product; this is also known as word-of-mouth communication⁵. The formation of strong brand equity supported by word-of-mouth communication may influence people’s decisions regarding the purchase of hospital services. In this context, “purchase” relates to buying medical services⁶.

Corresponding Author**
Nurmaines Adhyka
Department of Public Health, Medicine Faculty, Andalas University, Padang, Indonesia
e-mail: nurmaines.adhyka@gmail.com
This study was conducted in Ropanasuri Hospital, which specializes in surgery. During the hospital’s development, it used the power of brand equity and word of mouth to increase patients’ purchase intentions during visits. Unlike previous studies, which concentrated solely on the dimensions of brand equity, this study combined the brand equity dimensions and word-of-mouth factors in relation to the purchase intention of patients without national health coverage. Patients who use national health coverage do not have many hospital choices due to zoning systems which require choosing the referral hospital closest to the patient’s home. It is expected that hospital management might see the strength of brand equity and word of mouth from other perspectives.

Methods

The objective of the study was to investigate relationship models in terms of particular brand equity dimensions and word-of-mouth factors in patients without national health coverage who visited the specialist surgery hospital in Padang, Indonesia. The following hypotheses were tested:

**H1.** Brand equity has a positive influence on purchase intentions

**H2.** Word of mouth has a positive influence on purchase intentions

Using the convenience sampling method, samples were collected from 115 patients without national health coverage who were receiving outpatient services at the specialist surgery hospital, Ropanasuri. The data were analyzed using SmartPLS 2.0. In the first step, the data were tested to determine factor loadings and cross loadings. Using Cronbach’s alpha, composite reliabilities and average variances were then extracted. Second, the data were tested using structural models to evaluate the coefficient of determination ($R^2$). Last, we confirmed our hypotheses through partial least square structural equation modeling (PLS-SEM). In essence, SEMs are statistical models of linear relationships among latent (unobserved) and manifest (observed) variables. Their purpose is to estimate the coefficients in a set of structural equations.

Figure 1 presents the conceptual framework tested in this study. We identified four dimensions of brand equity (brand awareness, brand association, perceived quality, and brand loyalty), as well as the effect of word of mouth on purchase intention.

Items for measuring each variable were adopted from existing literature. Table 1 presents the source and details relating to 23 indicators used to measure the variables included in the study. These were measured using a five-point Likert-type scale based on agree-disagree respondent perceptions.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Source</th>
<th>Number of indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand awareness</td>
<td>Kumar et al., 2013$^3$</td>
<td>4</td>
</tr>
<tr>
<td>Brand association</td>
<td>Kumar et al., 2013$^3$</td>
<td>3</td>
</tr>
<tr>
<td>Perceived quality</td>
<td>Kumar et al., 2013$^3$</td>
<td>4</td>
</tr>
<tr>
<td>Brand loyalty</td>
<td>Kumar et al., 2013$^3$</td>
<td>4</td>
</tr>
<tr>
<td>Word of mouth</td>
<td>Tat Huei Cham, 2006$^4$</td>
<td>5</td>
</tr>
<tr>
<td>Purchase intention</td>
<td>Jalilvand et al., 2011$^{10}$</td>
<td>3</td>
</tr>
</tbody>
</table>
Results

The model used in this study was described in Figure 2.

**Figure 2. Structural Equation Model**

**Measurement of the Outer Model:** The aim of this measurement was to evaluate a validity and reliability instrument. Validity was examined by noting the convergent validity and discriminant validity of a construct. Convergent validity was supported if the outer loading value was more than 0.7. If this was the case, the indicator represented the construct; if not, it was eliminated. In Table 2, we found that some indicators had an outer loading value of below 0.7 (BA2, BA4, and PQ1), and these were therefore eliminated.

**Table 2. Convergent Validity – Outer Loading Value**

<table>
<thead>
<tr>
<th>Construct</th>
<th>Indicator</th>
<th>Initial Model</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brand awareness</strong></td>
<td>BA1</td>
<td>0.761145</td>
<td>0.842701</td>
</tr>
<tr>
<td></td>
<td>BA2</td>
<td><strong>0.651944</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BA3</td>
<td>0.771648</td>
<td>0.876628</td>
</tr>
<tr>
<td></td>
<td>BA4</td>
<td><strong>0.620817</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Brand association</strong></td>
<td>BS1</td>
<td>0.859663</td>
<td>0.865030</td>
</tr>
<tr>
<td></td>
<td>BS2</td>
<td>0.877098</td>
<td>0.880218</td>
</tr>
<tr>
<td></td>
<td>BS3</td>
<td>0.799836</td>
<td>0.790786</td>
</tr>
<tr>
<td><strong>Perceived quality</strong></td>
<td>PQ1</td>
<td>0.697039</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PQ2</td>
<td>0.833450</td>
<td>0.826007</td>
</tr>
<tr>
<td></td>
<td>PQ3a</td>
<td>0.850680</td>
<td>0.879221</td>
</tr>
<tr>
<td></td>
<td>PQ3b</td>
<td>0.867087</td>
<td>0.898337</td>
</tr>
<tr>
<td></td>
<td>PQ4</td>
<td>0.706023</td>
<td>0.722116</td>
</tr>
</tbody>
</table>

Discriminant validity represents the extent to which the construct is empirically distinct from other constructs; in other words, the construct measures what it is intended to measure. Table 3 shows how each indicator has a higher score than the other constructs.
Table 3. Discriminant Validity – Cross Loading Value

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Brand awareness</th>
<th>Brand association</th>
<th>Perceived quality</th>
<th>Brand loyalty</th>
<th>Word of mouth</th>
<th>Purchase intention</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA1</td>
<td>0.842701</td>
<td>0.445500</td>
<td>0.359508</td>
<td>0.427108</td>
<td>0.259598</td>
<td>0.245867</td>
</tr>
<tr>
<td>BA3</td>
<td>0.876628</td>
<td>0.489347</td>
<td>0.511767</td>
<td>0.410583</td>
<td>0.389661</td>
<td>0.299475</td>
</tr>
<tr>
<td>BS1</td>
<td>0.559584</td>
<td>0.865030</td>
<td>0.637959</td>
<td>0.627460</td>
<td>0.432684</td>
<td>0.474940</td>
</tr>
<tr>
<td>BS2</td>
<td>0.378779</td>
<td>0.880218</td>
<td>0.668180</td>
<td>0.551213</td>
<td>0.381631</td>
<td>0.430441</td>
</tr>
<tr>
<td>BS3</td>
<td>0.436189</td>
<td>0.790786</td>
<td>0.559632</td>
<td>0.627889</td>
<td>0.400264</td>
<td>0.354791</td>
</tr>
<tr>
<td>PQ2</td>
<td>0.506259</td>
<td>0.670866</td>
<td>0.826007</td>
<td>0.565135</td>
<td>0.516964</td>
<td>0.522878</td>
</tr>
<tr>
<td>PQ3a</td>
<td>0.463326</td>
<td>0.632706</td>
<td>0.879221</td>
<td>0.682843</td>
<td>0.461137</td>
<td>0.590100</td>
</tr>
<tr>
<td>PQ3b</td>
<td>0.401165</td>
<td>0.641410</td>
<td>0.898337</td>
<td>0.647815</td>
<td>0.499127</td>
<td>0.522120</td>
</tr>
<tr>
<td>PQ4</td>
<td>0.318272</td>
<td>0.496813</td>
<td>0.722116</td>
<td>0.478218</td>
<td>0.417220</td>
<td>0.374195</td>
</tr>
<tr>
<td>BL1</td>
<td>0.445044</td>
<td>0.676143</td>
<td>0.646352</td>
<td>0.824765</td>
<td>0.482912</td>
<td>0.664064</td>
</tr>
<tr>
<td>BL2</td>
<td>0.261083</td>
<td>0.421632</td>
<td>0.484069</td>
<td>0.788174</td>
<td>0.297848</td>
<td>0.653316</td>
</tr>
<tr>
<td>BL3</td>
<td>0.530354</td>
<td>0.668147</td>
<td>0.648662</td>
<td>0.880865</td>
<td>0.306657</td>
<td>0.561435</td>
</tr>
<tr>
<td>BL4</td>
<td>0.375683</td>
<td>0.604530</td>
<td>0.623410</td>
<td>0.878548</td>
<td>0.257050</td>
<td>0.645222</td>
</tr>
<tr>
<td>WOM1a</td>
<td>0.250897</td>
<td>0.346475</td>
<td>0.429347</td>
<td>0.244474</td>
<td>0.801397</td>
<td>0.443235</td>
</tr>
<tr>
<td>WOM1b</td>
<td>0.211469</td>
<td>0.308603</td>
<td>0.409205</td>
<td>0.170362</td>
<td>0.842798</td>
<td>0.388081</td>
</tr>
<tr>
<td>WOM2a</td>
<td>0.279015</td>
<td>0.427550</td>
<td>0.513306</td>
<td>0.396529</td>
<td>0.809200</td>
<td>0.483371</td>
</tr>
<tr>
<td>WOM2b</td>
<td>0.311456</td>
<td>0.364857</td>
<td>0.464413</td>
<td>0.244244</td>
<td>0.794745</td>
<td>0.358532</td>
</tr>
<tr>
<td>WOM3a</td>
<td>0.310082</td>
<td>0.343599</td>
<td>0.392567</td>
<td>0.328649</td>
<td>0.816004</td>
<td>0.457110</td>
</tr>
<tr>
<td>WOM3b</td>
<td>0.369377</td>
<td>0.346019</td>
<td>0.435589</td>
<td>0.308893</td>
<td>0.839393</td>
<td>0.456065</td>
</tr>
<tr>
<td>WOM4a</td>
<td>0.279776</td>
<td>0.411946</td>
<td>0.431064</td>
<td>0.294411</td>
<td>0.806431</td>
<td>0.532254</td>
</tr>
<tr>
<td>WOM4b</td>
<td>0.408662</td>
<td>0.425354</td>
<td>0.547103</td>
<td>0.364361</td>
<td>0.865641</td>
<td>0.426990</td>
</tr>
<tr>
<td>WOM5a</td>
<td>0.223625</td>
<td>0.412782</td>
<td>0.465877</td>
<td>0.428097</td>
<td>0.728827</td>
<td>0.485063</td>
</tr>
<tr>
<td>WOM5b</td>
<td>0.372727</td>
<td>0.406359</td>
<td>0.420086</td>
<td>0.353457</td>
<td>0.751457</td>
<td>0.837082</td>
</tr>
<tr>
<td>PI1</td>
<td>0.271750</td>
<td>0.503280</td>
<td>0.524792</td>
<td>0.695595</td>
<td>0.493195</td>
<td>0.837082</td>
</tr>
<tr>
<td>PI2</td>
<td>0.260012</td>
<td>0.360276</td>
<td>0.479412</td>
<td>0.539750</td>
<td>0.515547</td>
<td>0.862517</td>
</tr>
<tr>
<td>PI3</td>
<td>0.262867</td>
<td>0.371366</td>
<td>0.51565</td>
<td>0.615246</td>
<td>0.420649</td>
<td>0.794640</td>
</tr>
</tbody>
</table>

The reliability analysis demonstrated value based on Cronbach’s alpha and composite reliability. Composite reliability is used to examine indicators in internal measurements of consistency. Essentially, it is used to address any deficiencies arising from the Cronbach’s alpha and reliability tests. Composite reliability, which prioritizes indicators based on individual reliability, is in line with the PLS-SEM algorithm calculations; these calculations do not assume all indicator values are the same in the population. All the Cronbach’s alpha and composite reliability values in Table 4 were above 0.6, which indicates that all the constructs used in this study have good reliability. Therefore, we can conclude that the instrument used in the study met the full set of criteria for validity and reliability.

Table 4. Reliability Test

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach's Alpha</th>
<th>Composite Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand Awareness</td>
<td>0.648359</td>
<td>0.850070</td>
</tr>
<tr>
<td>Brand Association</td>
<td>0.800731</td>
<td>0.883072</td>
</tr>
<tr>
<td>Perceived Quality</td>
<td>0.852348</td>
<td>0.900930</td>
</tr>
<tr>
<td>Brand Loyalty</td>
<td>0.864967</td>
<td>0.908111</td>
</tr>
<tr>
<td>Word-of-Mouth</td>
<td>0.936631</td>
<td>0.946120</td>
</tr>
<tr>
<td>Purchase Intention</td>
<td>0.648359</td>
<td>0.850070</td>
</tr>
</tbody>
</table>

Measurement of the Inner Model: This measurement observed the model’s prediction accuracy, and other external variables were added. The variables measured were brand equity and purchase intention.
Accuracy in relation to brand equity was found in the four dimensions, while purchase intention was built on brand equity and word of mouth. Table 5 shows coefficient of determination value showed that brand equity variable 99.6% were affected by brand awareness, brand association, perceived quality and brand loyalty. Meanwhile, purchase intention variable 54.7% were affected by brand equity and word of mouth.

Table 5. Coefficient of Determination ($R^2$)

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R$-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand Equity</td>
<td>0.9963</td>
</tr>
<tr>
<td>Purchase Intention</td>
<td>0.5466</td>
</tr>
</tbody>
</table>

Hypothesis testing: Hypothesis testing in Table 6 is seen from t-statistical value of PLS bootstrapping results. The t-statistic value is solved by the t-table value with a significant level ($\alpha$) 5% then the hypothesis is accepted.

Table 6. Hypothesis Tested

<table>
<thead>
<tr>
<th>Path Coefficients</th>
<th>Standard Deviation (STDEV)</th>
<th>Standard Error (STERR)</th>
<th>T Statistics ($O/STERR$)</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand Equity -&gt; Purchase Intention</td>
<td>0.552</td>
<td>0.072432</td>
<td>0.072432</td>
<td>7.619803</td>
</tr>
<tr>
<td>Word of Mouth -&gt; Purchase Intention</td>
<td>0.278</td>
<td>0.073059</td>
<td>0.073059</td>
<td>3.805424</td>
</tr>
</tbody>
</table>

Discussion

This study showed that brand equity was build from brand awareness, brand association, perceived quality, and brand loyalty. Brand equity has strong influence on purchase intention than word of mouth, although both of variables had significant value on purchase intention to hospital. It also set out to verify the findings of previous studies by Jalivand but this time in a different country and industrial context. Earlier study about healthcare service by Altaf has reported that brand awareness has less impact on loyalty while brand loyalty was the most contributing factors in generating brand equity. Khan, found that Word of Mouth has a positive impact on Consumer Purchase Intention in clothing industry.

Patients without using health national insurance have many choices in choosing hospital. Therefore they will consider many things before it. Hospital should have a characteristic that could be remembered by patients, and then being able to associate it with good things about hospital, able to perceived patients perceptions about service so could foster loyalty and has a willing to inform others about the hospital service.

Strengthening brand equity is strongly recommended to be a priority for managers to increase patient visits. It could be done by differentiating service products and improving personal performance and hospital facilities. The manager must focus on market target in the marketing strategy. In word of mouth marketing strategy, manager has to able to identify loyal patients who could help spreading the information to others. Build strong loyalty bond with customers, help manager to outcompete the competitor. Word of mouth effectiveness reduced the search process in purchasing a product/service and save time and money. Information from trusted sources is believed strengthen someone to purchase intention on hospital.

Conclusions

In four dimension of brand equity; brand awareness, brand association, perceived quality and brand loyalty of surgery specialist hospital Ropanasuri hospital is considered good by patients. There is significant relationship between brand equity and word of mouth to purchase intention to visit in surgery specialist hospital Ropanasuri Hospital in Padang City.

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Conflict of Interest: The authors declare that there is no conflict of interests.

Source of Funding: This study is self-funded.

Ethical Clearance: This study is a literature review so it does not require for ethical clearance.
References

1. Setiyowati YD, Pasinringi SA, Irwandy .. The influence of brand image on interesting return of outpatients to take the advantage of medical services at Hasanuddin University Hospital in 2013. FKM Unhas. 2013.


Effect of Repetitive Transcranial Magnetic Stimulation on Cortical and Motor Outcomes Post Stroke: A Randomized Controlled Trial

Mohammed S. El-Tamawy2, Moshera H. Darwish1, Saly H. Elkholy3, Engy Badreldin S. Moustafa1,*

1Department of Physical Therapy for Neuromuscular disorders and its surgery, Faculty of Physical Therapy, 2Department of Neurology, Faculty of Medicine, Cairo University, Cairo, Egypt, 3Department of Clinical Neurophysiology, Faculty of Medicine, Cairo University, Cairo, Egypt

Abstract

Cortical reorganization post stroke has great impact on upper extremity motor recovery. Purpose: to investigate the effect of low frequency repetitive transcranial magnetic stimulation (LF-rTMS) on cortical excitability and upper limb motor performance post stroke. Forty ischemic stroke patients aged between 50-65 years were randomly assigned into two groups (“A” control & “B” study). Both groups were treated with a selected physical therapy program for the upper limb but only group “B” received contralesional (LF-rTMS) sessions, daily for two consecutive weeks in addition. Cortical excitability, upper limb motor performance and grip strength were measured and compared for both groups before and after intervention using single pulse TMS to measure contra- and ipsilateral active motor threshold (cAMT, iAMT), Fugl-Myer Assessment Upper Extremity scale (FMA-UE), and hand grip dynamometer for grip strength, respectively. There was significant difference in the post treatment findings of all measured variables between both groups in favour of group B (P ≤0.05). The correlation results revealed significant linear correlation between the tested cortical excitability measures (cAMT, iAMT and iAMT/cAMT difference) and the findings of upper limb motor performance (FMA-UE). The study revealed that 10 contralesional LF-rTMS sessions improved the upper limb functional performance via enhancing cortical reorganization post stroke. Cortical excitability measures as (cAMT, iAMT and iAMT/cAMT difference) could act as an accurate predictor regarding the level of upper limb motor recovery in stroke patients.

Keywords: Cortical excitability; Cortical reorganization; Transcranial magnetic stimulation; Single pulse TMS; Upper limb motor performance.

Introduction

Stroke is envisioned as a global health problem and a leading cause of adult disability. Two-thirds of all strokes occur in developing countries1. Upper limb motor dysfunction is a significant disability that affects daily living and increases the burden on the patients and their families2. Cortical modulation interventions could enhance the therapy-induced upper limb recovery in stroke populations3,4.

After a stroke, there is reduced inhibition from the stroke affected area “ipsilesional hemisphere” onto the unaffected “contralesional hemisphere”, resulting in increased excitability of the contralesional hemisphere which ultimately leads to excessive interhemispheric inhibition onto ipsilesional cortex. This excessive imbalanced inhibition impedes the neuroplasticity and limits the gains in motor recovery 5,6.

Repetitive transcranial magnetic stimulation (rTMS) is a non-invasive stimulation that induces electrical currents in the brain tissues aiming to promote cortical reorganization and subsequently enhance the functional
Modulation of cortical excitability via repetitive transcranial magnetic stimulation (rTMS) was discussed in prior studies. However, the effect of contralesional low frequency repetitive transcranial magnetic stimulation (LF-rTMS) on cortical excitability measures of each hemisphere was barely discussed.

Cortical excitability measures using TMS can make a prediction about the level of upper limb motor performance in stroke patients. Other TMS measures used the peak to peak amplitude of the MEP, others measure the functional connectivity between different cortical areas using TMS mapping, cortical silent period (SP), and paired pulse TMS. However, most of these studies require complex application manoeuvres and much time and effort for implementation.

This study was designed to investigate the effect of contralesional low frequency repetitive transcranial magnetic stimulation (LF-rTMS) on cortical excitability and the subsequent changes upon the upper limb functional performance in subacute stroke patients.

**Materials and Methods**

**Area of study and sampling:** The study used a single-blind, randomized controlled design. Intervention procedures for the enrolled patients consisted of ten daily sessions for two consecutive weeks. Each patient in the control group (A) was treated with a selected upper limb physical therapy program, while each patient in the study group (B) was treated with the (LF-rTMS) on the contralesional primary motor “hotspot” in addition to same program as (GB).

Forty first ever hemiparetic subacute ischemic stroke patients from both sexes with age ranged between 50 and 65 were recruited in this study. They were enrolled in the study between January 2018 to November 2018. This study was conducted in the transcranial magnetic lab of the Clinical Neurophysiology Unit and in the Outpatient Physical Therapy clinic, Department 26, Faculty of Medicine, Cairo University.

**A. Cortical excitability examination:** Cortical excitability was assessed before and after the whole treatment protocol for each patient in both groups by measuring the active motor threshold (AMT) of both the unaffected (contralesional-cAMT) and the affected (ipsilesional- iAMT) hemispheres, in addition to calculating the difference in the active motor threshold between both cortices (iAMT/cAMT difference). Single pulse TMS was used to assess (AMT) of each hemisphere with the visible observation of contralateral first dorsal interossous (FDI) muscle contraction (Observational Measurement-Motor Threshold) (OM-MT) (Fig1). Cortical excitability assessed variables for each patient were:

a. Contralesional Active Motor Threshold Examination (cAMT).

b. Ipsilesional Active Motor Threshold Examination (iAMT).

c. The active motor threshold difference between both cortices (iAMT/cAMT difference) = (iAMT) - (cAMT).

**B. LF-rTMS intervention procedures:** The Magstim Rapid2 magnetic stimulator system (Model P/N 3576-23-09, Magstim Company, USA) was used to deliver 1-Hz stimulation at 90% of the Active Motor Threshold (AMT) to the “hot spot” of the primary cerebral cortex (M1) in the contralesional hemisphere via a 70-mm figure-8 coil. Each session lasted 20 minutes.

**C. Correlation between cortical excitability and upper limb motor function:** Correlation between the level of upper limb motor function represented by (FMA-UE) and the cortical excitability represented by (cAMT, iAMT and iAMT/cAMT difference) were assessed for (GA & GB).

**Statistical Analysis**

Descriptive data for patients, characteristics and dependent variables was calculated as mean ± SD. Parametric procedures as paired and unpaired t-tests were conducted to analyze the inter-group and intra-group cortical excitability and upper limb motor function findings before and after treatment. Chi-square ($\chi^2$) and fisher’s exact tests were applied to compare the categorical data of the patients’ main characteristics and clinical features within and between groups. Pearson
correlation coefficient (r) was used to correlate between level of upper limb motor impairment represented by Fugl-Myer upper extremity scale and cortical excitability findings.

**Findings**

**Patients' demographics and clinical characteristics:** There was no significant difference in the distribution of patients between both groups with regards to their main demographics (age & duration of illness) and clinical characteristics (gender & smoking history) (Table 1).

**Cortical excitability Findings:** There was significant improvement in the post treatment cortical excitability findings (increased (cAMT) and decreased (iAMT), (iAMT/cAMT difference)) in favor to (GB). As the post treatment mean values of (cAMT) were (60.5±4.310) and (72.65±4.771), (iAMT) were (81.80±4.797) and (76.35±2.390), while (iAMT / cAMT difference) were (21.30±8.724) and (4.4±5.670) for groups A and B respectively, with (P < 0.05) (Table 2).

**Upper-extremity motor function findings:** There was significant improvement in the post treatment upper limb motor function and grip strength scores in favor to (GB). As the post treatment mean values of FMA-UE scores were (87.85±4.716) and (94.70±4.014), hand grip dynamometer scores were (29.45±6.386) and (33 ±6.122) for groups A and B respectively, with (P <0.05) (Table 3).

**Correlation between cortical excitability and upper limb motor function:** There was a positive linear correlation between (FMA-UE scores) and (cAMT), and negative linear correlations between (FMA-UE scores) and both (iAMT), (iAMT/cAMT difference). Where, the P values were (≤ 0.001) (fig 2).

**Table 1. Patients’ demographics and clinical characteristics with the P Value for the difference between groups**

<table>
<thead>
<tr>
<th>Patients' demographics and clinical characteristics</th>
<th>Control group (A) n=20</th>
<th>Study group(B) n=20</th>
<th>(P-Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years)</td>
<td>(57.45 ±3.649)</td>
<td>(57.15±4.380)</td>
<td>0.815</td>
</tr>
<tr>
<td>Duration since stroke onset (in months)</td>
<td>(4.35±1.268)</td>
<td>(4.45±0.999)</td>
<td>0.783</td>
</tr>
<tr>
<td>Sex difference</td>
<td>65% M</td>
<td>75% M</td>
<td>0.490</td>
</tr>
<tr>
<td></td>
<td>35% F</td>
<td>25% F</td>
<td></td>
</tr>
<tr>
<td>Smoking history</td>
<td>50% S</td>
<td>65% S</td>
<td>0.337</td>
</tr>
<tr>
<td></td>
<td>50% NS</td>
<td>35% NS</td>
<td></td>
</tr>
</tbody>
</table>

* P values ≤ 0.05 was considered statistically significant, Age and duration of illness are represented in mean and standard deviation, Gender and Smoking history are represented in percentage (%), M: male, F: Female, S: smoking, NS: Non-smoking.

**Table (2): Mean values for the cortical excitability measures for both groups**

<table>
<thead>
<tr>
<th>Cortical excitability measures</th>
<th>Mean ±SD</th>
<th>Control group (A)</th>
<th>Study group (B)</th>
<th>T-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contralesional active motor threshold (cAMT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-treatment</td>
<td>51.75±4.435</td>
<td>53.3±5.440</td>
<td>-0.988</td>
<td>0.330</td>
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</tr>
<tr>
<td>Post-treatment</td>
<td>60.5±4.310</td>
<td>72.65±4.771</td>
<td>-8.450</td>
<td>≤ 0.001</td>
<td></td>
</tr>
<tr>
<td>IpsiLesional active motor threshold (iAMT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-treatment</td>
<td>87.95±6.825</td>
<td>86.55±7.466</td>
<td>0.619</td>
<td>0.540</td>
<td></td>
</tr>
<tr>
<td>Post-treatment</td>
<td>81.80±4.797</td>
<td>76.35±2.390</td>
<td>4.548</td>
<td>≤ 0.001</td>
<td></td>
</tr>
<tr>
<td>(iAMT/cAMT) difference</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-treatment</td>
<td>36.20±10.904</td>
<td>33.25±12.615</td>
<td>0.791</td>
<td>0.434</td>
<td></td>
</tr>
<tr>
<td>Post-treatment</td>
<td>21.30±8.724</td>
<td>4.4±5.670</td>
<td>7.264</td>
<td>≤ 0.001</td>
<td></td>
</tr>
</tbody>
</table>

* P values ≤ 0.05 was considered statistically significant.
Table (3): Mean values for the upper limb motor performance measures for both groups

<table>
<thead>
<tr>
<th>Upper Limb Motor Performance Measures</th>
<th>Mean ±SD</th>
<th>Control group (A)</th>
<th>Study group (B)</th>
<th>T-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fugl-Myer assessment upper extremity (FMA-UE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-treatment</td>
<td>83.20±4.561</td>
<td>84.00±4.942</td>
<td>-0.532</td>
<td>0.598</td>
<td></td>
</tr>
<tr>
<td>Post-treatment</td>
<td>87.85±4.716</td>
<td>94.7±4.014</td>
<td>-4.946</td>
<td>≤ 0.001</td>
<td></td>
</tr>
<tr>
<td>Hand Grip Dynamometer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-treatment</td>
<td>27.65±6.450</td>
<td>28.25±5.830</td>
<td>-0.309</td>
<td>0.759</td>
<td></td>
</tr>
<tr>
<td>Post-treatment</td>
<td>29.45±6.386</td>
<td>33.00±6.122</td>
<td>-1.795</td>
<td>0.081</td>
<td></td>
</tr>
</tbody>
</table>

* P values ≤ 0.05 was considered statistically significant.

Figure (1). Cortical excitability measurement using (MagstimRapid2system) with a figure-of-eight coil
a. Measuring the cAMT from the unaffected hemisphere with the coil above the contralesional primary motor ‘hotspot’
b. Measuring the iAMT from the affected hemisphere with the coil above the ipsilesional primary motor ‘hotspot’.
Discussion and Conclusion

This is a preliminary randomized study that correlated upper limb motor performance level in stroke patients with cortical excitability variables using the single pulse TMS-induced observational muscle contraction. Where the previous studies relied on the size of the MEP (amplitude), silent period interval, intracortical inhibition (ICI) or facilitation (ICF)\textsuperscript{11,16}. The use of single pulse TMS-induced observational muscle contraction to predict upper limb motor recovery post stroke could save much more time, effort and expenses exerted by other complicated and more sophisticated procedures.

The study findings revealed that, application of LF-rTMS on the primary motor “hotspot” of the contralesional (unaffected) hemisphere in subacute stroke patients could enhance cortical modulations in both the contralesional and ipsilesional hemispheres compared with the control group. This may be attributed to the ability of contralesional LF-rTMS to apply disinhibition on the surviving neurons in the perilesional areas via diverse molecular, neurotransmitter and synaptic plasticity mechanisms\textsuperscript{17,18}.

Correlation results revealed very high significant positive linear correlation between (FMA-UE) scores and (cAMT) and a very high significant negative linear correlation between (FMA-UE) scores and (iAMT) either pre or post treatment. This suggested that inhibition of the contralesional hemisphere while excitation of the ipsilesional hemisphere would consequently be associated with improved upper limb motor performance. These results emphasize the notion that, normalizing the cortical reorganization is crucial to enhance the functional motor recovery in the hemiparetic upper limb\textsuperscript{19}.

Post treatment changes in the (observational measurement) cortical excitability findings (cAMT),...
(iAMT) and (iAMT/cAMT difference) were associated with improvement in the upper limb function represented by FMA-UE and grip strength in both groups. This support the notion that enhancing cortical reorganization is crucial to augment the functional motor recovery in the hemiparetic upper limb post stroke\textsuperscript{20,21}.

Another point of interest is the (iAMT/cAMT difference) which is the difference in the active motor threshold between both cortices, it refers to the degree of cortical interhemispheric balance. The study findings revealed very a negative linear correlation between (FMA-UE) scores and (iAMT/cAMT difference) either pre or post treatment, which means that as the difference in the active motor threshold between both cortices decrease, the upper limb motor performance would eventually be promoted in subacute stroke patients. Thus (iAMT/cAMT difference) could be used as an accurate predictor regarding the interhemispheric balance between both cortices, where prior studies examine cortical interhemispheric balance using TMS, fMRI, or DTI and many other non-invasive brain stimulation methods\textsuperscript{22,23}.

This study supports the role of contralesional LF-rTMS in re-establishing the cortical interhemispheric balance and upper limb motor recovery post stroke\textsuperscript{24,25}. However, more studies are recommended to figure out whether the changes that occurred on the level of cortical excitability and upper limb motor performance are impacted solely by the application of LF-rTMS regardless the conventional physical therapy program. Also, follow up assessments are recommended to reveal whether these enhancements in cortical excitability and the upper limb motor function are long lasting.

The current study revealed that contralesional Lf-rTMS sessions as an adjuvant to a selected upper limb physical therapy program improved the upper limb functional performance via enhancing cortical reorganization post stroke Also, Cortical excitability measures as (cAMT, iAMT and iAMT/cAMT difference) could act as accurate and more feasible predictors regarding the level of upper limb motor recovery in stroke patients.

**Acknowledgement:** Authors express appreciation to all our study patients. Heartfelt thanks extended to the clinical neurophysiology lab staff.

**Conflict of Interest:** Nil.

**Source of Funding:** No source of funding

**Ethical Clearance:** All procedures were in accordance with the Declaration of Helsinki and were approved by the Cairo university faculty of physical therapy Research Ethics Committee with registration number (P.T.REC/012/001647). Prior to patient recruitment to the study a written informed consent was acquired. This study was registered in the Pan African Clinical Trials Registry (PACTR201807106955779).

**References**


Correlation Study of Functional Performance between Diabetic and Non-Diabetic Patients with Knee Osteoarthritis

Abla M Hamed1*, Mohamed H. Aboeleinen2, Hala A. Abdelgawad3, Shimaa N. Aboelazm4

1Physical Therapy Department For Cardiopulmonary and Geriatrics, Faculty of Physical Therapy, Misr University for Science and Technology, Egypt, 2Basic Science Department, Faculty of Physical Therapy, Misr University for Science and Technology, Egypt, 3Physical Therapy Department For Gyna and Pediatric and Its Surgery, Faculty of Physical Therapy, Misr University for Science and Technology, Egypt, 4Basic Science Department, Faculty of Physical Therapy, Pharos University of Alexandria, Egypt

Abstract

Osteoarthritis is recently considered a part of metabolic syndrome which shifts the traditional concept that believed on, osteoarthritis is a degenerative joint disease based on continuous mechanical overload to a metabolic pathogenesis. The aim of our study designed to investigate the correlation between type two diabetes and knee osteoarthritis with the impact on functional performance. One hundred women with knee osteoarthritis enrolled in the study with mean age 50.5±3.11 years and mean BMI 26.23±2.48 Kg/m2. All patients were subjected to radiological assessment to detect the degree of knee osteoarthritis, laboratory investigations to measure glycemic control, Western Ontario and Mc Master Universities Index (WOMAC) scale to evaluate functional performance. All patients assigned into two groups, group A (50 women) as a type two diabetic group and group B (50 women) as a non-diabetic group. Results showed a non-significant correlation between glycemic level and limitations in functional performance in mild knee osteoarthritis. However, there were significant differences among diabetic and non-diabetic groups regarding functional performance. Then our conclusion demonstrated non-significant correlation between type two diabetes and functional performance. Meanwhile, there were significant differences among diabetic and non-diabetic patients regarding functional performance.

Keywords: Type two diabetes, knee osteoarthritis and functional disabilities.

Introduction

Osteoarthritis (OA) is the most frequent and disabling joint disease in adults1. A recent hypothesis suggested a new classification for OA as ageing, metabolic syndrome (Met S), post-traumatic and genetic2

This classification was confirmed by Pelletier and Pietrangelo3, who mentioned that, categories of OA are, post traumatic with age less than 45 years which commonly caused by repetitive mechanical stress, joint fracture or meniscectomy. The second type is age related OA, which occurs over 65 years in hip, knee or hand without any previous trauma or metabolic syndrome. The last one is metabolic syndrome associated with OA with age between 45 to 65 years in patients have at least one of the components of metabolic syndrome (diabetes mellitus, hypertension and dyslipidaemia).

The components of Met S including diabetes mellitus (DM), hypertension or dyslipidaemia may together or separately participate in OA pathophysiology 4.

Every metabolic disorder is associated with OA through different mechanism as hypertension causes sub-chondral ischemia. While dyslipidaemia was leading to lipid deposition in chondrocytes. Hyper glycaemia and OA interact through formation of oxidative stress, advanced glycation end-products and low-grade systemic inflammation. Finally, Obesity altered levels...
of adipokines and degradative enzymes, leading to inhibition of cartilage matrix synthesis and sub-chondral bone remodeling.

The OA joint is characterized by osteophytes, synovial inflammation, cartilage degeneration and bone sclerosis. All these findings titled as “systemic metabolic disturbances and low-grade inflammation”. These findings associated with hyperglycemia that causes a decrease in production of collagen II with increase in free fatty acids that cause inflammation and increase in fibroblast like-synovitis. In addition Courties and Sellam found that, elevated fasting glucose concentration has also been associated with bone marrow lesions which predict OA structural damages.

Diabetes causes much musculoskeletal degeneration that lead to different symptoms such as pain, stiffness and swelling in joints; nodules, tightness and thickened skin; trigger finger; carpal tunnel syndrome, frozen shoulders and severely affected foot.

Knee OA might affect the activities of daily living as a result of reduction in strength, power and muscular endurance, providing decrease in proprioceptive and balance. These changes affect physical function and hinder the performance of functional activities.

The Western Ontario and McMaster University Arthritis Index (WOMAC) questionnaire was a self-administered and specific functional performance assessment for hip and/or knee osteoarthritis patients. Currently it is the most frequently used questionnaire and is known to be a valid, reliable and responsive instrument for patients with OA. High score interpret worse of condition and vice versa regarding pain, stiffness, functional disability or limitations.

Subjects, Materials and Methods

Patients: One hundred women with mild osteoarthritis knee enrolled in this study. They were collected from outpatient orthopedic and diabetes mellitus clinics, Misr University Hospital, Giza during the period from April to November (2018). Their age ranged from 45-55 years with mean equal 50.5±3.11 years and BMI ranged from 25±29.9 Kg/m2 with mean equal 26.23±2.48 Kg/m2. The patients were divided according to their glycemic level into two groups, group A (50 women) with glycemic level represent type two diabetes by less than five years and underwent regular conventional treatment in form of oral hypoglycemic drugs and group B (50 women) as a non-diabetic group.

Exclusion criteria: Our study excluded any candidate having history of trauma, previous knee surgery, injection or deformities. Other conditions suffered from local or systemic inflammation, cardiovascular, renal and hepatic or thyroid problems did not share in our study. Also any case underwent hormonal supplements or lowering cholesterol medications excluded.

All patients signed a written informed consent and were subjected to the following evaluation protocols:

Radiological assessment: All patients underwent radiological assessment in form of X-Ray for both knees from standing and bending positions using (Samsung-Collimator-SDR-OGCL 60A apparatus) and the findings were recorded to detect the degree of osteoarthritis. All patients were suffered from knee osteoarthritis by less than two years.

Laboratory investigations: Following twelve hour overnight fasting, 20 ml venous blood samples were collected from an antecubital vein for all patients in sitting position between 8:00 and 9:00, a.m. Serum was separated by centrifugation and samples were stored at (-80 centigrade) until analyzed in the laboratories of Misr University Hospital. Fasting blood glucose level and glycated hemoglobin (HbA1c) were evaluated for detection of glycemic level.

Assessment of functional performance: Functional performance of all patients was assessed by Western Ontario and McMaster Universities osteoarthritis index (WOMAC) as a functional assessment scale. The WOMAC scale is a widely and standardized questionnaire used to evaluate the condition of patients with osteoarthritis of knee and hip. It is also used to assess back pain, rheumatoid arthritis, systemic lupus erythematosus and fibromyalgia. It includes 24 parameters five for pain, two for stiffness and 17 for physical functioning. The WOMAC scale is valid and reliable. Lower scores indicate better subjective functional abilities. The response points were; None 0, Slight 1, Moderate 2, Severe 3 and Extreme 4. The minimal total possible score is 0 while the maximal total score is 96. In the current study only physical function parameters from WOMAC was detected in both groups.

Anthropometric measurements: Weight and height for all patients were recorded by using ZT-160 HEALTH SCALE for calculating of body mass index BMI to exclude any obese candidate. Body mass index was calculated by dividing weight per kilogram on height per meter square KG/m2.
Statistical analysis: Results were expressed as minimum, maximum, mean and standard deviation. Comparison between two groups in all parameters as well as correlation between all parameters done by using (SPSS) computer program (version 24). P value≤0.05 was considered significant.

Results

One hundred women suffered from mild knee osteoarthritis involved in the study. The average age was 50.5±3.11 years and the average BMI was 26.23±2.48 Kg/m2. (Table1).

Table (1) shows minimum, maximum and mean values of age/year and body mass index (BMI)/ Kg/m2 for all patients.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mini.</th>
<th>Max.</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>45</td>
<td>55</td>
<td>50.5</td>
<td>3.11</td>
</tr>
<tr>
<td>BMI</td>
<td>25</td>
<td>29.9</td>
<td>26.23</td>
<td>2.48</td>
</tr>
</tbody>
</table>

All candidates divided into two groups according to their glycemic level. Group A (50 women) with high glycemic level represented as type two diabetic group and group B (50 women) with normal glycemic level represented as non-diabetic group.

Glycemic levels: Statistical analysis showed, significant difference between both groups in two parameters (Fasting blood glucose level FBS and glycosylated hemoglobin HbA1c), group A recorded a mean of fasting blood glucose level equal 193.7±16.7 mg/dl while group B recorded a mean equal 87.7±8.36 mg/dl with statistical significant difference .Also, Significant difference was observed regarding glycosylated hemoglobin (HbA1c) as group A recorded a mean equal 8.75±.68 % while group B recorded a mean equal 4.9±0.45% (Table 2).

Functional performance: Significant difference was observed between group A and B after using WOMAC scale, group A recorded a mean equal 42.2 ± 2.0 points while group B recorded a mean equal 29.± 3.4 points (Table 3).

Correlation between glycemic parameters and functional performance in diabetic groups: Correlation analysis between functional performance and glycemic variables was detected there was a non-significant correlation between WOMAC scale and fasting blood glucose level as well as HbA1c in diabetic group as shown in (Table 4).

Table 2 shows a mean and standard deviation of fasting blood glucose level (FBS) by mg/dl and glycosylated hemoglobin

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SD group A</th>
<th>Mean ± SD group B</th>
<th>t-value</th>
<th>p-value</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBS</td>
<td>193.7±16.7</td>
<td>87.7±8.36</td>
<td>24.75</td>
<td>0.0001</td>
<td>S</td>
</tr>
<tr>
<td>Hb A1c</td>
<td>8.75±0.68</td>
<td>4.9±0.45</td>
<td>21.39</td>
<td>0.0001</td>
<td>S</td>
</tr>
</tbody>
</table>

SD: standard deviation, P: probability as P> 0.05= non-significant, P ≤ 0.05= significant, S: significance.

Table 3 shows a mean, slandered deviation and comparison of functional performance by using WOMAC scale for group A and B

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SD group A</th>
<th>Mean ± SD group B</th>
<th>t-value</th>
<th>p-value</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOMAC</td>
<td>42.2 ± 2.0</td>
<td>29.± 3.4</td>
<td>17.8</td>
<td>0.0001</td>
<td>S</td>
</tr>
</tbody>
</table>

SD: standard deviation, P: probability as P> 0.05= non-significant, P ≤ 0.05= significant, S: significance.

Table 4 Shows correlation between functional performance and glycemic variables in diabetic group

<table>
<thead>
<tr>
<th>Diabetic</th>
<th>WOMAC</th>
<th>HbA1c</th>
<th>FBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOMAC</td>
<td>Pearson correlation 1</td>
<td>-0.03</td>
<td>-0.08</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>-</td>
<td>0.853</td>
</tr>
<tr>
<td>HbA1c</td>
<td>Pearson Correlation -0.035</td>
<td>1</td>
<td>0.328</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.853</td>
<td>-</td>
</tr>
<tr>
<td>FBS</td>
<td>Pearson correlation -0.082</td>
<td>0.328</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.668</td>
<td>0.076</td>
</tr>
</tbody>
</table>

Correlation between glycemic parameters and functional performance in non-diabetic group: Correlation between functional performance in form of WOMAC scale and glycemic variables in form of fasting blood glucose level and HbA1c was detected in non-diabetic group as shown in (Table 5).

Table 5 Shows correlation between functional performance and glycemic variables in non-diabetic group

<table>
<thead>
<tr>
<th>Non Diabetic</th>
<th>WOMAC</th>
<th>HbA1c</th>
<th>FBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOMAC</td>
<td>Pearson correlation 1</td>
<td>0.171</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>-</td>
<td>0.367</td>
</tr>
<tr>
<td>HbA1c</td>
<td>Pearson Correlation 0.171</td>
<td>1</td>
<td>0.182</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.367</td>
<td>-</td>
</tr>
<tr>
<td>FBS</td>
<td>Pearson Correlation -0.001</td>
<td>0.182</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.996</td>
<td>0.335</td>
</tr>
</tbody>
</table>
Discussion

Prevalence of osteoarthritis between patients with type 2 diabetes was 29.5±1.2% and type 2 diabetes among patients with osteoarthritis was 14.4±0.1%. These results were confirmed by Rahman et al. 10.

On the other hand, Yoshimura et al., 11 found that, the levels of HbA1c fraction were ≥5.5% that was not completely associated with regression of OA. Which is confirmed our findings.

Visser et al., 12 recorded a unique significant association between DM and hand OA only. The study highlights on the metabolic causes and the systemic nature of hand.

Sellam et al. 13 found that, diabetes itself could be an independent risk factor for osteoarthritis and proposed a diabetes-induced phenotype through chronic, low-grade inflammation. They suggested that, lipid irregularities with inflammatory mediators released from adipose tissue and advanced glycosilated end products can be harmful to cartilage homeostasis.

Schett et al. 14 evaluated the long-standing effect of type 2 diabetes on knee and hip and reported, predicted the necessity for arthroplasty by two fold for these patients as a result of severe osteoarthritis after controlling the analysis for age, BMI and other potential factors.

Results were completely agree with Nielen et al. 15 who demonstrated that, the association between type 2 diabetes and knee osteoarthritis or even knee pain is no longer present after adjusting of body mass index which reflecting the importance of overweight in the relationship. Also, no difference in severity of knee pain in type 2 diabetes patients were detected compared with non-diabetic patients.

In contrast Nicola et al. (16), who analyzed the results of more than one million participants with type 2 diabetes and osteoarthritis and the data showed a clear association between the two variables with elevated risk of osteoarthritis in diabetic patients even with control of body weight.

Thorstensson et al. 17 were investigated the reduction in functional performance in the lower extremity as a predictor of knee osteoarthritis progression. The results were supported that, reduced functional performance in the lower extremity predicted development of radiographic knee osteoarthritis 5 years later among people aged 35–55.

However, Barker et al. 18 examined the correlation between radiographic knee osteoarthritis classification through Kellgren and Lawrence scale and functional performance by using WOMAC index. The parameters of WOMAC scale measured function, pain and power but they found that there are no statistically significant associations between osteoarthritis and WOMAC parameters.

Additionally, Schett et al. 19 assessing the outcomes of knee osteoarthritis symptoms by using Western Ontario and McMaster Universities Arthritis Index (WOMAC) as a functional assessment scale after detection of sonorities and knee effusion by ultrasound in participants with type 2 DM than those without DM. Which confirmed by validity of WOMAC scale in assessing osteoarthritis outcomes.

Conclusion

No significant correlation between functional performance and glycemic variables in diabetic as well as non-diabetic group. However, there was a significant difference between diabetic and non-diabetic group regarding functional performance expressed by WOMAC scale. Our recommendations are to increase the sample involved, selection of moderate or severe degree of osteoarthritis or to test another glycemic variables and finally to increase the time of follow up in form of longitudinal study.

Ethical Clearance: Taken from Research Ethics committee at faculty of physical therapy, 6th October University Hospital, Giza, Egypt.

Source of Funding: Self-funding.

Conflict of Interest: The author declares that there is no conflict of interest.

References


Implementation of Enhanced Recovery after Surgery for Endometrial Carcinoma: A Non-Randomized Controlled Trial

Ahmad Sameer Sanad1, Essam El-Gindi1, Reham R El-Khateeb1, Ahmed M Abdil-Ghany1, AmrNady Abdelrazik2, AhmedBakr Mousa1, AhmedShoukry Hafiz3

1Obstetrics and Gynecology Department, 2Anesthesia Department, Faculty of Medicine, Minia University, Egypt, 3Consultant of Oncology, El-Salam Oncology Center, Cairo, Egypt

Abstract

Study aim: to look at the effect of modified better enhanced recovery after surgery (ERAS) program for endometrial carcinoma, on hospital live length (HLL) and operative outcome.

Patients & methods: the study was done in El-Salam Oncology center; Cairo and Minia Maternity University Hospital, Minia university, Egypt. The study included two groups of patients diagnosed as endometrial carcinoma prepared for operations. First group included patients prepared for laparoscopy (n=27) and was managed with ERAS protocol. The other group of patients were prepared for laparotomy (n=31) and was managed with conventional protocol.

Results: The HLL was abridged in ERAS group when linked with the control group (1.77 ± 1.13 days compared with 6.13 ± 2.25 days; P < 0.0001; CI 3.4013 to 5.3187). Opioid use was reduced in ERAS group compared to the control groups (1.10 ± 0.41mg and 9.83 ± 3.6 mg; P < 0.0001) and postoperative fluid use was also less in the ERAS group compared to the control group (1362.9 ± 234.3 ml compared with 2303.2 ± 512 ml; P < 0.0001; CI 725.4990 to 1155.1010).

Conclusion: Implementation of ERAS protocols in gynecologic surgery for endometrial carcinoma should be tailored according to the situation of each case. But in general, ERAS was connected with substantial reduction in HLL, lessening in the operative time and blood loss, associated with controlled intravenous fluids utilized and comparable pain control to conventional protocols with improvement in complication rates.

Keywords: Enhanced recovery after surgery, hospital live length and endometrial carcinoma.

Introduction

Implementation of ERAS protocol is linked with the decreased HLL, a reduction in rates of postoperative difficulty, reduced illness, and cost funds, while conserving patient approval and life quality1,2.

ERAS programs include preoperative, intraoperative, and postoperative strategies; preadmission counseling, utilization of opioid-sparing multimodal perioperative absence of pain (counting local analgesia), intraoperative goal directed fluid therapy (GDT), and utilization of insignificantly invasive surgical methods with shirking of routine utilization of nasogastric tube, channels and/or catheters. Post-operatively, patients are encouraged for early feeding, early mobilization.

The aim of the present study was to investigate the impact of implementing modified ERAS program for endometrial carcinoma, on HLL and operative results.

Patients and Methods

Setting: The current study was a prospective non randomized clinical study on women who underwent surgery for endometrial carcinoma in Minia maternity
University Hospital (MMUH) and EL-Salam Oncology Center, Cairo. The study was conducted during the period between June 2012 and December 2017.

**Patients:** Eligible subjects were American Society of Anesthesiologists (ASA) physical status I and II females undergoing exploration for endometrial carcinoma.

The study was not randomized. Patients were classified into 2 groups, first group included patients undergoing operative laparoscopic exploration and was done in El-Salam Oncology Center. Patients were managed with enhanced recovery perioperative protocol (active group). Second group included patients undergoing open exploration and were managed with conventional perioperative protocol (control group) in MMUH. Eastern Cooperative Oncology Group (ECOG) Performance Status was used to determine patient’s disease progression and decide suitable treatment and prognosis.

**Sample size calculations:** The study was designed to detect difference with a type I error of .05, a statistical power of 0.80, ratio of sample size (Unexposed / Exposed) = 1, Risk/Prevalence Ratio: 3.3; assuming that length of hospital stay in laparoscopic group=2 day and 4 in abdominal group, this results in sample size of 27 patients in each group and an assumption that up to 10% of patients subsequently would be deemed ineligible and/or have inadequate follow-up. This resulted in a total planned sample size of 30 patients in each group.

**Primary outcome:** Postoperative length of hospital stay.

**Secondary outcomes:** Postoperative morbidities, for example: acute confusion, nausea and vomiting, postoperative fever, secondary hemorrhage, atelectasis, pneumonia, wound infection, embolism and deep vein thrombosis, acute urinary retention, paralytic ileus. Re-admission rate due to bowel dysfunction or wound dehiscence or infection was also reported.

**Methods:**

For first group: (ERAS protocol): First step was to establish of a multi-disciplinary team to implement the protocol of ERAS. The team was consisted of gynecological oncologists, anesthetist, nurse specialist, ward nurse managers, and clinical dieticians. The aim of the ERAS protocol is to reduce HLL without increase in the rate of complication.

**Components of the protocol:**
- Patient counselling and education:
- Patient preparation for surgery:

Preoperative control of chronic disease (cardiac function, pulmonary function, blood pressure, and diabetes) was accomplished. Serum albumin level was maintained greater than 3.5 g/dl. Preoperative prophylaxis against thrombosis, infection and nausea and vomiting was established.

**Perioperative diet:** Fasting at the most for 6 hours preoperatively for solid foods and 2 hours for clear liquids was advised. Preoperative carbohydrate-rich drinks were used to reduce the effect of fasting.

Postoperatively patients were advised to use chewing gums, laxatives and drink clear liquids upon awakening from anesthesia and to eat a general diet when begin walking. Intake of protein and energy-rich nutritional supplements was advised. Management of postoperative nausea and vomiting were guaranteed with the use of multimodal approach by 2 or more anti-emetics in combination.

**Mechanical bowel preparation:** Rectal enemas and mechanical bowel preparations were avoided.

**Minimal access surgery:** Minimal access surgery improves postoperative outcome and enhancing recovery by reducing tissue damage and physical injuries.

**Anesthesia:** Patients of the active group received combined general anesthesia with lumbar epidural analgesia.

**Fluid balance and management:** Perioperative fluid management aimed to maintain perioperative euvolemia. All patients were advised to have plentiful fluid intake before surgery.

Fluid balance was obtained by minimizing crystalloid administration, increasing the use of colloids and the use of vasopressors (epinephrine) in place of crystalloid for treatment of hypotension in a euvolemic patient.

**Pain management:** Our protocol included the use of opioid-free drugs as combining regional anesthetics techniques with multimodal pharmacologic pain management instead of the use of opioids. Multimodal pain management consisted of the use of two pain killers
with different mode of action as NSAIDs, paracetamol or acetaminophen.

**Drains and catheters:** The study protocol discarded the use of drains, tubes, and catheters. Urinary catheters were removed as soon as possible.

**Early Mobilization:** All patients were promoted to start early mobilization and to leave their beds as early as possible. Patients got out of bed a minimum of 2 hours on the day of surgery.

**For second group:** (conventional surgery):
Patients in control group were ordered to fast overnight. All patients received a mechanical bowel preparation. The patients were admitted to the hospital for 2–5 days before the procedures. All patients of control group received general anesthesia. Intraoperative fluid administration was managed by anesthesiologist according to the situation of each case. Postoperative fluids were continued until the intestinal motility was regained. The patients were instructed to start with clear liquid diet on the morning of postoperative day and then continued as afford postoperative pain management depended mainly on the use of opioids and other pain killers.

**Statistics:** Data are presented as numbers and percentages or medians and ranges. Data were analyzed with a two-sided chi-squared test, Fisher’s exact test when appropriate, and continuous variables were analyzed using the Mann–Whitney U-test for two independent groups. A p-value < 0.05 was considered significant. Statistical data were analyzed using the IBM SPSS software package, version 21 for Macintosh (IBM Corp., Armonk, NY, USA).

**Results**
A group of 58 patients was included in the current work, 27 patients were subjected to undergo laparoscopic procedures and managed with ERAS (active group). Thirty-one patients underwent laparotomy for endometrial carcinoma managed with conventional protocol (control group).

**Table (1): Shows component of the protocol applied to active groups**

<table>
<thead>
<tr>
<th></th>
<th>Active n=27</th>
<th>Control n= 31</th>
<th>????</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative bowel preparation:</td>
<td>0</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Admission preoperative (days)</td>
<td>1.33 ± 0.47</td>
<td>3.51 ± 0.94</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Overnight enema (n of patients)</td>
<td>0</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Fasting (hours)</td>
<td>6.14 ± 1.07</td>
<td>11.1± 1.3</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Preoperative carbohydrate drink (n of patients)</td>
<td>27</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Preoperative antiemetic (n)</td>
<td>27</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Fluids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intraoperative fluid balance (mL)</td>
<td>943.6 ± 213.4</td>
<td>1679.9 ± 270</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Postoperative fluid balance (mL)</td>
<td>1362.9 ± 234.3</td>
<td>2303.2 ± 512</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Analgesia:</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Epidural</td>
<td>27</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total Nalpophine (mg)</td>
<td>1.10 ± 0.41</td>
<td>9.83 ± 3.6</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Ambulation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day of surgery</td>
<td>20</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>More than 4 times on POD 1*</td>
<td>22</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Start oral feeding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid</td>
<td>24</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Oral soft food in operative day</td>
<td>21</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Oral soft food in OPD 1 day</td>
<td>24</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

*POD 1: postoperative day one.*
Table (2): shows operative and postoperative outcome

<table>
<thead>
<tr>
<th></th>
<th>Active 2 n=54</th>
<th>Control n=55</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative time (min)</td>
<td>94.8 ± 39.3</td>
<td>105.45 ± 27.4</td>
<td>0.2316</td>
</tr>
<tr>
<td>Blood loss</td>
<td>108.5 ± 46.5</td>
<td>396.1 ± 112.69</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>LOS (d) *</td>
<td>1.77 ± 1.13 (1-5)</td>
<td>6.13 ± 2.25 (3-10)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>VAS</td>
<td>3.18 ± 1.15</td>
<td>4.48 ± 1.68</td>
<td>0.0013</td>
</tr>
</tbody>
</table>

Infections:
- Surgical site infection: 0 vs 4
- Urinary tract infection: 0 vs 4
- Pneumonia: 1 vs 2
- Sepsis or septic shock: 0 vs 2
- Unplanned return to OR: 1 vs 2
- Readmission: 1 vs 5

*LOS: length of hospital stay or HLL: hospital live length, OR: operative room

There was a statistically significant difference in the HLL which was decreased with ERAS group when related to the control group (1.77 ± 1.13 days compared with 6.13 ± 2.25 days; P < 0.0001; CI 3.4013 to 5.3187).

Similar reductions were seen in median intraoperative fluids used (943.6 ± 213.4 ml compared with 1679.9 ± 270 ml; P < 0.0001; CI = 606.9187 to 865.6813) and postoperative fluid used (1362.9 ± 234.3 ml compared with 2303.2 ± 512 ml; P < 0.0001; CI 725.4990 to 1155.1010).

Visual analogue score (VAS) was less in patients managed with ERAS protocols rather than patients managed with conventional protocols; 3.18 ± 1.15 vs 4.48 ± 1.68 (P = 0.0013 an 95% CI= 0.5311 to 2.0689).

There was a statistical significant reduction in the rate of complication in the laparoscopy group (OR= 0.3116, CI=0.1033 to 0.9394 and P=0.0384) after ERAS protocol implementation.

**Discussion**

This aspirant study is in accordance with the objective to assess efficacy of ERAS approach that is characterized by tailoring the procedures implemented to the needs of organizations and according to the general condition of the patients.

The limitations to the present study is lack of randomization due to unavailability of laparoscopic hysterectomy of endometrial carcinoma in our hospital. Yet, because of the present indication on ERAS protocols, we considered the part done in El-Salam Oncology Center is the active group and we considered it a step to generalize the trial in MMUH. Also, it was not possible to achieve a blind study. One of the most important difficulties we faced during implementation of such a program is the need of joint effort between various wellbeing experts and various strengths. In spite of careful methodology, the study has another limit, lying in the small number of patients.

The strength points of the current study lie in the equity and impartiality. As this study was carried out in general hospitals, generalization of the data become possible and easy to be applied to other similar situations. Another strength point is that our study highlighted HLL, which may be considered as a surrogate outcome for recovery after surgery. Also, all patients underwent the same maneuver (hysterectomy) for the same lesion (endometrial carcinoma).

The success in the current study is attributed mainly to the use of minimally invasive surgery and the strict implantation of ERAS protocol. These finding is in accordance with De Groot’s hypothesis.

Once patients are euvoletic, vasopressors were used to maintain mean arterial pressure. Ideally patients controlled with ERAS protocol must be ingesting, consuming, mobilizing, and napping at the equal day of operation.

The American Society of Anesthesiology recommends a fast of 6 hours preoperatively for solid foods and that clear liquids be consumed for up to 2 hours prior to surgery.
Minimizing the preoperative fasting period increases patient quality of life and satisfaction as prolonged preoperative fasting is annoying for patients and may increase patient anxiety.  

In ERAS program, patients were promoted to start clear fluid upon awakening from anesthesia and to start eating small snack once patient started walking. We advised our patients against use of mechanical bowel preparations. Arnold has supported these advices as bowel preparation is associated dehydration, electrolyte abnormalities, and a prolonged period of fasting. For gynecologic surgery, a recent meta-analysis of 5 RCTs found that there was no benefit of bowel preparation in regard to visualization of the surgical field or decreases in operative time.  

Our policy in postoperative pain control is the use of regional anesthetics techniques with multimodal pharmacologic pain management with decrease use of opioids because use of opioids can deteriorate the patient’s equilibrium affecting patients’ mobilization and depressing the respiratory vitality and this policy is in accordance with many systematic literature review of 60 RCTs.  

Early mobilization is a lineament of ERAS. Many ERAS protocols recommend that patients start walking after a minimum of 2 hours per day of surgery and then 6 hours a day until discharge.  

There are multiple considerations in how to implement ERAS protocols. In our opinion, the most decisive point was to operate a devoted nurse to supervise the procedure from admission till discharge. We have established a follow up visit at outpatient clinic at the day 7 and day 14 postoperative, to detect postoperative complications. This goes in line with many previous studies.  

In the current work, there was a statistical significant lessening in the rate of complication in laparoscopy group reaching the level of statistical significance. These findings were in line with previous data that found a significant reduction in postoperative morbidity in patients undergoing ERAS and a trend towards decreased mortality. A recent meta-analysis included 2,376 colorectal patients from 16 randomized controlled trials that compared ERAS pathways to conventional postoperative care. ERAS pathways were resulted in a significant reduction in overall morbidity (RR = 0.60, 95% CI 0.46-0.76).  

Conclusions

Implementation of ERAS protocols in gynecologic surgery for endometrial carcinoma should be tailored according to the situation of each case. Implementation of ERAS resulted in significant reduction in hospital stay, proper pain management and lessen rate of difficulties deprived of an growth in re-admissions. 

Funding: Self-funding

Compliance with Ethical Standards:

Conflict of interest: Authors state that, there is no any conflict of interest.

Ethical approval: The observe protocol turned into permitted using the scientific ethical committee of the Department of Obstetrics and Gynecology, Faculty of Medicine, Minia University, February 2012. Approval was ascertained from the Institutional Review Board of the Faculty of Medicine; Minia University in March 2012. All tactics done in the work were in accordance with the moral requirements of Minia University, and with the 1964 Helsinki declaration and its later amendments or similar ethical standards.

Informed consent: The procedure was explained to all eligible participants. Informed written agreement was obtained from all patients. Data obtained was confidential and used only for the study.

References


5. Ryan NA, Ng VS, Sangi-Haghpeykar H, Guan X: Evaluating Mechanical Bowel Preparation Prior to Total Laparoscopic Hysterectomy. *JSLS* 2015, **19**(3).


Can Plasma Cystatin C Predict Clinical Outcomes in Hospitalized Patients with Acute Decompensated Heart Failure?

Amir Mostafa1, Karim Said1, Walid Ammar1, Ahmed Elsayed Eltawil2, Magdy Abdel Hamid1

1Cardiology Department, Kasr Alainy School of Medicine, Cairo University, Egypt,
2Clinical pathology Department, Kasr Alainy School of Medicine, Cairo University, Egypt

Abstract

Background: Acute decompensated heart failure (ADHF) is an important cause of hospital admissions, morbidity and mortality.

Objectives: To evaluate role of plasma cystatin C in prediction of adverse in-hospital clinical outcome in patients with ADHF.

Methods and results: Among 90 patients hospitalized with ADHF, clinical examination and echocardiographic assessment were done. Renal functions including serum urea, creatinine and estimated glomerular filtration rate (eGFR) were followed up daily. Plasma cystatin C was measured on admission and at 24 and 72 hours. The composite in-hospital adverse clinical outcome included the composite of death, need for ultrafiltration for refractory edema and hypotension requiring vasopressors. Mean value of plasma cystatin C on admission was 1822.7±553 mg/l. Independent predictors of the composite adverse in-hospital clinical outcome were left ventricular end-systolic diameter and admission values of plasma cystatin C. Admission plasma cystatin C ≥ 1707.5 mg/l had 80% sensitivity and 72% specificity for the prediction of the composite adverse in-hospital clinical outcome.

Conclusions: Among patients hospitalized with ADHF, measurement of plasma cystatin C on admission can identify patients at increased risk for developing in-hospital adverse clinical outcomes.

Keywords: Acute decompensated heart failure, adverse clinical outcome, plasma cystatin C.

Introduction

Acute decompensated heart failure (ADHF) is an important cause of hospital admissions, morbidity and mortality.

Worsening of renal functions (WRF) is a common complication for the use of diuretics in patients with acute decompensated heart failure (ADHF) with an incidence between 20% and 50%2,3,4 and with increased risk of morbidity and mortality.

Plasma cystatin C6,7 can be considered an ideal marker for WRF as it reflect the glomerular filtration rate (GFR) better than creatinine, and its levels are not affected by age, gender, diet, or muscle mass to the same extent as creatinine.6,7

Accordingly, this study was conducted to describe the changes in plasma Cystatin C as a marker for WRF in hospitalized ADHF patients receiving diuretic therapy and to study the potential relation between these changes and the development of adverse clinical outcomes.

Methods

This was a prospective study that recruited patients with ADHF admitted to the Heart Failure Unit of the Cardiology Department in Kasr Alainy Hospital, Cairo University between June 2016 and January 2017. The
investigation was approved by the ethical committee. All patients provided informed consents.

ADHF was defined based on the presence of rapid onset of, or change in symptoms and/or signs of heart failure.\textsuperscript{1} Enrolment was restricted to patients with New York Heart Association (NYHA) function class III or IV.

Patients were excluded from the study if they were < 18 years or having one of the following: cardiogenic shock, acute myocardial infarction, atrial fibrillation, eGFR < 30 ml/min, stenotic valvular heart disease beyond moderate severity, sepsis, pregnancy.

Study methodology: All eligible patients were subjected to clinical assessment, laboratory work up and echocardiography.

Clinical assessment included full history and physical examination on admission with daily follow up of clinical state, body weight and fluid balance.

Laboratory work up included complete blood picture, liver and renal functions on admission with daily follow up of urea, creatinine, Na, K and follow up of cystatin C at 24 and 72 hours. The samples of cystatin C were collected using EDTA and centrifuged for 15 minutes at 1000 x g at 2-8 degree Celsius then plasma was stored under -20 degrees Celsius. Measurement of plasma cystatin C was done by using human ELISA plasma cystatin C kits.\textsuperscript{8}

Echocardiographic examination was done according to American society of Echocardiography guidelines \textsuperscript{9} on admission to assess left ventricular (LV) dimensions, LV systolic function by Simpson’s method, LV diastolic function by pulsed Doppler assessment of the mitral inflow and tissue Doppler over the lateral and septal mitral annuli. Follow up echocardiography was done after 24 and 72 hours with special emphases on measurements of diastolic function.\textsuperscript{9}

In-hospital management: patients were treated according to the European society of cardiology guidelines for the diagnosis and treatment of acute and chronic heart failure.\textsuperscript{1} All patients received furosemide, the dose of furosemide, the route of administration (IV boluses or infusion) and the uptitration of the dose were left to the treating physician. In case of inadequate response to IV furosemide, another diuretic agent from other class was added (Spironolactone, Metolazone). Regarding the addition, reduction or discontinuation of B-blockers and ACEI, it was left to the treating physician.

In-hospital diuretic response included average net daily fluid loss, ml (defined as UOP minus oral and IV fluid intake) and total net fluid loss, ml.

In-hospital clinical outcome included hospital stay (days), change weight loss (Kg), change NYHA class I-II (%), need for ultrafiltration, need for vasopressors for hypotension and mortality. The composite in-hospital adverse clinical outcome included the composite of death, need for ultrafiltration for refractory edema and hypotension requiring vasopressors.

Statistical Analysis: All statistical analyses were performed using SPSS for Windows (17.0, SPSS Inc.). All continuous variables - except for duration of hospitalization - showed normal distribution when assessed by Kolmogorov–Smirnov test. Continuous variables were presented as mean ± standard deviation while categorical data were summarized as number (percentage). Analysis of Variance (ANOVA) test was used to assess differences in laboratory variables obtained on admission and at 24 and 72 hours. Bivariate correlations were analyzed by Pearson’s test.

Clinically relevant variables were used to identify univariate predictors of WRF and the adverse clinical outcomes using student sample t test for continuous variables and chi-square test for categorical variables; then stepwise multiple logistic regression analysis was performed to assess the independent predictors.

Receiver operating characteristics curves were used to choose cutoffs with best sensitivity and specificity. A p value ≤ 0.05 was considered to indicate statistical significance.

Results: A total of 102 patient were eligible for this study, however 12 patients were excluded 6 patients due to technical difficulties in assessing the intra-renal vessels, 3 patients died before completing the follow up studies and 3 patients withdrew consents). Accordingly, 90 patients constituted the study population.

Baseline Characteristics: Baseline clinical characteristics of the study population are listed in table 1. Of note, about 69% of patients had ischemic cardiomyopathy.
Table 1: Baseline characteristics of the Study Participants

<table>
<thead>
<tr>
<th>Variables</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical and laboratory data</td>
<td></td>
</tr>
<tr>
<td>Age, year</td>
<td>57.5 ±11.1</td>
</tr>
<tr>
<td>Male</td>
<td>56 (62.2)</td>
</tr>
<tr>
<td>Body mass index, Kg/m2</td>
<td>29.3 ±4.9</td>
</tr>
<tr>
<td>Body mass index ≥ 30</td>
<td>43 (47.8)</td>
</tr>
<tr>
<td>Current smokers</td>
<td>32 (35.6)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>46 (51.1)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>48 (53.3)</td>
</tr>
<tr>
<td>Heart failure hospitalization in past 6 months</td>
<td>60 (66.7)</td>
</tr>
<tr>
<td>Systolic blood pressure, mmHg</td>
<td>136.5±21.27</td>
</tr>
<tr>
<td>Heart rate, beat/ minute</td>
<td>95.2 ±20</td>
</tr>
<tr>
<td>NYHA class</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>25 (27.8)</td>
</tr>
<tr>
<td>IV</td>
<td>65 (72.2)</td>
</tr>
<tr>
<td>Laboratory findings on admission</td>
<td></td>
</tr>
<tr>
<td>Hemoglobin (g/dl)</td>
<td>12.07±2.2</td>
</tr>
<tr>
<td>Serum potassium (mEq/L)</td>
<td>4.2±0.7</td>
</tr>
<tr>
<td>Serum sodium (mEq /L)</td>
<td>137±4.5</td>
</tr>
<tr>
<td>Echocardiographic data</td>
<td></td>
</tr>
<tr>
<td>LV ejection fraction, %</td>
<td>35.6 ± 9.3</td>
</tr>
<tr>
<td>LV ejection fraction &lt; 40%</td>
<td>49 (54)</td>
</tr>
<tr>
<td>LV end-systolic dimension, cm</td>
<td>4.97 ± 0.94</td>
</tr>
<tr>
<td>LV end-diastolic dimension, cm</td>
<td>6.2 ± 0.9</td>
</tr>
<tr>
<td>Mitral E/e ratio</td>
<td>10.01±4.6</td>
</tr>
<tr>
<td>Diastolic dysfunction grade III/IV</td>
<td>22 (24)</td>
</tr>
</tbody>
</table>

Data are presented as number (%) or mean ± standard deviation, LV = left ventricle; NYHA = New York heart association.

Response to Diuretic Therapy: All patients received furosemide, 80% as IV shots and 20% as IV infusion (Table 2)

Table 2: In-hospital diuretic therapy: Use and response

<table>
<thead>
<tr>
<th>Variable</th>
<th>Median</th>
<th>Mean±SD</th>
<th>(Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretics use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily IV loop diuretic dose/patient (mg)</td>
<td>80</td>
<td>97±59</td>
<td>40-480</td>
</tr>
<tr>
<td>Cumulative IV loop diuretic dose/patient (mg)</td>
<td>490</td>
<td>604±344</td>
<td>160-1680</td>
</tr>
<tr>
<td>Diuretics response</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average net daily fluid loss, ml</td>
<td>1200</td>
<td>1315±722</td>
<td>100-3053</td>
</tr>
<tr>
<td>Total net fluid loss, ml</td>
<td>2190</td>
<td>2357±765</td>
<td>1100-5670</td>
</tr>
<tr>
<td>Decrease in body weight, Kg</td>
<td>2</td>
<td>2.58±1.47</td>
<td>0-7</td>
</tr>
</tbody>
</table>

Data are presented as number (%) or mean ± SD

Renal Function (Table 3): Compared to admission values, serum creatinine showed significant elevation at 24, 48 and 72 hours with p-value 0.0001. This was similarly associated with significant decline in eGFR and significant increase in blood urea. Plasma cystatin C showed significant increase at 24 hour and 72 hour follow up with p-value 0.005 and 0.003 respectively. 40% of the patients fulfilled the definition of WRF according to serum creatinine during index hospitalization.
Table (3): Renal function

<table>
<thead>
<tr>
<th></th>
<th>On admission</th>
<th>Fu-24h</th>
<th>Fu-72h</th>
<th>P-value (baseline Vs. 24h)</th>
<th>P-value (baseline Vs. 72h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum creatinine, mg/dl</td>
<td>1.14±0.26</td>
<td>1.26±0.39</td>
<td>1.31±0.35</td>
<td>0.0001</td>
<td>0.0001</td>
</tr>
<tr>
<td>eGFR, ml/min</td>
<td>87.3±26.6</td>
<td>82.98±34.6</td>
<td>77.5±27.2</td>
<td>0.02</td>
<td>0.0001</td>
</tr>
<tr>
<td>Urea, mmol/L</td>
<td>60.9±38</td>
<td>64.07±39.8</td>
<td>67.96±42.7</td>
<td>0.042</td>
<td>0.033</td>
</tr>
<tr>
<td>Plasma cystatin C, mg/L</td>
<td>1822.7±553</td>
<td>2027.9±710</td>
<td>2102±729</td>
<td>0.005</td>
<td>0.003</td>
</tr>
<tr>
<td>eGFR&lt;60ml/min</td>
<td>5 (5.6%)</td>
<td>23 (25.6%)</td>
<td>25(27.8%)</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Data are presented as mean ± standard deviation. * P- value by ANOVA, eGFR = estimated glomerular filtration rate.

Clinical outcomes: 93% of the patients showed clinical improvement in terms of symptoms and clinical examination, the composite adverse clinical outcome developed in 22.2% of the patients (Table 4).

Cystatin C and WRF: Elevated plasma Cystatin C on admission correlated statistically significant with elevated serum creatinine at 24, 48 and 72 hours follow up with p-values 0.03, 0.05 and 0.01 respectively and also with decreased eGFR at 24 hour follow up with p-value 0.05 (Figure 1).

Table (4): Clinical outcomes.

<table>
<thead>
<tr>
<th>Variable</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital stay, days</td>
<td>6.22± 2.3</td>
</tr>
<tr>
<td>Decrease in body weight, Kg</td>
<td>2.58±1.47</td>
</tr>
<tr>
<td>NYHA class I, II</td>
<td>77 (85.6%)</td>
</tr>
<tr>
<td>Need for ultrafiltration / dialysis</td>
<td>6 (6.7%)</td>
</tr>
<tr>
<td>Need for Vasopressors</td>
<td>11 (12.2%)</td>
</tr>
<tr>
<td>Death</td>
<td>4 (4.4%)</td>
</tr>
<tr>
<td>Composite outcome</td>
<td>20 (22.2%)</td>
</tr>
</tbody>
</table>

Data are presented as number (%) or mean ± SD

It was proposed that increase in Cystatin C by 0.3 mg/dl can be taken as a measure for WRF in patients with ADHF. In this study we found that there was statistically significant correlation between the WRF assessed by increase in plasma Cystatin C by 0.3 mg/l and WRF assessed by increase serum creatinine by 0.3 mg/l with R 0.439 and P-value 0.001.

Predictors of Adverse Clinical Outcomes: The adverse clinical outcomes occurred in 20 patients (22%): need for vasopressors in 11 patients (12 %); ultrafiltration for refractory edema in 6 patients (7%) and death in 4 patients (4 %). Among 7 variables (Male gender, prior heart failure hospitalization, left ventricular ejection fraction, left ventricular end-systolic diameter, E/e’, admission serum urea and admission plasma cystatin C) that were included in multivariate analysis, 2 variables appeared to independently predict adverse clinical outcomes: increased LV end systolic dimension and admission plasma cystatin C. (Table 5)

For the prediction of adverse clinical outcomes, LV end systolic dimensions ≥ 5.0 cm showed 85% sensitivity and 70% specificity (area under the curve 0.801; p= 0.0001) and admission plasma cystatin C ≥ 1707.5 mg/l was associated with 80% sensitivity and 72% specificity (area under the curve 0.695 and p= 0.01).
Table (5): multivariate regression analysis for predictors of adverse clinical outcome.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standardized coefficient B</th>
<th>P</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left ventricular end systolic diameter, cm</td>
<td>0.442</td>
<td>0.0001</td>
<td>0.115–0.277</td>
</tr>
<tr>
<td>Plasma cystatin C</td>
<td>0.242</td>
<td>0.01</td>
<td>0.242–0.433</td>
</tr>
</tbody>
</table>

R is 0.517 and R2 is 0.268

Discussion

The main finding of this study is that plasma cystatin C as a marker for WRF have important role in predicting adverse clinical outcomes in patients with ADHF receiving diuretic therapy.

WRF during admissions for acute decompenated heart failure has been directly associated with poor prognosis. It was found in some studies that the rise of serum creatinine ≥0.3 mg/dl is a strong predictor of morbidity and mortality. Unfortunately, serum creatinine has many disadvantages as a marker of WRF as its levels are elevated late after affection of a large proportion of the nephrons and it is affected by multiple factors as age, diet and muscle mass. The lack of early identification of WRF has hampered our ability to prevent and treat it.

Plasma Cystatin C is a better marker of renal function that can reflect the GFR better than creatinine, and its levels of are not affected by age, gender, diet, or muscle mass as creatinine.

Johan and Lassus et al, studied the use of plasma cystatin C in patients with acute heart failure as a marker of early WRF. They found that increase in cystatin C by 0.3 mg/L has a specificity of 90% and a sensitivity of 77% in predicting the development of WRF.

Also Raquel studied the role of plasma cystatin C in predicting early WRF and adverse clinical outcome including re-hospitalization and 60-days mortality in patients with acute heart failure. He found a significant correlation between increase in cystatin C by ≥0.3 mg/L and increase in creatinine by ≥0.3 mg/dl (p=0.001) and he concluded that plasma cystatin C is a better predictor of early WRF compared to creatinine or MDRD GFR and can be considered a more sensitive marker for WRF.

In this study, patients with elevated plasma cystatin C on admission were more prone to develop less change in body weight during hospitalization, and less improvement of NYHA class. Furthermore, admission value of plasma cystatin C was an independent predictor for the development of the composite adverse in-hospital clinical outcomes including death, hypotension requiring vasopressors and need for ultrafiltration for refractory edema. A cutoff value of plasma cystatin C on admission ≥ 1707.5 had 80% sensitivity and 72% specificity in predicting the development of the composite adverse in-hospital clinical outcomes.

This is consistent with the results of many studies including Changlu Gao et al who studied patients diagnosed with systolic heart failure according to clinical presentation or echocardiography for 2 years, they found that higher cystatin C levels is associated with significantly higher adverse outcome rate (P<0.0001).

Also in the study done by Johan and Lassus et al, they found that WRF defined by rise in cystatin C ≥0.3 mg/L within 48 h from admission was associated with longer hospital stay and a three-fold increase in the in-hospital mortality.

In this study, the left ventricular end-systolic diameter (LVESD) was an independent predictor for the development of the composite adverse clinical outcomes. A cutoff value of LVESD ≥ 5.0 cm had 85% sensitivity and 70% specificity in predicting the development of the composite adverse in-hospital clinical outcomes.

The LVESD is one of the parameters that reflect the left ventricular systolic function which is the most important predictor of outcome in patients with heart failure.

This study is predominantly limited by the small number of patients recruited so results should be validated in large multicenter study. Also the study recruited selected population with many exclusion criteria to avoid confounding variables; thus the results cannot be applied to general ADHF population.

Conclusion: Findings in our study suggest that admission plasma cystatin C is an independent parameters that can help identifying ADHF patients at increased risk for developing in-hospital adverse clinical outcomes.

Funding: Self-funding

Ethical clearance: Cleared by the ethical committee of the faculty of medicine, Cairo University.

No Conflict of Interest.
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11. Raquel L, Javed B, Steve E, Anekwe O. Cystatin C as a Biomarker of Worsening Renal Function in Acute Heart Failure: Insights from the DOSE Study. *Journal of Cardiac Failure* 2011.17 No. 8S

Effect of Dexamethasone on Marbofloxacin Residues in Rabbit Tissues Using HPLC

Gamal A. Shams1, Hosny A. Ibrahim1, Ashraf S. Darwish2, Hend A. Mahmoud3

1Pharmacology Department, Faculty of Veterinary Medicine, Zagazig University, Egypt, 2Biochemistry, Toxicology and Feed Deficiency Department, Pharmacology Unit, Animal Health Research Institute, Dokki, Giza, Egypt, 3Biochemistry, Toxicology and Feed Deficiency Department, Pharmacology Unit, Animal Health Research Institute, Zagazig Branch

Abstract

The present study sought to investigate the residues of marbofloxacin in different tissues of healthy rabbits as well as to detect the effect of dexamethasone on tissue residues of marbofloxacin when co-administrated together after multiple intramuscular administrations. Forty-five rabbits were divided into three equal groups (n=15); the first group, healthy male New Zealand rabbits were untreated and served as control, the second group was injected with marbofloxacin intramuscular at a dose of 2mg/kg b.wt for 5 consecutive days in the thigh muscle, and the third group was co-administrated marbofloxacin and dexamethasone intramuscularly with the same dose and same period. Samples were collected on the 1st, 3rd, 5th, 7th and 9th day from rabbit tissues (Liver, kidneys, breast muscle, thigh muscles, and lung). Samples from each rabbit were extracted and marbofloxacin residues were analyzed using HPLC with ultraviolet detection. The obtained result emphasized a widespread distribution of marbofloxacin in the tested tissues. The highest concentration (0.402±0.007 µg/gm), (0.406±0.010 µg/gm) of marbofloxacin alone or co-administered with dexamethasone was measured in kidney tissue respectively, followed by liver (0.324±0.016 µg/gm), (0.313±0.019 µg/gm), lung (0.204±0.01 µg/gm), (0.205±0.05), breast muscle (0.079±0.003), (0.080±0.006) and thigh muscle (0.0635±0.002), (0.0655±0.007) respectively with no significant changes between two groups. Marbofloxacin remained within detectable limit till the 3rd day in most tested tissues, while in kidneys and liver, it remained till the 5thday following the last intramuscular dose. The obtained results provide a basis for the rational use of dexamethasone with marbofloxacin in rabbit medicine to treat the sensitive bacterial infection with inflammatory conditions.

Keywords: Marbofloxacin, Dexamethasone, Residues, HPLC, Rabbits.

Introduction

The management of rabbits meat production showed that a very small percentage of the world meat market. This percentage has been increasing continuously throughout another 30 years. Rabbit is considered a minor food species, for that reason no drugs are specifically recorded for ones. This meat is estimated for its nutritional characteristics may be caused by lowering fat, rich in proteins of high biological value and decreasing in cholesterol content.

Due to the extra-label use of veterinary drugs, many greater remains levels may observe in the eaten animal products. Drug remains are a very small quantity of veterinary drugs that stay in animal products.

Moreover, have been suggested a number of potential harmful influences of veterinary drug residues such as allergy, antibiotic resistance, disruption of intestinal flora and chronic toxic effects. To confirm the safety of food of animal origin for consumers, therefore it could be limiting the maximum residue limits (MRL) of veterinary drugs utilized with the food animals.
Quinolone residues may be observed in the food of animal origin if proper checks and balances are not employed. It has been reported that Quinolone residues decrease the effectiveness of quinolones in human treatment due to its emergence of drug-resistant bacteria\(^6\). Marbofloxacin is a fluorinated quinolone derivative with broad spectrum activity that has been developed exclusively for use in veterinary medicine. It has a broad-spectrum and bactericidal activity against many gram-negative bacteria, gram-positive bacteria and mycoplasma SPP \(^7\). Its bactericidal action was achieved by a concentration–dependent mechanism \(^8\). It inhibits the bacterial DNA gyrase enzyme which is responsible for the supercoiling of DNA within the cells \(^9\). In fact, marbofloxacin was shown to be the most effective drug against bacterial strains isolated from rabbits infected with upper respiratory tract diseases compared to doxycycline, enrofloxacin, danofloxacin and tetracycline \(^10\).

Glucocorticoids (GCs) are a class of corticosteroids, which are a category of steroid hormones that connect to the GCs receptor (GR), which is current in nearly every vertebrate animal cell\(^11\). Anti-inflammatory factors such as Corticosteroids are utilized usually in veterinary medicine. Dexamethasone is utilized as an anti-inflammatory and anti-allergic factor for the palliative therapy of a number of conditions, comprehensive itching may be due to by dermatitis or insect bites, inflammation connected with arthritis or ulcerative colitis, and diseases of the adrenal glands \(^12\).

Information about tissue apportionment of an antibiotic may is very worthless to become better therapeutic performance and keep away from the problems connected with residues. Moreover, the objective of this research was to studied marbofloxacin’s tissue residues in rabbits after multiple intramuscular administration and to determine if co-administration with dexamethasone could change residue profile of marbofloxacin or not.

**Material and Methods**

**Animals:** A total of Forty-five healthy male New Zealand rabbits weighing 2–2.5 kg were used in the study. The rabbits were allowed to acclimate for 7 days with free access to water and a drug free pelleted diet. They were housed in batteries in the post-graduate research laboratory at the Faculty of Veterinary Medicine, Zagazig University. No clinically significant abnormalities were noted on rabbits. The study was approved by the Institutional Animal Care and Use Committee (IACUC) of Zagazig University. All animals were humanely handled.

**Chemicals and reagents:** The 10% Marbocyl (a Commercial veterinary formulation whose active ingredient is marbofloxacin) suitable for intramuscular injection was kindly provided by veterinary vetoquinopharmaceuticals (France). Marbofloxacin standard with a chemical purity of (99.82%) was provided by SIGMA ALDRICH (Germany). Methanol, acetonitrile and formic acid of high-performance liquid chromatography (HPLC) grades were purchased from Merck (Germany). The other reagents used in this study were all of analytical grades. Deionized water was purified by using a Milli-Q-system (Millipore, USA).

**Drug administration and sampling:** Rabbits were randomly divided into three groups with fifteen rabbits in each group. Group 1 was used as a control and was treated with the administration medium (physiological solution). Group 2 was weighed and intramuscularly injected on the thigh muscle with Marbofloxacin at the dosage of 2 mg/kg body weight for five consecutive days. Group 3 weighed and intramuscularly co-administered Marbofloxacin and dexamethasone at the dosage of 2 mg/kg body weight for five consecutive days. Three rabbits were slaughtered on 1st, 3rd, 5th, 7th and 9th day after last intramuscular dose respectively. Control rabbits (blanks) were sacrificed 96 h after the end of treatment. Samples of tissues including lung, liver, breast muscles, thigh muscle, and kidney were collected from each animal and stored at -800°C until analysis.

**Analytical procedures**

**Preparation of samples for analysis:** At the time of assay, frozen tissues were partially thawed at room temperature (23°C) for 30 minutes and blended in a food processor for 20-30 seconds at high speed to obtain a uniform paste-like consistency. The extraction was done by using a previously described method (Ding et al, 2013). Briefly, Three grams of tissue were accurately weighed and transported into a polypropylene centrifuge tube. Fifteen ml (15) extraction solution (0.015 mol/L phosphoric acid and 0.015 mol/L perchloric acid in water-methanol (50:50 v/v)) were added and shaken for 1 min. After shaking, Centrifugation was performed (15000 rpm for 8 min) then followed with Hydrolysis for 90 min in 50°C water bath then cooling to room.
temperature. Again, Centrifugation was performed (5000 rpm for 10 min) and An aliquot (50μl) was injected into the HPLC system.

**High-performance liquid chromatographic condition:** The HPLC system (LC Jasco, Italy) consisted of a quaternary gradient system (PU 1200) with an ultraviolet detector set to a wavelength 295 nm. The chromatographic separation assay was performed with the Hypersil gold C18 column (4.6 mm×100 mm×5 μm) (Surveyor, thermo scientific company, Germany) preceded by a security guard column with the same stationary phase. The system was maintained at 25 °C. The mobile phase consisted of 12% acetonitrile, 0.75% formic acid and 0.4% triethylamine at elution flow rate 1 ml/min.

**Statistical analysis:** The data were calculated as mean ± standard deviation (SDs). All statistical analysis was carried out using One way ANOVA. P value higher than 0.05 was considered significant.

**Results**

Marbofloxacin was determined using HPLC method, and no having internal cause interference was reported on chromatograms. The limit of quantization (LOQ) for marbofloxacin was specified have as the foundation for on a single-to-noise rate higher than10, and the LOQ values were 0.01μg/g. Marbofloxacin concentration was linear within the range of 0.025–1.0 μg/g (r> 0.998), standard curve of marbofloxacin were shown in figure (1) The Mean recovery of marbofloxacin ranged from 98.2-102.82 %. Repeatability was measured as within-run and among-run coefficient of differences, worth’s of which were less than 7.52%.

The results for marbofloxacin elimination from rabbit tissues at different times after intramuscular administration (2 mg/kg b.wt once daily for 5 consecutive days) were represented in the table (1). The data represented in this table emphasized a widespread distribution of the drug in the tested tissues (liver, kidney, breast muscles, lung, and thigh muscle). Marbofloxacin remained within detectable limit till the 3rd day in most tested tissues while in kidneys and liver it remained till the 5thday following the last intramuscular dose.

The highest concentration (0.402±0.007 μg/gm), (0.406± 0.010 μg/gm) of marbofloxacin alone or co-administered with dexamethasone was measured in kidney tissues respectively, followed by liver (0.324±0.016 μg/gm), (0.313± 0.019 μg/gm), lung (0.204±0.01 μg/gm), (0.205±0.05), breast muscle (0.079±0.003), (0.080±0.006) and thigh muscle (0.0635±0.002), (0.0655±0.007) respectively. There were no significant changes in marbofloxacin depletion when administered alone or in combination with dexamethasone.

**Table (1): The mean concentrations of marbofloxacin in tissues(µg/gm) of rabbits following the last intramuscular administration (2 mg/kg b.wt once daily for 5 consecutive days) alone or in combination with dexamethasone. Mean ± SD (n=3)**

<table>
<thead>
<tr>
<th>Tissues</th>
<th>Marbofloxacin</th>
<th>Marbofloxacin and dexamethasone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time post treatment (days)</td>
<td>Time post treatment (days)</td>
</tr>
<tr>
<td></td>
<td>1st</td>
<td>3rd</td>
</tr>
<tr>
<td>Liver</td>
<td>0.324±0.016</td>
<td>0.064±0.003</td>
</tr>
<tr>
<td>Kidney</td>
<td>0.402±0.007</td>
<td>0.297±0.003</td>
</tr>
<tr>
<td>Breast muscle</td>
<td>0.079±0.003</td>
<td>0.027±0.004</td>
</tr>
<tr>
<td>Thigh muscle</td>
<td>0.0635±0.002</td>
<td>ND</td>
</tr>
<tr>
<td>Lung</td>
<td>0.204±0.01</td>
<td>0.086±0.009</td>
</tr>
</tbody>
</table>

ND = not detected P ≤ 0.05 significant
Discussion

Rabbit meat, although representing a small market percentage in most Middle East countries, has been a valuable meat resource. Drug depletion from the food-manufacturer from components animal, the type should be estimated to limit the time necessary previously the drug cases from the animal tissues and to estimate when the treated animal can be safely consumed. Suitable and sensitive analytical methods are needed to monitor quinolone residues in food and to determine to retreat periods in rabbits after pharmacological therapy. When fluoroquinolones are not adequately administrated to food-producing animals following the legal indications for registered drugs, they can foster drug-resistance phenomena and, if absorbed at certain concentrations, might cause serious pathological changes in the joints of children’s and teenagers.

It is exceedingly known that the co-management of two drugs possibility influence the absorption, apportionment, biotransformation and/or excretion of both factors. The pharmacokinetic interactions between steroidal anti-inflammatory drugs (SAIDs) and antimicrobial drugs have been little studied in veterinary medicine, given their frequent clinical use in combination. SAIDs representative dexamethasone is successfully applied together with bactericidal antibiotics in the treatment of some diseases in different animal species (cows, horses, dogs and cats, and others).

At 24 h after the end of treatment, marbofloxacin concentrations in the tested tissues (Liver, Kidney, and Lung) were higher than the maximal residual limit (MRL) (150µg/kg) recommended by EMEA. However, its concentrations in thigh muscle and breast muscle were below the lowest MRL reported by EMEA. This finding is in agreement with (1) who stated that marbofloxacin in rabbit’s muscle was lower than those measured in the liver and kidney after subcutaneous injection (S/C) at a dose of 2 mg/kg body Wight daily for 5 days. This result strongly supported the safeness of eating the muscle of the rabbit after one day of treatment with marbofloxacin even from the injection site (Thigh muscle).

Marbofloxacin residues have not detected in thigh muscle at the 3rd day, while it was less than the LOD of the analytical method in the Breast muscle and Lung on the 5th day. However, it persisted till the 5th day in the Liver and Kidney following the last intramuscular dose. This is consistent with who reported that the withdrawal time for marbofloxacin in broiler chickens was about 3 days after oral administration at a dose of 2 mg/kg b.wt for 3 days and in agreement with who stated that the withdrawal period was 4 days after oral administration of marbofloxacin to broiler chicken at a dose of 5 mg/kg b.wt for 3 days. Moreover, the withdrawal period in rabbits was 2 days after S/C injection of marbofloxacin at a dose of 2 mg/kg b.wt for 5 days in accordance with previous data mentioned by (1). Indeed, like variations are comparatively popular and usually connected with a lot of agents such as breed, age, body weight, gender, diseases, and heritable traits. Pharmacokinetics is variation possibility to outcome from various edible habits, exercise, and water intake. These suggestions are supported with results published by that demonstrate that the withdrawal period of marbofloxacin for chickens either healthy or infected with E-coli was 3 days after oral treatment at a dose of 2 mg/kg b.wt for 5 days.

The results obtained in the present study confirmed that the absorption and distribution of marbofloxacin injected to rabbits via intramuscular route achieved high levels in a short time in kidney, Liver, Lung, and muscles. It was observed that marbofloxacin residues probably higher in kidneys than other examined tissues and this was in agreement with but was contrast with (1) who found that the concentration was more in Liver than kidney.

Conclusion

In conclusion, co-administration of dexamethasone with marbofloxacin doesn’t alter the high performance liquid chromatographic residual picture of marbofloxacin. Marbofloxacin residues were below the recommended MRL in breast and thigh muscle of rabbits at the 1st-day post-treatment, while in liver and kidney at the 3rd and 5th days post-treatment respectively. Thus, Rabbit’s meat could be eaten safely in the 1st-day post-treatment while in liver and kidney at 5th days post-
treatment without any health hazards on consumers. The obtained results provide a basis for the rational use of dexamethasone with marbofloxacin in rabbit medicine to treat the sensitive bacterial infection with inflammatory conditions.

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**Ethical clearance:** Cleared by the ethical committee of Biochemistry, Toxicology and Feed Deficiency Department, Pharmacology Unit, Animal Health Research Institute, Zagazig Branch

**Conflict of interest:** Nobody of the authors has any financial or individual connections that possibility unsuitable affect or bias the content of this study.

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