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Details of papers published in the journals other than UGC notified journals 2020

S.N	Publication type	Publication title	Author name	Journal name	Year
1.	Original article	Understanding etymology: awareness among doctors and a tool in successful medical education	Ebenezer DA, Saravanan M	International Journal of Medical Science and Education	2020
2.	Original article	Assessment of influence of Screen time on Quality of sleep among dental students	Anuradha Natarajan, Rekha Kanagamuthu, Mansi Sivagandhi Reddy, A.S. Sindhuja	Annals of International Medical and Dental Research	2020
3.	Original article	Influence of six weeks of supine slow leg raising abdominal exercise on abdominal fat	Mohamed Rayeez A, Anu S , Rajalakshmi Preethi G, Saravanan PSL, Jeyashree K	National Journal of Physiology	2020
4.	Original article	Profile of vitamin B12 deficiency and analysis of contributary factors among inpatients in a tertiary care hospital in Madurai, South India	Vairapraveena Ramesh, Sangeetha Ashokan, Anu Sengottaiyan, Vijay Anto James	Journal of Evidence Based Medicine and Healthcare	2020
5.	Original article	Assessment of Psychomotor skill using mentally guided imagery and physical practice in postgraudate emergency medicine students – a comparative study	S Anu, N Uwaraja, R Somaskandan, R Vairapraveena, K Jeyashree, VB Ranjith	Journal of Clinical and diagnostic research	2020

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6.	Original article	Evaluation of spontaneous locomotor activity of aqueous extract of Azadirachtaindica in mice	Brajesh Thankamony, Jesudoss Prabhakaran, J. Mohan, Raj Kishore Mahato Mahato	National Journal of Basic Medical Sciences	2020
7.	Original article	A Vignette on the Trend of Medicolegal Cases in a Tertiary Care Hospital in South India	Yogesh C, Amirthvarshan, Paranthaman, Priyanka	Indian Journal of Forensic Medicine & Toxicology	2020
8.	Original article	An Exploration into the biography of road Traffic Accident Cases in a Tertiary care hospital in South India	Yogesh C, Paranthaman, Amirthvarshan, Priyanka	Indian Journal of Forensic Medicine & Toxicology	2020
9.	Original article	A Qualitative Exploration of Substance Abuse among the Nursing Students of Coastal Karnataka	Dharnappa Poojary, Madhumitha Muruganandam, Avinash Kumar, Ganaraja B,Sneha Shetty Bhoja, Trupti Bodhare, Rashmi K	Indian Journal of Forensic Medicine & Toxicology	2020
10.	Original Article	E-learning: a key to sustain learning during COVID-19 pandemic	Bodhare T.	International Journal of Health & Allied Sciences	2020
11.	Original Article	Knowledge, attitude, and practice of post-natal exercises among post- natal women from a tertiary care centre, South India	Raja Sundaramurthy, Sasikala Kathiresan, Sriandaal Venkateshvaran, Surya Kannan	International Journal of Reproduction, Contraception, Obstetrics and Gynecology	2020
12.	Original Article	Profile of Vitamin B12 Deficiency and Analysis of Contributory	Vairapraveena Ramesh, Sangeetha Ashokan, Anu	Journal of Evidence Based	2020

		Factors among Inpatients in a Tertiary Care Hospital in Madurai, South India	Sengottaiyan, Vijay Anto James	Medicine and Healthcare	
13.	Original article	Relation of Serum Cholinesterase with Clinical Severity and Treatment Outcomes of Organophosphorus Poisoning in a Tertiary Care Center, a Prospective Observational Study	P. Yuri Gagarin, R. Lavanya Rajagopal	International Journal of Contemporary Medical Research	2020
14.	Original article	Clinical profile & outcomes in organophosphorus poisoning in a tertiary care centre, a prospective observational study	P. Yuri Gagarin, R. Lavanya Rajagopal	International Journal of Medical Research & Review	2020
15.	Original article	Role of mean platelet volume as predictive.Master of hypertensive vascular complications	R. Lavanya Rajagopal, P. Yuri Gagarin	Journal of Evidence based Medical Health Care Advance in Medicine	2020
16.	Original article	Self gripping mesh versus polypropylene mesh in ventral Hernia repair- an observational study	V. Om Kumar, Venkatesh Subbiah	International Surgery Journal	2020
17.	Original article	Acute Pancreatitis in Children – A Retrospective Observational	Arun AC,Jenish Rajma	International Journal of Medical	2020

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		Study in a South Indian Tertiary Care Hospital		Reviews and Case Reports	
18.	Case Report	Hyperpigmentation in a newborn: Not to forget this common cause in tropical countries: A case report	Jenish R, Arun AC	Sri Lankan Journal of Infectious Diseases	2020
19.	Original article	Screening for congenital Hypothyroidism using cord blood TSH in resource limited settings – An observational retrospective study.	Karthick Raj T, Jenish Rajma, Anu Tresa	Indian Journal of Applied Research	2020
20.	Original article	Unusual Case of Abscess involved in Head and Neck region caused by Burkholderia species	Sathasivam P, Rajavel S	Otolaryngology International	2020

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Original Research Article

UNDERSTANDING ETYMOLOGY: AWARENESS AMONG DOCTORS AND A TOOL IN SUCCESSFUL MEDICAL EDUCATION

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ABSTRACT

Background: The language of medicine has been derived from Latin and Greek, and so do many words used in the English language. Knowledge of etymology will aid in better fixation of medical terms if connections are made between words used in English and medicine. For those medical terms that have no parallel in English, the introduction of the new term with etymology will create interest and make learning an enjoyable experience. **Material & methods**: In this cross-sectional study, 214 preclinical medical students were randomly separated into two groups. One group was taught osteology of skull with etymology while the control group was taught the same topic without etymology. After the session questionnaire and feedback forms were administered to the students and evaluated. To find out awareness about etymology among doctors a questionnaire was administered in which 44 doctors took part. **Results:** A strong correlation has been found to exist between teaching with etymology and performance in the evaluation immediately after the class. This group also rated the class to be fun and enjoyable, was able to better recall the terms, spell terms more accurately and was able to better understand the topic. The etymology awareness questionnaire for the doctors brought to light the very poor knowledge that most doctors have regarding medical etymology. **Conclusion:** This study recommends that medical faculty educate themselves on etymology and incorporate it into teaching for an intellectually satisfying class that will with the same stone etch the newly introduced terms in the minds of the student and result in successful learning.

Keywords: Medical Education, Medical Etymology, Medical Terminology, Teaching Faculty, Student Success

INTRODUCTION

The objectives of studying medical etymology according to Stedman's medical dictionary is "to guide the student of medicine to speak more carefully, write more precisely, even coin new words more accurately". The study of the origins of medical terminology can be rewarding fun. Rewarding, because it makes difficult medical terms much easier to learn and retain and at the same time is a hobby that affords much intellectual pleasure and satisfaction. Fun, because many of our words have intriguing, romantic or even humorous origins **(1)**.

The majority of our medical terms stem from Latin and Greek. Indeed it is impossible to appreciate much of the English language itself without some knowledge of these dead languages. In fact, 35% of English words trace their etymology to Latin and Greek **(2)**.

We hypothesized that teaching medical terminology with its etymology will result in better fixation of terms and learning becomes enjoyable. Should this method of teaching prove to have a strong correlation, we want to see if the teaching faculties

in medical colleges are aware of etymology to meet this need.

MATERIALS AND METHODS

This is a cross-sectional study using both quantitative and qualitative analysis. Participants were 214 preclinical (medical and allied health) students and 44 doctors who are teaching faculty in the capacity of Professors, Associate Professors and Assistant Professors from various departments. It was done in Velammal Medical College Hospital & Research Institute, Madurai, India.

The students were divided into two groups randomly. The duration of the lecture was one hour. The experimental group consisting of 106 students was taught the osteology of the skull wherein new terms were introduced with its etymology. This group was also reminded of ordinary English words that shared a common etymology as that of medical terminology. The control group consisting of 108 students was taught the same topic the classical way without any reference to etymology. For quantitative analysis, both groups were administered a questionnaire with ten questions where they were required to name the part of the skull indicated. For qualitative analysis, both groups were asked to give feedback to rate the class on a scale of zero (very poor) to ten (excellent). They were asked to rate how interesting the class was, were they able to recall new terms, spell new terms correctly and able to understand the topic.

To evaluate the awareness of medical etymology among doctors, a questionnaire containing twenty-five commonly used terms from various disciplines of medicine were listed. The questionnaire was given to more than 50 doctors of which 44 agreed to take part in the study. The participants were required to anonymously give the etymology of the terms. The answer key was set in reference to Stedman's Medical Dictionary.

The questionnaire from the students and doctors were evaluated and statistically analyzed using SPSS version 23 and Microsoft Excel.

ETHICS

Formal approval from Institutional Ethics Committee was obtained. All the participants gave informed consent.

RESULTS

The quantitative analysis is given in table 1.

Table 1: Quantitative analysis of the mean score of two groups

Group	Mark ± SD (Max = 10)
Etymological teaching	4.09 ± 2.41
Classical teaching	2.83 ± 1.88

The mean score obtained by the students through etymological teaching was twice that of the mean score obtained by the students through classical teaching.

Checking the skewness using Microsoft Excel gave a positive value of 0.17 for the etymological teaching group and 0.65 for the classical teaching group. Considering the non-uniformity of the data, a non-parametric comparative test Mann-Whitney U test was applied in the SPSS software.

The Mann-Whitney U test rejected the null hypothesis with a significant level of 0.05. This showed that there is a statistically significant difference between the marks scored by etymology teaching and classical teaching methods.

The qualitative analysis given in Figure 1, shows the mean score given by the students.

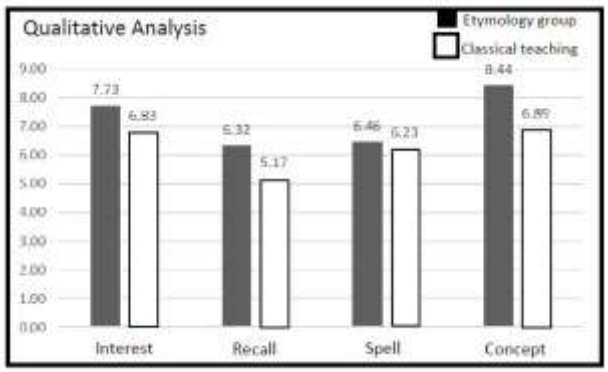

Figure 1: Qualitative analysis of the mean score of two groups

The maximum mark scored by the doctors in the questionnaire was 40% and the minimum mark scored was 0. The mean mark scored was 11.56% with a median of 8% and mode being 4%. The skewness was 1.7.

DISCUSSION

It is interesting to know that St. Peter **(3)** and petroleum **(4)** which are English words share a common etymology with the petrous part of the temporal bone [G. petra = rock]**(1)**. The petrous bone is aptly named as it is the densest bone in the human body. This is in agreement with Mc Minn who states that the "derivations of words are interesting and informative" **(5)**.

According to Kim EB et al "The key to memory is an alteration in the strength of selected synaptic connections. Synaptic conduction can be strengthened or weakened on the basis of experience" **(6)**. So more the connections, stronger the memory. This can be illustrated with the example of the etymology of the word 'temporary' [L.tempus= time] **(1)**. The introduction of the term 'temporal' [as grey hair starts here] **(5)** with reference to the word 'temporary' will result in stronger memory. Thus etymology is the key to "facilitate memory and promote association with similar derivatives" to help the student to go from what is known to the unknown.

This study confirms our hypothesis that teaching medical terms with etymology is a better tool by both quantitative and qualitative analysis. The results of our study are in agreement with Bujalková M **(7)** which reports that 70% of students prefer etymological teaching. Hallock R M et al **(8)** report that 83% of students indicated that etymology helped them better understand the terminology, 73% indicated that it helped them better apply some of the terms. According to Papoulas M and Douvetzemis S "Understanding the root, suffixes, and affixes of Greek terminology leads to an accurate and comprehensive scientific medical language where the word is self-explanatory, reflecting its own eternal semantic."**(9)** As medical research progresses the need to coin new scientific terms also arises. Knowledge of etymology will ensure that new terms are coined with accurate and apt sense. Wulff H R **(10)** states that "For medical doctors, an appreciation of the history and original meaning of words offers a new dimension to their professional language". Mehta LA et al **(11)** states that "Each term carries with it its own history, its own glory".

CONCLUSION

Our study brings out the abysmally low knowledge of etymology that medical teachers have in spite of the evidence from our study as well as from many other studies that prove its efficacy. We suggest that awareness should be created in the field of medical education regarding the benefits of etymology. It will bring intellectual satisfaction to the teacher. At the same time, it will result in better fixation of terms, interest in the subject and stronger memory.

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Assessment of Influence of Screen Time on Quality of Sleep among Dental Students

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ABSTRACT

Background: In this modern era, the usage of electronic gadgets by the students to update the knowledge in their respective fields become inevitable. The current study was designed to assess the sleep quality and its association with screen time among dental students. **Methods:** 275 dental students of both the genders in the age group of 18 to 23 years were included in the study. The quality of sleep was assessed using self-administered questionnaire (PSQI) and its association with screen time was correlated statistically. PSQI score was categorized into two groups ≤5 good sleep and >5 poor sleep quality. Screen Time was categorized into ≤2 normal & >2 high. **Results:** Prevalence of poor sleep quality was found among 49.8% of total students and increased screen time was found among final year students (91.4%). Irrespective of the academic year there was a strong association between screen time and quality of sleep which was statistically significant. (p value- 0.000). **Conclusion:** In the study there was a significant association observed between poor sleep quality and increased duration of screen time. The usage of devices with screen should be limited to improve the overall health and academic performance of the college students.

Keywords: Pittsburgh Sleep Quality Index (PSQI), Screen time (ST), Sleep quality.

INTRODUCTION

College life is the transitional period where a teenager matures to a responsible adult both physically and mentally. During this time, the usage of electronic gadgets and accessibility to various social platforms has increased for personal and academic purpose.

Sleep is a physiological state of reversible unconsciousness in which brain is less responsive to external stimuli. It is needed for physical and psychological wellbeing of a person and important for optimal biological functioning of our body. Sleep is important for consolidation of memory and cognitive function. Secretion of many endocrine hormones like growth hormone, melatonin and prolactin depends on the sleep-wake cycle. The duration of sleep requirement depends on the age.[1] Recommended sleep duration for age group ≥ 18years is 7 -9 hours per day.[2] During adolescence it was found out that there is dramatic maturational changes in sleep pattern and its neurobiological regulation. Adequate sleep will enhance academic performance, but college students are unaware of the importance of sleep on the physical health, mental health and learning. Poor sleep in adolescence may trigger many psychosomatic disorders in their latter part of life.[3] It has been observed that young adults tend to be more awake in evening hours, along with that they have difficulty in sleep initiation and insufficient sleep during night and also with day time sleepiness.[4] Nowadays insufficient sleep has become a public health issue.[5] Among the causes for sleep disturbances, screen time and light emitting devices used during late hours plays a major role.

Screen time (ST) is the amount of time spent using a device with a screen such as a smartphone, computer, television, or video game console.[6]

Sleep and screen time have an impact on each other which will affect the physical and mental wellbeing of an individual which in turn affect their academic performance. Due to advancement of teaching learning devices in this modern era, the increase in screen time by the college students is inevitable.

In this study we decided to assess the quality of sleep and to correlate with the screen time in dental students. We used standardized questionnaire (PSQI) to assess the quality of sleep. Screen time usage was obtained by using separate questionnaire.

Aim:

To assess the influence of screen time on quality of sleep among dental students.

Objectives:

1. To assess the sleep quality among dental students.
2. To evaluate the screen time among them.
3. To correlate the screen time and the quality of sleep among them.

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MATERIALS AND METHODS

The study was started after getting Institutional human ethical committee clearance. This observational study was carried out in the Department of Physiology, Sathyabama Dental College, Chennai. 275 students of both the genders from first year to interns, within the age group of 18 to 23 years were involved in the study.. Students below 17years and with history of adenoids, tonsils and sleep disorders and on other medications were excluded from the study. After obtaining informed written consent they were addressed year wise and given detailed instruction about the components of the PSQI and made to fill the questionnaire.

The quality and pattern of sleep were assessed by using Pittsburgh Sleep Quality Index (PSQI) questionnaire under seven components – subjective sleep quality, sleep latency, sleep duration,sleep disturbances, habitual sleep efficiency, use of sleeping medications and day time dysfunction over past month.

The data collected were entered in the Microsoft excel sheet.

PSQI score was categorized into two groups ≤5 good sleep and >5 poor sleep quality.

ST was categorized into ≤2 normal & >2 high.

RESULTS

Categorical variables were expressed as frequency and percentages. Continuous variables were expressed as mean and standard deviation (SD). $\chi 2$ test and correlation was used for statistical analysis. p-value of <0.05 was considered statistically significant. SPSS statistical package 20.00 was used for statistical analysis.

Table 1: Total number of study participant according to year & gender (n=275)

Year of study	Male	Female	Total
1st year	14	81	95
2nd year	0	42	42
3rd year	0	35	35
4th year	2	45	47
Interns	2	54	56
Total	18	257	275

[Table 1]: 275 students were participated in the study. Among them first year students were 95(34.5%), second year were 42(15.3%), third year were 35(12.7%), fourth year were 47(17.1%) and interns were 56(20.4%). Total females were 257(93.5%) and male were 18(6.5%)

Prevalence of high screen time was found among 87.6% of students in that 1st year showed 89.5%, 90.5% in 2nd year,88.6% in 3rd year ,91.5% in 4th year and 78.6% in interns.

[Table 2]: Prevalence of high screen time was found among 87.6% of students, in that 89.5% in 1st year, 90.5% in 2nd year,88.6% in 3rd year ,91.5% in 4th year and 78.6% in interns.

There is no statistical significance among year of study and screen time.

Total screen time mean ± standard deviation is 3.87 ±1.286. Mean screen time among each group of 1st year, 2nd year, 3rd year, 4th year and interns were 3.84±1.188, 4.14±1.475, 4.06±1.282, 3.87±1.209 and 3.59±1.345 respectively..

Table 2: Prevalence of Screen time among study participants (n=275)

Year	Screen time		$\chi 2$ (df)	P value
	Normal (≤2)	High (>2)		
1st year	10 (10.5%)	85 (89.5%)	5.528 (4)	0.237
2nd year	4 (9.5%)	38 (90.5%)		
3rd year	4 (11.4%)	31 (88.6%)		
4th year	4 (8.5%)	43 (91.5%)		
Interns	12 (21.4%)	44 (78.6%)		

Table 3: Pittsburgh Sleep Quality index (PSQI) among study participants (n=275)

Year	Pittsburgh Sleep Quality index among study participants		$\chi 2$ (df)	P value
	Normal sleep quality (≤5)	Poor sleep quality (>5)		
1st year	46 (48.4%)	49 (51.6%)	2.612 (4)	0.628
2nd year	21 (50%)	21 (50%)		
3rd year	15 (42.9%)	20 (57.1%)		
4th year	23 (48.9%)	24 (51.1%)		
Interns	33 (58.9%)	23(41.1%)		

[Table 3]: Prevalence of poor sleep quality was found among 49.8% of students, remaining students had good sleep. When analysing into different year wise poor sleep quality was found among 51.6% in 1st year, 50% in 2nd year, 57.1% in 3rd year, 51.1% in 4th year and 41.1% in interns. There is no statistically significant association between year of study and PSQI.

Pittsburgh Sleep Quality Index mean ± standard deviation is 6.15 ±3.401. Among each group of 1st year, 2nd year, 3rd year, 4th year and interns were 5.92±3.079, 7.12± 4.407, 6.74±2.984, 6.26±3.089, 5.34±3.429 respectively

Table 4: Association between gender and PSQI and screen time among study participants (n=275)

Variables		Gender		$\chi 2$ (df)	P value
		Male	female		
Screen time	Normal	5 (14.7%)	29 (85.3%)	4.224 (1)	0.4
	High	13 (5.4%)	228 (94.6%)		
PSQI score	Normal	10 (7.2%)	128 (92.8%)	0.222 (1)	0.637
	Poor	8 (5.8%)	129 (94.2%)		

Among females 94.2% had poor sleep and 94.6% had high screen time when compared to males. There is no statistically significant difference among

gender and PSQI. But screen time is statistically significant with gender (p value 0.05)

There is positive correlation(r-0.374) between PSQI score and screen time and it is statistically significant (p value-0.000)

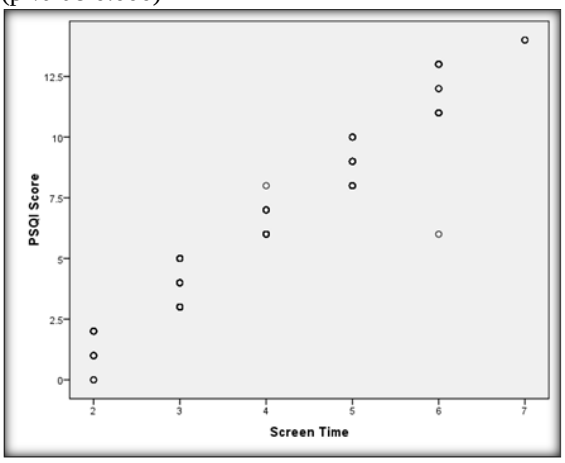

Figure 1: Scatter plot to show the relation between screen time and PSQI score

DISCUSSION

The usage of electronic gadgets has become increased tremendously in general population due to technological revolution. Among them the college students are more exposed to the screen both academically and socially. The screen time has an impact on sleep quality and daytime sleepiness.

In the study, around 49.8% of the students had poor sleep quality. A study in Indian medical students has reported that two out of ten medical students suffer from poor sleep quality.[7] In another study among undergraduates 62.6% had poor sleep quality.[8] Similar data was obtained in an Lebanese study and about 96.4% of Brazilian students had poor sleep quality.[9,10] Thus, the problem of poor sleep in college students has a public health importance.

Female college students have poor sleep quality and high screen time than males. Poor sleep quality was significantly higher in a Taiwanese study.[11] Increase prevalence of poor sleep quality may be the unique hormonal and physiological make up of females.[12] Gender difference regarding poor sleep quality begins at a very early age.[13] Menstrual cycle changes affect the sleep pattern.[14] More over female students browse study material which make them having increase chance of screen time. Blue light exposure from the screen will reduce the secretion of melatonin thereby decreases the onset of sleep, quality and duration of sleep.[15]

Limitations:

The study was conducted only among dental students, can be done with others.

The subjective questionnaire was used for the study, instead of that android applications can be used to monitor the exact screen time of the participants.

CONCLUSION

In the study there was a significant association observed between poor sleep quality and increased duration of screen time.

Since acceptable screen time is up to 2 hours per day, the usage of devices with screen should be limited within this time to improve the overall health and academic performance of the college students.

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Abstract

Introduction: Around 20% of the population in Tamilnadu has central/abdominal obesity. Obesity related metabolic and cardiovascular complications are associated mainly with abdominal obesity. Though moderate or high intensity exercises do have some effect in reducing abdominal fat, there are only very few studies depicting the importance of spot specific abdominal exercises on abdominal fat. Supine slow double leg exercise is one such exercise practiced commonly. Hence the present study aims to find out the effect of slow leg exercise on abdominal fat. Materials and methods: The study was conducted in the department of physiology of a private medical college 5 days a week for 6 weeks. Out of the 40 overweight individuals recruited, 20 were included in the study and 20 in the control group. The parameters measured include Body Mass Index (BMI), Waist Hip Ratio (WHR) and Abdominal Subcutaneous fat (SAT) by ultrasound. Results and discussion: BMI,WHR and SAT had decreased significantly (p value < 0.001) in the slow leg raising group with no significant changes in BMI,WHR in the Control group except for significant

increase in SAT. No significant difference existed between the study and the control group in the baseline parameters. Conclusion: Supine leg raise exercise when performed slowly, by exerting isometric force on the abdominal muscles, help to reduce the abdominal fat.
Key words: Abdominal fat, central obesity, Slow Leg raise exercise.

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Introduction

Obesity is increasingly prevalent worldwide due to physical inactivity and over consumption of high energy foods. According to a 2015 Indian study, 135 million and 153 million people in India have generalized and abdominal obesity.1 The percentage of women and men who were obese in Tamilnadu is 24.4 and 19.8% and the prevalence is more in urban than rural population. Individuals with central or abdominal obesity were at increased risk for hypertension, coronary artery disease, dyslipidemia, diabetes mellitus, stroke, sleep apnea, osteoarthritis, cancer, gastro esophageal reflux and polycystic ovarian disease than individuals with generalized obesity.2,3

Abdominal fat is in two compartments: Visceral abdominal fat (VAT) and Subcutaneous abdominal fat (SAT). VAT is composed of mainly omental fat, mesenteric fat and retroperitoneal fat masses. SAT is stored beneath the skin. Though many studies had shown the significant association of visceral fat with metabolic complications, subcutaneous fat also was shown to correlate with obesity related complications. The increased free fatty acid release from the visceral and subcutaneous abdominal fat reduces hepatic insulin sensitivity and favor fat accumulation in the liver.4,5Abdominal obesity is associated with high triglycerides and low high-density lipoproteins. Leptin levels correlated with subcutaneous abdominal fat and increased leptin was found to be associated with vascular dysfunction and cardiovascular complications. Angiotensinogen from adipose tissue increases the risk for hypertension. Breast and endometrial cancer in women are due to the aromatase enzyme in adipose tissue which converts sterol to estrogen.6

As weight loss is the best remedy, whole body exercises were tried to reduce the body fat. But the result on abdominal fat was negligible with low and moderate intensity exercises. A significant reduction in both VAT & SAT was observed with high intensity

intermittent exercises without change in diet in overweight and obese individulas.7,8 High intensity exercises reduced abdominal fat by increasing the release of catecholamines, glucocorticoids and growth hormone in to the circulation. As adipose tissue has abundant receptors for all these hormones, increased lipolysis and fatty acid oxidation occurs. β adrenergic sensitivity of the adipose tissue also increases. A decrease in appetite also occurs due to increased release of corticotrophin releasing hormone in the post exercise period.9

Obesity was conventionally measured with body mass index (BMI), but BMI does not account for variation in regional fat distribution. According to WHO, BMI 24-29.9kg/m2 is considered as preobese /overweight and >30 kg/m2 is considered as obese. Waist circumference (WC) and waist hip ratio (WHR) are used as indirect measures of visceral abdominal fat, but cannot distinguish between the two fat depots.10 Since these anthropometric measurements were associated with inter observer variations, ultrasound was found to be an easy, reliable, non-invasive method to measure abdominal fat. 11

Studies on effectiveness of selective abdominal exercises in reducing abdominal visceral and subcutaneous fat were inconsistent. In a previous study done on 12 different types of abdominal exercises on abdominal fat, hanging straight leg raise test showed maximal activity in all the abdominal muscles12 .Since this test will be highly challenging for the normal, non-athletic people to perform, in the present study supine double straight leg raise test exercise was chosen. Hence the purpose of the present study was to evaluate the efficacy of this simple exercise in reducing abdominal fat in overweight individuals.

Objectives

1. To assess the effect of supine slow leg raise exercise on Body mass index, Waist hip ratio and abdominal subcutaneous fat of overweight/obese individuals before and after 6 weeks of exercise training
2. To compare the effect of supine slow leg raise exercise on Body mass index, Waist hip ratio and abdominal subcutaneous fat in overweight/obese individuals with that of the controls before and after 6 weeks of exercise training.

Materials and Methods

The study was conducted in the department of physiology of a private Medical College &Hospital in Madurai over a period of 2 months from September to October 2017 after obtaining Institutional Ethical clearance. 40 healthy overweight males and females aged 19 to 23 years were chosen by simple random sampling from the list of all eligible students. After obtaining their informed consent, they were then assigned as SLR group

(n=20), and control group (n=20) randomly by using a randomization sequence generated in Microsoft Excel. Subjects were selected in such a way that their BMI >25, Waist Circumference >80cm in females and >94cm in males and Waist hip ratio > 0.9 for males and >0.85 in females. No restriction was put up on the diet pattern. Only subjects staying in the medical college hostel were included in this study to ensure that all will be almost consistently on the same diet pattern. Trained individuals, students with skeletal muscle disorders, with history of abdominal disorders /previous abdominal surgery, students suffering from cardiac, lung diseases and on medication were excluded from the study.

Description of intervention

The study was conducted in the physiology department at 4pm every day, 5 days a week for 6 weeks. The subjects were instructed to refrain from caffeine and alcohol. Every day, before starting exercises, subjects were instructed to do breathing for 3 minutes and warm up exercises for 5 minutes. After that subjects on loose clothing were asked to lie supine on the ground with legs extended and hands behind their head. They then must raise both the legs off the ground perpendicular to the hip (almost 70 degree) in full expiration without bending the knees. After raising the legs straight for a count of 2 (2 sec), the subjects must bring down both the legs in inspiration immediately for 2 counts (2sec). Without the feet touching the ground, subjects must do this maneuver for 15 times in a minute on day 1.

Data collection method & tools

Baseline data on all participants were collected using structured questionnaire. Body mass index (BMI) was assessed with weight in kilograms &height in meter square in the standing position with feet together. Weight was measured with electronic weighing scale (Doctor Beliram & sons, New Delhi) and height with a stadiometer. Waist circumference (WC) was measured in cms by placing the inch tape midway between top of the iliac crest and last palpable rib at the end of a normal expiration in an empty stomach and in a relaxed state. Hip circumference (HC) was measured around the widest portion of the buttocks. Waist hip ratio (WHR) was then calculated. Measurement of abdominal subcutaneous fat (ASC) was performed with a linear high frequency transducer, positioned transversely 1cm above the umbilicus, without exerting any pressure over the abdomen. The subcutaneous fat thickness was measured in centimeters as the distance between the skin and the outer surface of the abdominal muscles. Measurement was made at the end of quiet expiration.

Results and discussion

Statistics: The data was entered into MS excel and analyzed using SPSS v16. The values of BMI, WC and SAT before and after 6 weeks of slow leg raise exercise compared using paired t test and one-way ANOVA. Between group differences were analyzed using unpaired t test. P value < 0.05 will be the cut of to determine statistical significance.

Discussion

The baseline parameters of both the study and the control group were almost similar as shown by Table1 .In the control group, no statistically significant difference was observed for BMI & WHR but a significant difference was observed for SAT (p value 0.035) .The mean value, instead of decreasing had increased from the baseline value of 3.2600 to 3.2050 after 6 weeks. This could be attributed to the sedentary life style. Also, no statistically significant difference was observed between the control and the study groups after 6 weeks.

After 6 weeks, in the study group, there was a statistically significant decrease in the values of BMI, WHR & SAT (Table 2).This is contradictory with the results of a previous study done on obese subjects who were on isocaloric diet.7 types of abdominal exercises were practiced for a duration of 8 weeks(10minutes/day of abdominal exercise) and no reduction in body weight, body fat %, abdominal circumference and SAT was observed.13The results of the present study coincides with the results of a study which compared vacuum therapy with the abdominal exercises on abdominal obesity, where a significant decrease in BMI,WC and skin fold thickness was reported after 8 weeks.14 In another study done on obese women where both diet and abdominal exercises were prescribed for 12 weeks, a significant reduction in BMI, SAT, waist and hip circumference was noted. 15

Exercise protocol Number of sets of leg raising exercise
Week 1 Breathing exercise (BE)3 minutes, warm up (WU)5 min, leg raising(LR) 1 minutes
1 set of LR exercise (15 times)
Week 2 BE 3 minutes, WU 5 min, LR 2 minutes 2 minutes rest in between each set
2 sets of LR exercise (30times)
Week 3 BE 3 minutes, WU 5 min, LR 2 minutes 2 minutes rest in between each set
2 sets of LR exercise (30 times)
Week 4 BE 3 minutes, WU 5 min, LR 3 minutes 2 minutes rest in between each set
3 sets of LR exercise (45 times)
Week 5 BE 3 minutes, WU 5 min, LR 3 minutes 2 minutes rest in between each set
3 sets of LR exercise (45 times)
Week 6 BE 3 minutes, WU 5 min, LR 4 minutes 3 minutes rest in between each set
4 sets of LR exercise (60times)

Table: 1 Baseline characteristics of study groups

Control vs. Slow SLR (unpaired t test)
Control SLR p
Mean±Standard
Deviation Mean±Standard Deviation
BMI before 27.69±2.54 27.74±3.05 0.958
Waist Hip Ratio .87±.06 .90±.05 0.061
Abdominal subcutaneous fat (cms) 3.26±.73 3.61±1.03 0.224

Table 1 show that there was no statistically significant difference between Control group and Slow Leg Raising (SLR) group in all the baseline parameters

Table: 2 within group difference in parameters before and after 6 weeks
Groups Mean±Std. Deviation N Std. Error Mean P
Control Pair 1 BMI before 27.6950±2.53574 20 .56701 0.199
BMI after 27.8050±2.38139 20 .53250
Pair 2 Waist Hip ratio before .8655±.05558 20 .01243 0.072
Waist Hip ratio after .8735±.05344 20 .01195
Pair 3 Abdominal fat before 3.2600±.73154 20 .16358 0.035
Abdominal fat after 3.3050±.71633 20 .16018

Slow LR
Group Pair 1 BMI before 27.7425±3.04921 20 .68182 <0.001
BMI after 25.4000±3.05958 20 .68414
Pair 2 Waist Hip ratio before .8965±.04557 20 .01019 <0.001
Waist Hip ratio after .8540±.05707 20 .01276
Pair 3 Abdominal SC fat before 3.6100±1.03308 20 .23100 <0.001
Abdominal SC fat after 2.8850±.96533 20 .21586

According to Table 2,in the control group, there was no significant difference in the values of BMI & WHR before and after 6 weeks except for abdominal subcutaneous fat. In the study group, all parameters had significantly decreased from the baseline values after 6 weeks of slow leg raising exercise.
Table 3: Between group differences before and after 6 weeks
Control SLR p
Mean±Standard Deviation Mean±Standard Deviation
BMI difference -.11±.37 2.34±1.45 <0.001
Waist Hip Ratio difference -.01±.02 .04±.03 <0.001
Abdominal subcutaneous fat difference -.05±.09 .73±.17 <0.001

According to Table 3, a highly significant difference was observed between control and

slow leg raising group after 6 weeks.

In the SLR exercise practiced during the present study, the subjects had to raise the legs slowly up for a count of two till 70◦ and then bring down for a count of two and then repeat the same without touching the ground. During the procedure, the legs should be kept extended without bending and stopped at 70 degree. This exhibits a stronger isometric force on the abdominal muscles to stabilize spine and also focuses all the different especially lower abdominal muscles. The rectus works isometrically to fix the pelvis against iliopsoas contraction. If the legs were to be lifted up to 90 degree, the isometric effect on the abdominal muscles will be very minimal because maximum contraction of the iliopsoas is possible only when both the legs are near horizontal and not vertical.16 without foot touching the ground, again both the legs have to be lifted. Due to very less relaxation time and more volume overload on the abdominal muscles with a slow leg raise, a significant decrease in abdominal fat was observed in the present study. If the exercise is performed rapidly in a faster pace, facet vertebral joint structures would be damaged thereby limiting the performance.

Specific diet is not prescribed, in the present study, to find out the effect of abdominal exercises alone on abdominal fat. A decrease in BMI indicates decrease in overall body weight .Decrease in WHR definitely indicate the decrease in abdominal fat.17The study was performed on only overweight individuals and not on normal subjects, as a significant decrease in abdominal fat was observed only in overweight and obese individuals.18As significant differences was observed between the study and the control group (Table 3), this study confirms the role of specific abdominal exercise in reducing abdominal fat.

Strength of the study is this is the first of its kind to record the effect of slow supine double leg raise exercise on abdominal fat. Warm up exercises were given initially and adequate counter poses and rest was given at the end of every day session. The duration and frequency of the exercise was increased gradually to obtain consistent results.

Limitation of the study is few more abdominal exercises could have been added to equally involve all the abdominal muscles. Waist Height ratio could have been measured. Serum triglycerides and HDL cholesterol levels could have been measured to correlate with the results of the present study.

Conclusion

Specific supine slow leg raise abdominal exercise significantly decreases abdominal fat as shown by a decrease in SAT, WHR and BMI. These exercises also prevent low back pain, inguinal hernia etc. by strengthening the abdominal muscles. When practiced

regularly along with aerobic exercises, it could prevent over all morbidities associated with both generalized and central obesity

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Profile of Vitamin B12 Deficiency and Analysis of Contributory Factors among Inpatients in a Tertiary Care Hospital in Madurai, South India

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ABSTRACT

BACKGROUND

It is well known that Vitamin B_{12} deficiency is common among vegetarians as Vitamin B_{12} is obtained predominantly from animal sources. However, recent reports show that Vitamin B_{12} deficiency is becoming more common among non-vegetarians too and surprisingly the major factor attributing to this is found to be due to dietary deficiency. We hypothesized that this could also be due to the type of non-vegetarian food consumed, cooking methods, type of utensil used, and other modifiable risk factors like smoking, alcohol and diseases causing Vitamin B_{12} deficiency. We wanted to assess the proportion of vegetarians and non-vegetarians with vit. B_{12} deficiency and analyse the contributing factors among inpatients with vitamin B_{12} deficiency in a tertiary care hospital in South India.

METHODS

This observational, prospective study was done between June and September 2019 & involved 200 Vitamin B_{12} deficiency patients in the age group of 20 - 50 years of both the genders. Patients were identified after reviewing their medical records and laboratory tests for MCV, MCH, MCHC, Hb & vitamin B_{12}. A detailed history of their food habits, practices & other relevant factors was obtained using a questionnaire. Statistical analysis was done using Mann Whitney U test.

RESULTS

There was no statistical difference ($p = 0.379$) in the vitamin B_{12} levels among vegetarians and non-vegetarians. 54.6 % of participants consumed poultry, 32.5 % consumed fruits & vegetables less than 4 times a week, 36 % & 42 % consumed fried & boiled food, 58 % used ever-silver vessels for cooking, 70.6 % used packaged milk, 23 % consumed alcohol & 21 % were smokers.

CONCLUSIONS

Vitamin B_{12} deficiency is common both among vegetarians and non-vegetarians. Among non-vegetarians, deficiency is seen more with poultry eaters, packaged milk consumers, with fried / boiled method of cooking using ever-silver vessels. Alcoholism, caffeinated beverages, smoking, presence of other diseases like diabetes, hypertension, peptic ulcer, drug intake also contributes to Vitamin B_{12} deficiency.

KEYWORDS

Vitamin B12 Deficiency, Non-Vegetarians, Vegetarians, Contributing Factors

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BACKGROUND

It is a well-established fact that vitamin B_{12} is obtained from animal sources and because of this, vitamin B_{12} deficiency is quiet common in vegetarians.[1,2] Despite this, recent findings observed an alarming increase in the incidence of vitamin B_{12} deficiency anaemia even among non-vegetarians.[3] Dietary deficiency of vitamin B_{12} was found to contribute a major role in vitamin B_{12} deficiency anaemia in non-vegetarians.

Following ingestion, vitamin B_{12} is dissociated from food proteins by hydrochloric acid and pepsin secreted by gastric parietal cells. Vitamin B_{12} then binds to salivary protein R-binder or transcobalamin I in stomach. The parietal cells produce intrinsic factor which binds with vitamin B_{12} in the duodenum after cleavage from the R-binder by the action of trypsin and other pancreatic enzymes. This binding is essential for absorption of vitamin B_{12} across the terminal ileum, mediated by the protein cubilin.[4] Any disruption in the above process results in vitamin B_{12} deficiency. A serum B_{12} above 300 pg / mL is interpreted as normal. Patients with B_{12} levels between 200 and 300 pg / mL are considered borderline, and further enzymatic testing may be helpful in diagnosis. Patients with B_{12} levels below 200 pg / mL are considered deficient.

Causes for Vitamin B_{12} deficiency in both vegetarians and non-vegetarians include defective intake, damage to parietal cells in stomach, acidic environment in duodenum and ileal diseases. Source of Vitamin B_{12} in non-vegetarians is animal foods like meat, poultry, eggs & sea foods. Apart from organic causes, in normal non vegetarians, in spite of adequate non-veg food intake, the causes for vitamin B_{12} deficiency could be due to not allowing the indoor factory farmed animals to feed on the soil, use of pesticides in farm which kill Vitamin B_{12} producing bacteria in soil, use of heavy antibiotic in animals which kills Vitamin B_{12} producing bacteria in gut of animals as well as in humans. Lifestyle changes including increased intake of fat rich junk foods, preserved foods, tea, coffee, alcohol, smoking and drugs like proton pump inhibitors, metformin could also contribute to Vitamin B_{12} deficiency.[5&6] Vitamin B_{12} (Cobalamin) is essential for DNA synthesis of red blood cells (RBC's), which helps in nuclear maturation and formation of RBC's. It is also essential for the conversion of homocysteine to methionine. Deficiency of Vitamin B_{12} results in megaloblastic anaemia due to defect in nuclear maturation, producing less & immature RBC's. In vitamin B_{12} deficiency, blood homocysteine level increases leading to atherosclerosis, increasing the risk for myocardial infarction and stroke. Methionine is essential for the methylation of myelin, DNA, RNA & neurotransmitters. Deficiency of methionine affects the myelination of the nervous system resulting in demyelination of corticospinal and dorsal column tracts. Deficiency also causes bone degradation by stimulating osteoclastic activity.

As sufficient amount of vitamin B_{12} is stored in the liver, deficiency symptoms usually take more than five years to develop. Symptoms develop early before a decrease in serum Vitamin B_{12} below the reference value was observed.[7] The onset of anaemia in case of Vitamin B_{12} deficiency is usually insidious and gradually progressive. Typically, the patient presents with smooth, beefy, red tongue often associated with diminished taste sensations. The patient may have shortness of breath, pallor, dizziness, tinnitus, fatiguability, lethargy and palpitations. Since the underlying pathologic process consists of demyelination of peripheral nerves, the spinal cord and the cerebrum, the signs and symptoms include numbness, paraesthesia, weakness, ataxia, poor finger coordination, diminished reflexes and loss of vision. Patients may come up with several mental problems like depression, memory loss, irritability, behavioural changes, panic attacks and insomnia. Untreated Vitamin B_{12} deficiency can cause pulmonary embolism, deep vein thrombosis, suppression of immune system and bone marrow failure.

The prevalence of vitamin B_{12} deficiency in Asian Indians is 70 to 80 %, especially in north Indian population is 47 %.[8] Hence the aim of this present study was to identify the proportion of non-vegetarians having B_{12} deficiency among all vitamin B_{12} deficiency patients in a tertiary care hospital in south India and to analyse the contributing factors.

Among inpatients with vitamin B_{12} deficiency in a tertiary care hospital in South India, we wanted to study the haematological profile, assess the proportion of vegetarians and non-vegetarians and analyse the contributing factors.

METHODS

This observational, cross sectional study involved 200 vitamin B_{12} deficient patients in the age group of 20 - 50 years involving both the genders, who sought admission in the General Medicine Department of a private Medical college& Hospital in South India between June 2019 - September 2019. This study was conducted after obtaining proper Institutional Ethical Committee Clearance. Patients with 1) MCV >100 fl 2) Haemoglobin < 12 gm / dL for female subjects, < 13 gm / dL for male subjects 3) WBC count < 4000 / mm^3 4) Platelet count < 150,000 / mm^3 5) Vitamin B_{12} < 200 pg / ML were included in the study.

Exclusion Criteria

1. Pregnant and lactating women. The Recommended Dietary Allowance (RDA) for vitamin B_{12} is 2.4 µg / d for adults.[9] These requirements become higher during pregnancy and lactation.
2. Elderly people who are over 50 years of age, as the Vitamin B_{12} content of healthy elderly population was found to be lower when compared with the younger age group.[10]
3. Patients with types of anaemia other than Vitamin B_{12} deficiency anaemia.
4. Patients who were on Vitamin B_{12} supplementation.
5. Patients who received blood transfusions within one month.

Data Collection Method & Tools

Medical records and laboratory tests were reviewed for identifying patients with clinical symptoms of Vitamin B_{12} deficiency anaemia and for decreased serum vitamin B_{12} levels, increase in MCV or pancytopenia. Medical records were also reviewed for pallor, glossitis, stomatitis, tingling, numbness, paraesthesia, dietary habits, personal habits, and previous history of blood transfusions, drug intake and other symptoms. Non vegetarians were defined as those consuming some meat (red meat, poultry, at least once per month) and the total of meat and fish > 1 time / week.[11] Serum vitamin B_{12} was estimated using electrochemiluminescence immune assay "ECLIA" intended for use on Elecsys and Cobase immunoassay analysers (Elecsys 2010 Modular Analytics E170 cobas e 411 Cobas E 601). After getting informed written consent from patients, values of Hb, vitamin B_{12}, complete blood count and blood indices were obtained.

Statistical Analysis

Data was analysed using SPSS v 16.0. Proportion of vegetarians and non-vegetarians was compared using Mann Whitney U test. An arbitrary cut off of 0.05 was used to interpret significance of p value.

RESULTS

Vegetarian / Non–Vegetarian	n	%
Vegetarian	92	46.0
Non-Vegetarian	108	54.0
Total	**200**	**100.0**
Gender	**n**	**%**
Male	146	73.0
Female	54	27.0
Total	**200**	**100.0**

Table 1. Proportion of Vegetarians and Non-Vegetarians & Gender Wise Distribution

Test of Normality				
	Veg / Non-Veg	Shapiro-Wilk		
		Statistic	Df	P-Value
Vitamin B12	Vegetarian	.763	92	.000
	Non-Vegetarian	.972	108	.021
Veg / Non-Veg	Vitamin B_{12} Mean Rank	Mann - Whitney U		P-Value
Vegetarian	104.40	4609.5		0.379
Non-vegetarian	97.18			

Table 2. Test of Normality & Mann-Whitney U test

History	n	%
1. Patients with Hypertension	30	15
Hypertensive patients on regular drugs	20	10
2. Patients with Diabetes Mellitus	40	20
Diabetic patients on regular drugs	30	15
3. Patients with H/O any Abdominal Surgery	35	17.5
4. Patients with H/O Peptic ulcer	15	7.5
a. Peptic ulcer patients on proton pump inhibitors	10	5
b. Peptic ulcer patients on antacids	5	2.5
5. Patients with H/O Autoimmune disease	5	2.5
6. Patients with H/O Ileal disorder	5	2.5
7. Patients with H/O Liver disorder	10	5
8. Patients with H/O Any other drug intake	20	10
9. Total number of patients consuming alcohol	46	23
a. Patients who consume brandy	17	37
b. Patients who consume beer	15	33
c. Patients who consume vodka	6	13
d. Patients who consume rum	8	17
10. Total number of smokers Cigarette / Beedi	42	21
Cigarette smokers	17	40.47
Beedi smokers	25	59.53
a. Patients who smoked 1-5 pack years of cigarette*	2	12
b. Patients who smoked 6-10 pack years of cigarette*	4	23
c. patients who smoked 11-15 pack years of cigarette*	5	29
d. Patients who smoked 16-20 pack years of cigarette*	3	18
e. Patients who smoked ≥ 21 pack years of cigarette*	3	18
f. Patients who smoked 1-5 pack years of beedi**	9	36
g. Patients who smoked 6-10 pack years of beedi**	9	36
h. Patients who smoked 11-15 pack years of beedi**	7	28

Table 3. Medical, Surgical and Personal History

* Number of cigarettes per day multiplied by duration of smoking divided by 20.
** In case of beedi smokers, the number of pack years was further divided by 4, as some articles suggest four beedis are equivalent to one cigarette. 13

Dietary Habits	n	%
1. Patients who consume milk (only milk, milk with coffee, milk with tea)	170	85
a. Patients who consume packaged milk	120	70.6
b. Patients who consume milk obtained from dairy farms	50	29.4
c. Patients who consume milk with coffee	50	29.4
d. Patients who consume milk with tea	60	35.3
e. Patients who consume only milk, without coffee or tea	60	35.3
2. Patients who consume fruits & vegetables	35	17.5
a. Patients who consume fruits & vegetables at least 2 times a day, 5 days a week		
b. Patients who consume fruits & vegetables at least once a day, 5 days a week	50	25
c. Patients who consume fruits & vegetables less than 4 times a week	65	32.5
d. Patients who consume fruits & vegetables less than 2 times a week	50	25
3. Patients who consume fish, meat, poultry	21	19.4
a. Patients who consume fish		
b. Patients who consume meat	28	26
c. Patients who consume poultry	59	54.6
4. Patients who consume fresh / preserved non-vegetarian food	99	91.7
a. Patients who consume fresh non-vegetarian food		
b. Patients who consume preserved non-vegetarian food	9	8.3
5. Patients who consume smoked / fried / boiled / grilled / non-vegetarian food	20	18.5
a. Patients who consume smoked non-vegetarian food		
b. Patients who consume fried non-vegetarian food	36	33.3
c. Patients who consume boiled non-vegetarian food	42	39
d. Patients who consume grilled non-vegetarian food	10	9.2
6. Patients who use aluminium / tin / silver / non-stick vessels for cooking	27	13.5
a. Patients who use aluminium vessels for cooking		
b. Patients who use tin vessels for cooking	40	20
c. Patients who use ever silver vessels for cooking	116	58
d. Patients who use non-stick vessels for cooking	17	8.5

Table 4. Diet History

Parameters	Mean
Haemoglobin	6 (±) 0.5 g / dL
MCV	108.4 (±) 2 fL
MCH	44 (±) 1 pg
MCHC	36 (±) 0.5 g / dL

Table 5. Haemogram Values

Shapiro wilk test and box-whisker plot revealed that vitamin B_{12} level data failed to satisfy normality assumptions. Hence, non-parametric test like Mann-Whitney U test was

used to find the difference in vitamin B_{12} level among vegetarian and non-vegetarian. On the basis of statistical significance value ($p > 0.05$), there was no difference in the vitamin B_{12} level among vegetarians and non-vegetarians.

DISCUSSION

In the present study, among the 200 vitamin B_{12} deficiency patients assessed based on their serum vitamin B_{12}, Hb content, MCV, MCH and MCHC (Table 5), 92 were vegetarians and 108 were non vegetarians (Table 1). The study results show no significant difference (p value - 0.379) in vitamin B_{12} level among vegetarian and non-vegetarian population (Table 2). This shows that vitamin B_{12} deficiency is almost equally prevalent in both vegetarian and non-vegetarian population. The results of our study differ from the results of previous studies done on vitamin B_{12} deficiency.[1,4,13] According to these studies, the prevalence of vitamin B_{12} deficiency was higher among vegetarians due to sub optimal intake of vitamin B_{12}.

Plant food is a very poor source of Vitamin $B_{12.}$ Foods rich in vitamin B_{12} include mushrooms (due to contact with B_{12} synthesizing bacteria in the soil), algae and foods fortified with vitamin $B_{12.}$ In vegetarians, deficiency is not only due to lack of non-vegetarian food, but also due to failure of regular and sufficient intake of green leafy vegetables coated with soil bacteria. Thorough washing for fear of pesticides and deep cooking reduces the level of vitamin B_{12}.[14] In our study, 32.5 % of the population consumed fruits and vegetables less than 4 times a week (Table 4).

Good sources of vitamin B_{12} include meat, fish, milk and milk products (yogurt and cheese). According to National Institute of Nutrition, Hyderabad, the amount of vitamin B_{12} for 100 g of edible portion in liver of goat, sheep is 91 mg, goat meat is 2.8 mg, egg yolk (hen) is 4.4 mg, egg whole is 1.8 mg, buffalo meat is 1.7 mg, shrimp is 9 mg, mrigal fish is 1.4 mg, cow milk is 0.14 mg, cow milk curd is 0.13 mg, skimmed milk powder is 0.3 mg.[15] Though B_{12} content of the meat is high, the bioavailability is less. The equal increase in prevalence of vitamin B_{12} deficiency in non-vegetarians could be due to the fact that in developing countries, the consumption of meat is not on a regular basis. They take meat only once a week generally as meat is expensive and the lower / middle class group cannot afford to buy. An average sized steak that is consumed by a single person in western countries will serve 6 - 8 persons after making as curry in the developing countries. Only daily meat eaters in the developing countries will have a vitamin B_{12} level similar to that of a non-vegetarian in the developed countries.[16] Among the animal foods, fish and shellfish are important contributors of vitamin B_{12}.[17] Moreover, most of the non-vegetarian population consumes more poultry when compared to meat and fish. In the present study, 54.6 % of the non-vegetarians consumed poultry and the intake of fish is only 19.4 % (Table 4). The effect of roasting and grilling on vitamin B_{12} content is minimal. However, frying causes a 32 % decrease in cobalamin content. [18] The preferred type of cooking is boiling and frying in the present study (Table 4). Only 8.3 % of the non-vegetarian participants used preserved meat. Processing of raw meat also decreases vitamin B_{12} level.[19] All these would have contributed to vitamin B_{12} deficiency in non-vegetarians.

The B_{12} status of vegetarians was mainly correlated with their intake of milk and milk products. Though vitamin B_{12} content of milk is less, the bioavailability of vitamin B_{12} is greater.[20] Half of the recommended daily intake of vitamin B_{12} is provided by 250 ml of milk. The concentrations of vitamin B_{12} in milk were affected by cow breed, season, cobalt supply, and feeding regimens. Vitamin B_{12} concentrations in milk of cows receiving a daily supplement of cobalt were higher when compared with unsupplemented cows. Heating milk at 95°C for 5 minutes, pasteurization at 75°C for 16 seconds, storing in a domestic refrigerator for nine days and day light exposure do not potentially alter vitamin B_{12} content. Whereas 30 to 40 % loss of vitamin B_{12} was observed in milk after boiling for 30 minutes or microwave heating for 5 minutes.[21] Fermentation during yogurt formation and storage of yogurt at 4° C for 14 days results in a 25 % & 26 % loss of vitamin B_{12} content. In the present study, patients who consume milk without coffee or tea is only 35.3 % and almost 70.6 % of this is packaged milk (Table 7). Coffee consumption was associated with reduced vitamin B_{12} concentration and increased homocysteine levels.[5] Coffee might increase the excretion of B-vitamins in urine. Increased consumption of coffee (29.4 %) and tea (35.3 %) by both vegetarians and non-vegetarians also could have contributed to Vitamin B_{12} deficiency.[5] Peptic ulcer especially due to *Helicobacter pylori* infection can lead to vitamin B_{12} deficiency. The infection leads to atrophic gastritis and hypochlorhydria, which results in failure of splitting of vitamin B_{12} from the food proteins and subsequent binding with R-binder.[22] Proton-pump inhibitors can also lead to vitamin B_{12} deficiency by impairing the release of vitamin. In the present study, 7.5 % of the participants had peptic ulcer (Table 3). The prevalence of vitamin B_{12} deficiency is very high among both Type I and Type II diabetes mellitus. In Type I diabetes, auto antibodies are formed against intrinsic factor and parietal cells resulting in pernicious anaemia. In Type II diabetes, vitamin B_{12} deficiency is due to the drug metformin. It causes anaemia by stimulating bacterial overgrowth in small intestine, by competitively inhibiting vitamin B_{12} absorption, by altering the intrinsic factor level and by preventing the absorption of vitamin B_{12} across ileum by binding with the cubilin receptor.[23] Out of the 200 participants in our study, almost 20 % had diabetes. Our results coincides with the results of a study conducted on the effect of metformin on vitamin B_{12} in diabetic population, where vitamin B_{12} deficiency was common among both the vegetarian (56.52 %) and non-vegetarian (35.71 %) population and the difference is not statistically significant.[24] The level of homocysteine is regulated by vitamin B_{12} and deficiency of vitamin B_{12} is associated with increased levels of homocysteine, which is an independent risk factor for high blood pressure. In our study, about 15 % of the participants were hypertensive. According to Table 3, the presence of hypertension (15 %), peptic ulcer (7.5 %), autoimmune diseases (2.5 %), abdominal surgery (17.5 %), ileal disorder (2.5 %) and drug

intake (10 %) among the study participants would have reduced the vitamin B_{12} level in both the population.

Smoking decreases serum Vitamin B_{12} concentration. In tobacco smoking patients, vitamin B_{12} levels are decreased as high amount of cyanide in tobacco smoke affects vitamin B_{12} metabolism. In smokers, there is also increased excretion of vitamin B_{12} in urine.[25] In the present study, 21 % of the male participants were smokers (Table 3). Vitamin B_{12} acts as a cofactor for the enzymes regulating homocysteine metabolism. Previous study on the effect of smoking on vitamin B_{12} in 300 male subjects showed a significant decrease in vitamin B_{12} concentration in chronic smokers as when compared with non-smokers.[26] Homocysteine was doubled. 23 % of the participants of this study were alcoholics (Table 3). Alcohol consumption reduces serum vitamin B_{12} concentration.[27] Functional B_{12} deficiency was also observed in alcoholics. They respond to vitamin B_{12} treatment inspite of normal cobalamin levels.

The type of cooking utensil used may cause changes to the contents of vitamins. Chronic use of aluminium vessel for cooking all the three meals a day for more than 10 years results in anaemia.[28] But in our study, majority of the participants used only ever silver utensils (Table 10). In the present study (Table 1), the prevalence of vitamin B_{12} deficiency was more common among male participants (73 %) when compared to female participants (27 %). The results of our study coincides with the results of two previous Indian studies which showed that men are more susceptible to vitamin B_{12} deficiency.[29 & 30] Strength of the study: The first study of its kind to measure the prevalence of vitamin B_{12} deficiency among the non-vegetarian population in south India. Limitation of the study: Because of small sample size, to extrapolate the findings to general population, large scale multicentric studies are required in the future.

CONCLUSIONS

The present study results show that the prevalence of vitamin B_{12} deficiency was nearly equal among both vegetarian and non-vegetarian population. Increasing prevalence of vitamin B_{12} among the non-vegetarian population could be predominantly due to reduced, regular consumption of milk and fish, frying of non-vegetarian food, increased consumption of beverages like coffee, smoking and alcoholism, and increased prevalence of diabetes and hypertension. It was found to be more prevalent among males than females. Identifying this deficiency in non-vegetarians could help improve their anaemia and prevent the development of long-term complications.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.
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Original Article

Physiology Section

Assessment of Psychomotor Skill using Mentally Guided Imagery and Physical Practice in Medical Interns- An Interventional Study

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ABSTRACT

Introduction: Mentally Guided Imagery (MGI) has successfully been applied in sports for skill acquisition and performance enhancement. Despite the fact that athletes often use mental imagery as a part of their preparation, it has not been extensively explored as a learning technique in medical education. Few studies had highlighted mental imagery as a way to review and practice surgical skills efficiently. The present study aimed to assess the efficiency of intubation skills acquired through mental imagery in medical interns.

Aim: To assess and compare the effect of Guided mental imagery and physical practice using mannequins on intubation technique among 40 medical Interns after seven days of training.

Materials and Methods: The study was conducted in the Department of Emergency Medicine, Velammal Medical College and Hospital, Madurai over a period of seven days. Forty house surgeons were randomly divided into two groups. Group A (n=20) practiced MGI on intubation technique and Group B (n=20) practiced on mannequins one hour everyday for seven days. The performance of the students was assessed using a graded Objective Structured Clinical Examination (OSCE).

Results: Results of Group A and Group B were analysed and compared statistically using paired and unpaired t-test. Though there was significant difference between the pre and post values in the MGI group ($p<0.001$), there was no statistically significant difference ($p=0.216$) in the post-intervention scores between the Mentally Guided Imagery (MGI) and physical practice group.

Conclusion: Guided mental imagery was as effective as additional physical practice for medical students learning to perform intubation.

Keywords: Intubation, Mental imagery, Neuroplasticity

INTRODUCTION

The MGI is an intervention by which a person evokes and generates mental images that recreate various perceptions without the actual stimuli. It is a simple yet potent technique that points imagination in proactive and pragmatic way. It is the process of "seeing with the mind's eye" without a direct external stimulus.

MGI has successfully been applied in sports for skill acquisition and performance enhancement [1]. Despite the fact that athletes often use mental imagery as a part of their preparation it has not been extensively explored as a learning technique in medical education.

There is a perspective that mental imagery involves activation of visual areas in prestriate occipital cortex, parietal and temporal cortex, and that these areas react in the same way as they do in perception [2]. High level visual areas i.e., anterior parts of ventral temporal lobe is associated with changes in semantic content of visual scenery and low level visual area i.e., occipital cortex is associated with visual detail. There are to and fro projections between these two areas. Damage to anterior areas of temporal cortex predominantly because defects in visual imagery, related to objects and colour. The generation, visualisation and rotation of mental images from memory depend on left and right posterior hemisphere [3].

In perceptual learning, performance improves when a task was practiced repeatedly. Neural synaptic changes happen in specific areas of the brain, depending on the task performed, including activation of supplementary motor area, premotor area, and somatosensory areas. Equal changes could also occur in these areas by mental imagery technique, in the absence of physical stimulation as both share common neural mechanisms [4,5]. Mental imagery could function like afferent sensory perception and would enhance the performance of a perceptual task.

Mental imagery was categorised according to the purpose and can be used to practice motivational-general aspect of memory (emotions), motivational-specific aspect of memory (goal oriented), behavioural skills and motor skills [6]. The role of mental imagery in reducing stress, respiration, heart rate, blood pressure, cortisol levels, blood lipids, immune responsiveness, metabolic rates in cells, gastrointestinal motility and secretion, sexual function and stroke rehabilitation had well been documented in many previous studies [7,8].

There are only few studies that highlight mental imagery as a way to review and practice surgical skills efficiently. It has been shown that mental imagery augments the development of certain surgical skills like suturing, venepuncture and lumbar puncture [9-11]. Few studies had also shown that mental imagery enhances performance of surgeons in virtual reality based laparoscopic surgeries [12]. Hence, this study was aimed at assessing the efficiency of intubation skills acquired through mental imagery in medical interns.

1. To assess the effect of Guided mental imagery practice on intubation technique using OSCE after seven days among 20 medical interns.
2. To assess the effect of physical practice on mannequins on intubation technique using OSCE after seven days among 20 medical interns.
3. To compare the skills of both guided mental imagery group and mannequin group on intubation technique after seven days.

MATERIALS AND METHODS

The present interventional study was conducted on 40 medical interns in the Department of Emergency Medicine of a private medical college in Velammal Medical College and Hospital, Madurai after obtaining the Institutional Ethical Committee clearance (IEC No: VMCIEC/46/2018). The participants chosen were allocated in two

groups: Group A (n=20) who practiced MGI and Group B (n=20) who practiced on mannequins randomly by using a randomisation sequence generated in Microsoft Excel. Informed, written, voluntary consent was obtained from each participant. Duration of the study is seven days.

Inclusion criteria and Exclusion criteria: Interns of both the genders aged 21-24 years were included in the study. The students must have a basic knowledge on how an intubation is done. Those students who were found to be well trained in intubation technique, assessed using a questionnaire, were excluded from the study.

Description of Intervention

On the 1st day, the participants listened to a common basic lecture and underwent a demonstration on intubation in a mannequin. Then both the groups physically practiced the technique for 10 minutes each. A pre-test was conducted on day 2 using OSCE. From the next day, Group A participants were made to practise mental imagery technique for 30 minutes a day for next five days. They were taken to a separate room where they will be allowed to relax in comfortable chairs. As the first step, they were asked to close their eyes and take refreshing deep breaths. Then, they were asked to visualise themselves performing an intubation on a patient following an audio recorded script that would read all the intricate steps of performing an intubation. Group B students were allowed to practice on mannequins for 30 minutes a day for next five days.

Data Collection Method and Tools

Performance of the students was assessed using a graded OSCE. Content of the audio recorded mental imagery script as well as the OSCE steps were developed by experts in emergency medicine. On day eighth, assessment was done during two sessions for all the 40 students on mannequins (General doctor J5 S). Each student was given a time of 10 minutes for intubating the mannequin. Each session which lasted for 4 hours involved the assessment of 20 students from mental imagery group (n=10) and physical practice group (n=10). The assessment was done by the same observer for both the sessions. After the data collection, for the benefit of all interns who participated in the study, cross over was done and the procedure repeated.

Day 1- Lecture and Demonstration

Day 2- Pre-test and then divided into Groups A and B

Days 2-7- Group A underwent MGI practice and Group B physical practice

Day 8- Post-test using OSCE

OSCE: 16 Steps for assessment (each step carries 1 mark)

1. Check for equipments 2. Selection of laryngoscope, ET-Tube 3. Pre-oxygenate with ambu bag 4. Position the patient 5. Open the patient mouth with cross finger techniques 6. Grasp the laryngoscope in left hand 7. Slowly insert the blade into the right side of the patient's mouth and push the tongue to the left 8. Advance the blade and place it in the vallecula 9. Apply external laryngeal manipulation pressure 10. Visualise the vocal cord by lifting the handle 11. Grasp the ET-Tube in right hand 12. Gently insert the ET-Tube along the right side of the mouth under direct visualisation of the vocal cord 13. Withdraw the blade and inflate the ET-Tube cuff with air (5-10 mL) 14. Assess the placement of ET-Tube by bilateral breath sound, symmetric chest movements, absence of breath sound over the epigastrium 15. Fix the tube at appropriate length at the level of incisor 16. Connect to the mechanical ventilator.

STATISTICAL ANALYSIS

The data was analysed using Statistical Package for the Social Sciences (SPSS) version 16.0. Paired and unpaired t test were used to compare the values within the group (before and after) and between the groups respectively. An arbitrary cut off of 0.05 was used to interpret significance of p-value.

RESULTS

According to [Table/Fig-1], the mean scores had increased after the intervention in both groups A (from 9.5 to 12.7) and B (from 8.9 to 12.1) after intervention. A statistically significant increase in mean scores was observed in both the groups after the intervention [Table/Fig-2].

	Total		Group A		Group B	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Pre	9.2	1.6	9.5	1.9	8.9	1.3
Post	12.4	1.6	12.7	1.7	12.1	1.5

[Table/Fig-1]: Comparison of pre and post mean values of Group A and Group B.

Groups A and B	Mean	N	Std. Deviation	p-value
Pre	9.18	40	1.631	<0.001
Post	12.35	40	1.594	

[Table/Fig-2]: Comparison of mean pre and post (after seven days) values of both Groups A and B.
p-value< 0.05 is considered as statistically significant

[Table/Fig-3] shows that no statistically significant difference was observed between the difference in mean of pre and post scores of groups A and B. That means MGI technique was almost as effective as the physical practice in learning skills.

Groups	N	Mean	Std. deviation	p-value
Group A	20	3.1500	1.03999	
Group B	20	3.2000	0.83351	0.216

[Table/Fig-3]: Comparison of difference in mean of pre and post intervention values between Group A and Group B.

DISCUSSION

The results of the present study is consistent with the results of a study done to teach the venepuncture skill to medical students, where after receiving the lecture demonstration and guided physical practice for 30 minutes, the physical practice group participants received one additional session of 30 minutes physical practice and mental imagery group received one additional session of guided imagery. Both the groups showed improved performance but do not statistically differ from each other [9]. In another study done to learn the technique of lumbar puncture on simulators by medical students, where the performance was assessed with the OSCE scores, the results of the mental imagery and the physical practice group do not differ from each other [10]. Also, in a previous study done to assess the learning of suturing technique on a live pig's foot, the results of the initial physical practice followed by mental imagery rehearsal group was statistically equal to physical practice alone group [11].

In the present study, even for the mental imagery group one session of physical practice training was conducted before the beginning of the intervention, as this technique is not at all a replacement for physical practice. It was a failure when practiced as a sole method of training without a prior exposure to physical practice [13]. However, mental rehearsal definitely would be a better way to review and practice the task efficiently without any risk. This would be an additional method to enhance the performance, an adjunct to physical practice as reported by the results of the previous studies on Virtual Realistic laparoscopic cholecystectomy and laporoscopic suturing training sessions [14,15]. A preliminary exposure to physical practice is required to form a template, which the participant can use as a reference to form a mental image.

Mental imagery practice induce neuroplastic changes in specific areas of the brain by reorganisation due to short and long term action on synapses. This plastic change is detectable at minimal one week and maximal at four weeks. Very few studies contradict the positive effects of MGI, as evidenced by a 2014 study where

neuroplastic changes were not observed in the cortical areas after MGI intervention [16]. But majority of studies confirm the positive role of MGI [17].

Mental imagery is synonymous with mental rehearsal and mental practice. Here participants imagine the experience of performing a skill in elaborate detail in the absence of a stimulus, before its actuation and can produce genuine sensory and perceptual experiences. A review article had reported that successful mental imagery designs were obtained with interventions based on motor and strength-related tasks, with participants aged between 20 to 29 years and of both the genders [18]. Two other important criteria include short retention interval and novice participants. In the present study, participants were new to the technique and were of the age group 21-24 years including both the genders with study duration of seven days and a shorter retention interval. As sleep was also found to enhance MGI performance, similar to physical practice, in this study MGI sessions were conducted every day for seven days [19].

MGI technique enhances the motor performance by enabling the students to prepare for the intubation procedure ahead of time, by building confidence, focusing attention, by identifying complications and solutions and by priming the skeletal muscles to perform physically [20]. By rehearsing again and again, the interns could have understand the steps of the intubation procedure in a step wise, sequential way, overcome weaknesses or intraoperative errors in performance and thought about to how to actually perform the procedure in right way.

An important barrier to concentration and attention during MGI technique is stress, anxiety, and negative thoughts. That was the reason the interns were instructed to relax in the sitting position for few minutes and then take down deep breathing exercises which could reduce stress by balancing the autonomic nervous system and enhance selective attention [21]. Tasks with specific goals and shorter duration were found to be more effective [20]. In this study, the task was specified appropriately and time duration was around only one week. Previous studies had highlighted the effectiveness of MGI on other surgical skills. But its effect in acquisition of intubation skills was for the first time proved to be equally as effective as that of the physical practice.

Limitation(s)

Limitation of the present study was that it should have been done on a larger sample size with a control group. MRI of brain, if done, could have substantiated the neural changes after MGI.

CONCLUSION(S)

MGI was as effective as additional physical practice for medical students learning to perform intubation. Guided mental imagery in acquisition of surgical skills considerably decreases the expense of repeated practice, simulators and staff support. Ultimately, this practice can be incorporated for individualistic 'anytime-anywhere' try out. Incorporating the use of mental rehearsal as an adjunct to physical practice in an effort to facilitate skill acquisition was found to be beneficial.

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Original article

EVALUATION OF SPONTANEOUS LOCOMOTOR ACTIVITY OF AQUEOUS EXTRACT OF *AZADIRACHTAINDICA* IN MICE.

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ABSTRACT

Aim and Objectives: The objective of this study would be to evaluate spontaneous locomotor activity of aqueous extract of *Azadirachtaindica* in mice.

Materials and Methods: This is an animal interventional study where 48 mice were divided to 8 groups. Each group was given the respective drug either aqueous extract of *Azadirachtaindica* or standard drug or control drug. Spontaneous locomotor activity was recorded before and after 10 days of administration of drugs using actophotometer.

Results: There was no statistically significant difference in spontaneous locomotor activity of aqueous extract of *Azadirachtaindica*, standard drug and control drug before and after administration respectively.

Conclusions: The results of this study clearly demonstrate that aqueous extract of *Azadirachtaindica* leaves doesn't possess CNS psychostimulant activity or sedative action.

Keywords: Azadirachtaindica, psychostimulant.

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INTRODUCTION:

Since animal behavior appears as the total of cognitive function, psychological status and physical condition, its assessment for experimental animals is often applied in wide-ranged scientific fields including pharmacology, toxicology and physiology.[1]

There are several established experiments to investigate emotion, recognition, and memory of experimental rodents under special environment. For example, elevated plus maze test is used to assess their anxiety.[2] Forced swim test is used to assess their depression.[3] Water maze test is used to examine their memory.[4] In addition to these behavioral tests, spontaneous locomotor activity (SLA) is often measured to assess basic status of animal.SLA is the extent of free movement in the familiar environment, which directly reflects the animal's physical and mental conditions.[1]

Approximately two-thirds of the depressed patients respond to the currently available treatments (Tricyclic antidepressants, Selective serotonin reuptake inhibitors, etc.), but the magnitude of improvement is still

disappointing. Regular use of antidepressants makes changes in CNS monoamines leading to deterioration of cognitive functioning, psychomotor impairment, confusion, physical dependence and tolerance[5]. Currently available treatment of depression is often associated with several undesirable side effects like sedation, anticholinergic effects, postural hypotension, and weight gain and cheese reaction with chronic use of antidepressantsand it is effective only in a certain portion of the patients[6]. A search for novel pharmacotherapy from herbal plants for psychiatric diseases has progressed considerably within the past decade. A large number of different herbal preparations for antidepressant drug activity have been evaluated in a variety of animal models[7].

Though effective drugs are available for depression, the adverse effects produced by their respective drugs are significant. Hence, plant products like *Azadirachta indica*, claimed to be free from all those adverse effects and less toxic than synthetic drugs may be used to effectively treat the condition, if found to be effective in experimental animal models. Hence, the objective of this study is to evaluate spontaneous locomotor activity (SLA) in all mice for ruling out stimulant activity using actophotometer apparatus.

MATERIALS AND METHODS:

This is an animal interventional study in which there was 8 groups, where each group containing 6 male albino mice weighing between 20-30g were obtained from the registered (1081/a/07/CPCSEA) Central Animal House facility of Pondicherry Institute of Medical Sciences (Pondicherry, India). Hence, a total of 48 mice were used in this study. The animals were housed in clean polypropylene cages, in groups, maintained under standard laboratory conditions with natural 12 hours light and dark cycles and ambient room temperature, with free access to food and water. The animals were acclimatized to laboratory conditions every time before testing. Experiments were conducted between 10.00 and 17.00 hours. All procedures in the study were reviewed and approved by the Institutional Committee for Ethical use of animals. The care of animals was taken as per guidelines of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA).

The test drug *Azadirachta indica* was procured from CL Baidmetha College of pharmacy, Chennai, India. Phytochemical analysis of *Azadirachta indica* showed the presence of Alkaloids, Steroids, Flavonoids, Glycosides, Terpenoids, Carbohydrates and Antiquinones. The extract was reconstituted in distilled water and then fed to the animals according to the appropriate doses mentioned below in each group.

- **Study Medications:**

Standard- Purified form of fluoxetine was obtained from Sigma Chemical Company, St. Louis, Missouri, United states of America. The powdered form was reconstituted in distilled water and then fed to the animals according to the appropriate doses mentioned below in each group.

Control- Distilled water

- **Instruments:** Digitalactophotometer for measuring locomotor activity.
- **Principle:** Locomotor activity estimates whether a test substance possesses

psychostimulant or sedative activity. Locomotor activity is considered as an index of alertness and a decrease in that indicates a sedative effect [8]. This helps to rule out any stimulant activity of the drugs involved in this study.

- **Procedure:** The locomotor activity was measured by using an actophotometer. The actophotometer contains a square arena (30×30 cm) with walls that are fitted with photocells just above the floor level [9]. The photocells were checked before the beginning of the experiment. The number of times each animal crossed the light beam was recorded automatically for a period of 5 minutes. All groups of mice as shown below were checked for locomotor activity before and after giving the respective drug to rule out stimulant activity.

➢ **Group A:** Control (Distilled water) per oral (p.o)
➢ **Group B:** Standard Drug (Fluoxetine 20mg/kg) per oral (p.o)
➢ **Group C:** Test Drug [Neem leaf extract (NLE) 25mg/kg] per oral (p.o)
➢ **Group D:** Test Drug (NLE 50mg/kg) per oral (p.o)
➢ **Group E:** Control (Distilled water) per oral (p.o)
➢ **Group F:** Standard Drug (Fluoxetine 20mg/kg) per oral (p.o)
➢ **Group G:** Test Drug (NLE 25mg/kg) per oral (p.o)
➢ **Group H:** Test Drug (NLE 50mg/kg) per oral (p.o)

- **Followed Order Of Procedures:**

Day 1-7: All groups of mice were acclimatized in the departmental laboratory and locomotor activity was recorded.

Day 8-17: 8 AM to 10 AM, respective drugs were administered orally for all mice once daily for 10 days.

Day 18 onwards: 10 AM to 5 PM, blinding was done for all groups of mice and locomotor activity was recorded.

STATISTICAL ANALYSIS:

All the parameters recorded from the above models were tabulated and expressed as mean ± SEM (standard error of mean). One-way ANOVA (analysis of variance) followed by Dunnett's test was used for analysis of data between different groups. For analysis of data between same group, Students paired "t" test was used for seven groups which followed normal distribution and Wilcoxon signed ranks test was used for one group since it did not follow normal distribution. For all inferential statistical tests, a two tailed P value of <0.05 was considered to be statistically significant and P value of <0.01 was considered to be extremely statistically significant. Graph Pad in Stat software of version 3.06 was used for analysis of data.

Figure 1: Locomotor activity using actophotometer

RESULTS:

Table 1: Evaluation of Locomotor Activity of mice in Groups A, B, C, H (Mean ± SEM) n (Number of mice) = 6 in each group;[NS] – Not significant before vs. after, * data was analyzed by using Wilcoxon signed ranks test, ** data was analyzed by using Paired t test.

Groups	Drugs	Locomotor Activity (counts) (Mean ± SEM)	
		Before drug	After drug
A**	Control (Distilled water)	206 ± 8.25	204.64 ± 7.89 [NS]
B*	Standard Drug (Fluoxetine 20mg/kg)	204.84 ± 7.76	204.47 ± 8.15 [NS]
C**	Test Drug (NLE 25mg/kg)	268.17 ± 7.59	267.7 ± 8.14 [NS]
H**	Test Drug (NLE 50mg/kg)	189.17 ± 19.27	187.04 ±19.45 [NS]

From table 1, it is evident that, the test drug NLE at both doses after giving it for 10 days (chronic study) did not show any statistically significant difference ($p>0.05$) in the total counts of locomotor activity when compared with that of before giving the NLE. The standard drug fluoxetine also after giving it for 10 days (chronic study) did not show any statistically significant difference ($p>0.05$) in the total counts of locomotor activity when compared with that of before giving the standard drug.

Table 2: Evaluation of Locomotor Activity of mice (Mean ± SEM) n = 6 in each group;[NS] – Not significant before vs. after, ** data was analyzed by using Paired t test.

Groups	Drugs	Locomotor Activity (counts) (Mean ± SEM)	
		Before drug	After drug
E**	Control (Distilled water)	223.5 ± 15.61	221.87 ± 15.22 [NS]
F**	Standard Drug (Fluoxetine 20mg/kg)	170.84 ± 11.64	170.92 ± 12.08 [NS]
G**	Test Drug (NLE 25mg/kg)	215.5 ± 26.96	214.64 ± 26.71 [NS]
D**	Test Drug (NLE 50mg/kg)	195.5 ± 28.20	194.52 ± 27.91 [NS]

From table 2, it is evident that, the test drug NLE at both doses after giving it for 10 days (chronic study) did not show any statistically significant difference ($p>0.05$) in the total counts of locomotor activity when compared with that of before giving the NLE. The standard drug fluoxetine also after giving it for 10 days (chronic study) did not show any statistically significant difference ($p>0.05$) in the total counts of locomotor activity when compared with that of before giving the standard drug.

DISCUSSION:

In spite of all the advancements in modern medicine, traditional medicines have always been practiced, because of their natural origin, easy availability, cost effectiveness, lesser side effects and better tolerability [10]. *Azadirachta indica*, commonly known as neem worldwide, has been most commonly used in traditional medicine for several ailments. In both acute and sub-acute toxicity studies of aqueous extract of neem leaf, there was no impact on mortality up to a dose of 2.5 g/kg in mice. There were no significant changes in tissues or body weight, water and food intake. For 28 days with treatment of 1 g/kg dose of aqueous extract of neem leaf, blood parameters and different kidney and liver functional tests in rats were found to be within normal limits[11].

Locomotor activity is assessed usually by actophotometer and is used to estimate whether a substance has any CNS psychostimulant or sedative action. Thus, locomotor activity is considered as an index of alertness and a decrease in that indicates a sedative effect. For example, drugs like barbiturates and alcohol which are known CNS depressants reduces the locomotor activity whereas drugs like caffeine and amphetamines which are known CNS stimulants increases the locomotor activity [8]. If the test substance has a psychostimulant activity, this can give rise to a false positive result. Thus, it is ideal to rule out any CNS psychostimulant activity before checking for antidepressant like property. From the results it is clear that both standard fluoxetine and NLE does not have any CNS psychostimulant activity nor sedative property. By this finding it is ascertained that there won't be any false positive outcomes in checking for antidepressant like property using experimental animal models.

CONCLUSION:

In conclusion, this study shows that aqueous extract of *Azadirachta indica* leaves doesn't possess CNS psychostimulant activity or sedative action. Further studies are needed to be done to evaluate antidepressant property of aqueous extract of *Azadirachta indica* leaves using experimental animal models. The problems with the conventional antidepressants like delay in the onset of their efficacy and other unacceptable side effects are needed to be investigated in further studies to see if it lacks with *Azadirachta indica*.

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A Vignette on the Trend of Medicolegal Cases in a Tertiary Care Hospital in South India

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Abstract

Introduction: Profiling of medico-legal cases is an important aspect for the prevention of preventable casualties in future and to study the genuine crime in the area which contributes a substantial workload in casualty department.

Objectives: The aim of the study is to measure the incidence of medicolegal cases recorded in a tertiary care hospital in South India in one year.

Method: A retrospective analytical content based analysis was made on 776 medicolegal cases recorded in a tertiary care hospital in South India in one year from June 1st 2017 to May 31st 2018 and the results were tabulated.

Results: Of the 776 cases, 545 were men and 231 were women with RTA constituting 70.74% (549 cases) of the cases and poisoning with 10.69% (83 cases) of the cases forming the majority of the case profile.

Conclusion: The study concludes that road traffic accidents are the major causes of medicolegal cases recorded in a tertiary care hospital in South India. Preventive measures of better traffic control and road safety are to be instituted at the earliest. More number of medicolegal profiling should be conducted in every region for further measures.

Key words: *Medicolegal profile; RTA; Road safety; Casualty Department; Documentation.*

Introduction

A medico-legal case is a case of injury or illness where the attending doctor, after eliciting history and examining the patient, thinks that some investigation by law enforcement agencies is essential to establish and fix responsibility for the case in accordance with the law of the land[1]. Common medico-legal cases include alleged cases of assault, road traffic accidents, burns, poisoning, snake bite, insect bite, industrial accidents, alcoholic intoxications etc.

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The casualty department is backbone of every hospital because almost all cases of medical emergencies reported first to Casualty Department of hospital, and also Casualty Department also deals with the medico legal cases more frequently than any other department of hospital and so medico legal cases constitute substantial proportion of workload. A medico-legal register should be maintained in the casualty of every hospital and details of all medico-legal cases should be entered in this register, including the time and date of examination and the name of the doctor who is dealing with the case. This would be of immense help for future reference, when the patient through the court/ the police, requests for a copy of the medicolegal report. A case may be registered as an MLC even if it is brought several days after the incident[2].

The reporting of medico-legal cases is imperative to recognize the burden of medico legal cases, calculate

their risk and for the avoidance of preventable casualties in future.[3] The idea is to initiate legal proceeding at the earliest so that maximum evidence can be collected to study the crime pattern in the area[4]. The mortalities and morbidities from all medico legal causes has been increasing at an alarming rate in our country and also throughout the world, yet to be controlled effectively; by the year 2020 mortality from injury will be more than those from communicable diseases[5]. Despite this documentation, injuries are still not well recognized as a major public health problem in our country[6].

Profiling of medico-legal cases is an important aspect for the prevention of preventable casualties in future and to study the genuine crime in the area[7]. In spite of recent advancement of technology in the field of medical sciences, death and deformities due to all causes, are yet to be controlled successfully; rather incidences of road traffic accidents has been increasing at an alarming rate throughout the world[8]. Not all medicolegal cases are being recorded as many of them remain unnoticed even after thereoccurs a death of an individual. Hence, this study aims to find the profile of various medicolegal cases that was recorded in a tertiary care hospital in South India, most probably covering the data of south Indian population.

Method

A total of 776 medicolegal cases were studied that was recorded in one year from June 1st 2017 to May 31st 2018 in a tertiary care hospital in South India. It was a retrospective analytical study with secondary data obtained from the Medical Records Department in the hospital. It was a based on content analysis where a proforma was formed related to the nature and details of the medicolegal cases that was used to obtain the data.

All age group registered with medicolegal cases and treated in the hospital were included in the study. Unregistered medicolegal cases and cases that were sent for further referral from the hospital were excluded from the study. The data was analysed and results were tabulated using simple tables and pie charts. Percentage calculations were made for better statistical reporting.

Results

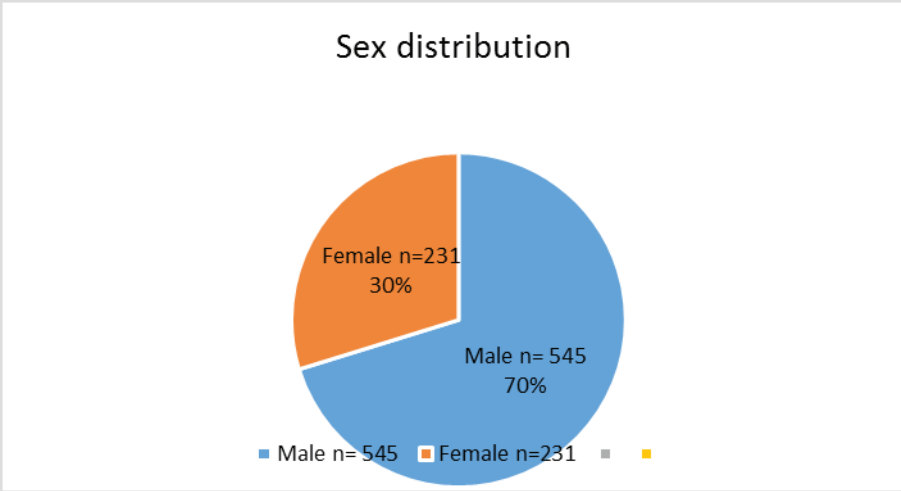
Of the 776 cases analysed, 545 cases were males and 231 were females accounting for 70.2% and 29.8% respectively. Of all the 776 cases, 99.36% (771 cases) were alive and discharged post treatment and 0.64% (5 cases) were dead in spite of adequate medical care and all of them were due to severe RTA.

With regard to nature of medicolegal cases, 549 cases were due to road traffic accidents forming 70.7% of the total medico-legal cases. There are 30 cases of burns which contributes to 3.87% and 12 cases of assault which amounts to 1.54% of the total cases. 41 cases are due to fall from height constituting 5.28% of the total cases collected.

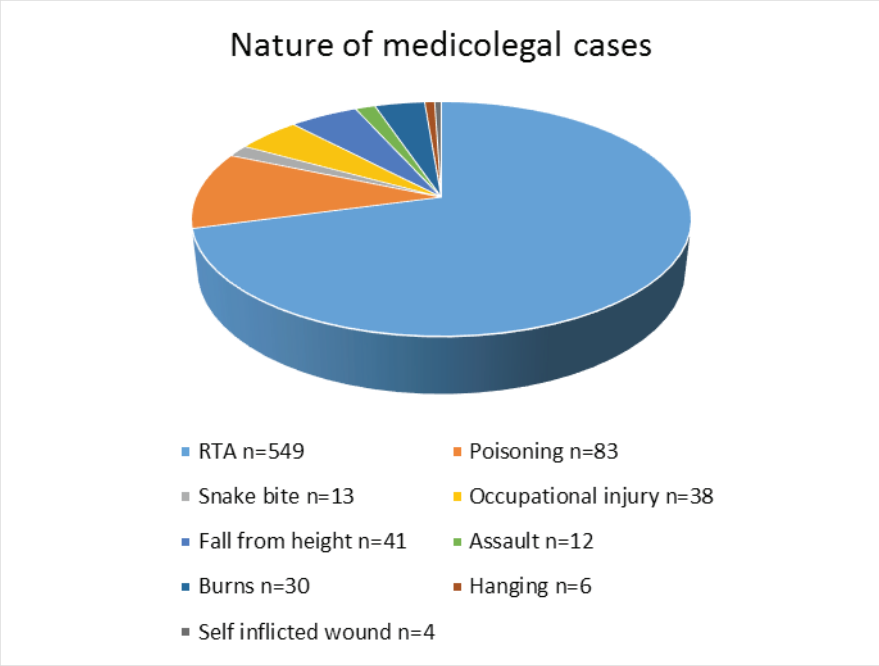
38 cases are due to occupational injuries which is about 4.89% of the total cases. 10 cases of snake bite and 3 cases of scorpion string were collected constituting about 1.3% and 0.38% respectively . 6 cases of hanging and 4 cases of self-inflicted wound accounting to 0.77% and 0.51% respectively were collected. A total of 83 cases due to various poisoning were noticed resulting in 10.69% of all the cases. The details of each poisoning are given in the Table 1. Pie charts 1 and 2 are given to depict the sex distribution and the nature of medicolegal cases respectively.

Table 1: Types of poisoning

Type of Poisoning	Number of cases	Percentage
Cow dung poisoning	21	25.30%
Rat killer poisoning	10	12.04%
Antipsychotic poisoning	3	3.61%
Unknown liquid poisoning	2	2.40%
Ant killer and alcohol poisoning	1	1.20%
Cleaning liquid poisoning	2	2.40%
Insecticide poisoning	4	4.81%
All out poisoning	6	7.22%
Paracetamol poisoning	5	6.02%
Benzodiazepine poisoning	3	3.61%
OPC poisoning	10	12.04%
Thyroid tablet poisoning	1	1.20%
Alprazolam poisoning	1	1.20%
Phenytoin poisoning	1	1.20%
Ant killer poisoning	2	2.40%
Harpic poisoning	3	3.61%
Insecticide poisoning	2	2.40%
Pesticide poisoning	2	2.40%
Paraquat poisoning	4	4.81%



Pie chart 1: Sex distribution



Pie chart 2: Nature of medicolegal cases

Discussion

Medico-legal case is an integral part of medical practice that is frequently encountered by medical officers working in emergency department[9]. For such patients, not only treatment, but exhaustive documentation is also mandatory. It is the responsibility of a registered medical practitioner to judge each and every case properly and in doubtful cases, it is mandatory to inform the police as required by law. This saves the doctor from unnecessary and needless allegations later[10].

Injuries account for 10.1% of the world burden of disease in 2013[11]. In 1990, 5 million people died due to trauma and injuries. The number is expected to rise to 8.4 million by year 2020[12]. Road traffic accidents will be the second most common cause of disability in the developing world[13]. In a retrospective study profile of medico-legal cases in the casualty department of Sri Aurobindo Medical College and PGI, Indore for a period of 1 year, from 1st June 2016 to 31st May 2017, Majority of cases about 57.70% were of road traffic accident (RTA)[14]. In our study that was done exactly one year after, 70.74% were RTA

showing the increasing trend of RTA year after year due to various factors like the increasing high speed vehicles, poor traffic control and adventurous mindset of the people especially youngsters.

Earlier reports demonstrated that everyday almost 700 people die from poisonings around the world and for every person that dies, several thousands more are affected by poisoning[15,16]. It has been estimated that, in India five to six persons per lakh of population die due to acute poisoning every year[17]. Pattern of poisoning in a region depends on various factors which include availability and access to the poison, socioeconomic status of an individual, cultural and religious influences, etc. In India, as agriculture is the main occupation, insecticides and other agrochemical fertilizers are used to a greater extent and the poisoning with such products are more common[18]. This was similar to our study where total poisoning cases were found to be 10.69% (83 cases) of which cow dung (25.30%) and OPC along with rat killer poison (12.04%) constituting the bulk of the poisoning proving the fact they are more commonly used, available and easy to handle by the population.

One year retrospective study was carried out between 1st July 2012 to 30th June 2013 from the in the causality data of Government Medical College, Akola which revealed that Burns - 21.87% (449 cases) constituted majority of medico legal cases[19] , comparable to our study which has 3.87% (30 cases) of cases. The decrease in percentage may be attributed to better fire safety precautions and easy availability of fire service on call.

Considerable amount of occupational injuries were recorded which amounts to 4.89% (38 cases) of total cases. In a study of 173 medico-legal cases reported to the casualty department of Sri Siddhartha Medical College, Tumkur during the period from 1st January 2012 to 31st August 2013, 21 cases were recorded for occupational injuries[20]. The rise may be due to rapid industrialisation in the past five years engaging more people in hazardous activities.

10 cases of snake bite were recorded in our study – a very lesser number because of the high industrial oriented occupation and less field related work and also better protective measures in houses and fields. The treatment of snake bite cases have gone a far way better in the recent decade with appropriate clinical management and anti-venom availability since there were no deaths among the 10 cases. This was similar to the study done in tertiary care hospital in Bengaluru during the period of January 2013 to June 2013[21].

Other cases such as assault and fall from height contributed to 1.54% (12 cases) and 5.28% (41 cases) respectively. The fall from height were mostly seen in young children mostly due to accidental slip and fall as a result of lack of attention. Overall, the medicolegal profile reflected on the alarming rise in RTA and a considerable amount of poisoning which may indicate the stress and depression level of the population though accidental poisonings have to be ruled out. Road traffic accidents and poisoning cases continue to be a growing menace, incurring heavy loss of valuable man-power and human resources in the form of death and disability along with a corresponding drain of potential economic growth[22]. There should be a road-safety program in which all the cities of our country must be ranked on the basis of various criteria like standard of roads, functioning of traffic signals, obeying of traffic rules by the citizens etc. Despite the weight of evidence, the importance of preventing and treating injuries in low and middle income countries has yet to be embraced by global public health community[23].

Poison prevention strategies can be implemented at various levels such as strict implementation of pesticide act, so that import, manufacture, sale, transport, distribution and use of pesticides can be under the supervision of the government and controlling access to dangerous pesticides and follow secure storage practice[24]. Health education to adolescents at school and college level about poisoning and its first aid treatment and strict implementation of anti-dowry law, marriage counselling and women empowerment will help in decreasing the day to day tension in married life and decrease the incidence of poisoning among house wives.

Conclusion

The study concludes that road traffic accidents are the major causes of medicolegal cases recorded in a tertiary care hospital in South India followed by poisoning. The basic principles of injury prevention are education, engineering, uniform enforcement of law & order, pre-hospital care and the evaluation. Proper education, training for safety standards and behaviour modification are interlinked; and are required to be implemented in the community to prevent all kind of injuries including domestic violence. Injury related research should be increased; and improvement in health

care facilities and posttraumatic care should be worked on. Further large number of prospective studies should be carried out that would assist various organizations to set various causative risk factors, circumstances, chain of events; and the preventive measures accordingly to bring down the incidence of not only RTA but all medicolegal cases and shaping the future generation and society more towards being more humane and reaching the goal of World Peace.

Conflict of Interest: No.

Source of Funding: Nil.

Ethical Clearance: Yes

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An Exploration into the Biography of Road Traffic Accident Cases in a Tertiary Care Hospital in South India

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Abstract

Introduction: RTA is the public health issue and cost a lot to individuals, families, communities and nations as injuries and deaths due to road traffic accidents (RTA) are a major public health problem in developing countries.

Objectives: The present study was carried out with the objective to find out the profile of RTA cases in a tertiary care hospital in South India in one year.

Methods: A retrospective analytical content based analysis was made on 549 RTA cases recorded in a tertiary care hospital in South India in one year from June 1st 2017 to May 31st 2018 and the results were tabulated.

Results: Of the 549 cases, 409 cases were males and 140 were females of which head injury with 182 cases (29.50%) forms the majority of the injury followed by orthopaedic injuries with163 cases (26.04%).

Conclusion: This study thus analyses various aspects of RTA with head injury being the most common and and its various confounding factors which shows that there is clearly a need for road safety education particularly targeting student community.

***Key words**: RTA; Head injury; Epidemic; Students; Road safety.*

Introduction

Globalization has led to the expansion in the road network along with rise in motorization of vehicles. Simultaneous population explosion and rapidly increasing use of motor vehicles has led to rise in the number of road traffic related accidents, road accident injuries and fatalities[1]. Death from road traffic accidents (RTA) and in particular Motor vehicle Traffic Accidents have been characterized worldwide as a hidden epidemic which affects all sectors of society[2] . RTA is the public health issue and cost a lot to individuals, families, communities and nations.

Injury and deaths due to road traffic accidents (RTA) are a major public health problem in developing countries where more than 85% of all deaths and 90% of disability-adjusted life years were lost from road traffic injuries[3]. The statistical profile reflects a global estimate of 5.1 million deaths in 2000, which was due to injuries that accounted for 10% of deaths due to all causes. Out of this a quarter of injury-related deaths occurred in the South-East Asian region[4].

As a developing country, India is no exception. Not a day passes without RTA happening in the roads in India in which countless number of people are killed or disabled. The data for fatal accidents presented to the Parliament by the Ministry of Road Transport and

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Highways for year 2008 shows that 119,860 people perished in mishaps that year and the national and state highways accounted for nearly half of all road accidents. Deaths due to road accidents in 2009 were reported to be 126,896 and in 2010 it increased to 133,938 which is about 5.5% over and above the previous year's deaths[5].

The reasons for the high burden of road traffic injuries in developing countries are increase in the number of motor vehicles, poor enforcement of traffic safety regulations, inadequacy of health infrastructure, and poor transport facility[3]. Road crashes deserve to be a strategic issue for any country's public health and can lead to overall growth crisis, if not addressed properly[6]. In spite of recent advancement of technology in the field of medical sciences, death and deformities due to all causes, are yet to be controlled successfully; rather incidences of road traffic accidents has been increasing at an alarming rate throughout the world[7]. If the current trends continue, the number of people killed and injured on the world's roads will rise by more than 60% by 2020[8]. Hence, this study aims to provide an insight into the road traffic accidents reported to a tertiary care hospital in South India, probably covering the data from south Indian population.

Method

A total of 549 RTA cases were studied that was recorded in one year from June 1st 2017 to May 31st 2018 in a tertiary care hospital in South India. It was a retrospective analytical study with secondary data obtained from the Medical Records Department in the hospital. It was a based on content analysis where a proforma was formed related to the nature and details of the RTA cases that was used to obtain the data.

All age group registered with RTA cases and treated in the hospital were included in the study. Unregistered cases and cases that were sent for further referral from the hospital were excluded from the study. The data was analysed and results were tabulated using simple tables and pie charts. Percentage calculations were made for better statistical reporting.

Results

Of the 549 cases, 409 were males and 140 were females accounting for 74.49% and 25.51% respectively. With regards to age distribution, 33 cases(6.01%) under 15 years of age, 170(30.96%) cases from 16-30 years of age, 141(25.68%) cases from 31-45 years of age, 135(24.59%) cases from 46-60 years of age and 70(12.75%) cases over 60 years of age.

With regard to time of incident, 60 cases (10.92%) occurred before 8am, 220 cases(40.07%) from 8am-4pm and 269 cases(48.99%) from 4pm-12pm. Various injuries that occurred in the RTA cases are tabulated in Table 1. The duration of hospital stay was divided into 3 categories: 238 cases stayed less than 5 days, 170 cases stayed between 6-10 days and 100 cases were hospitalised more than 10 days.

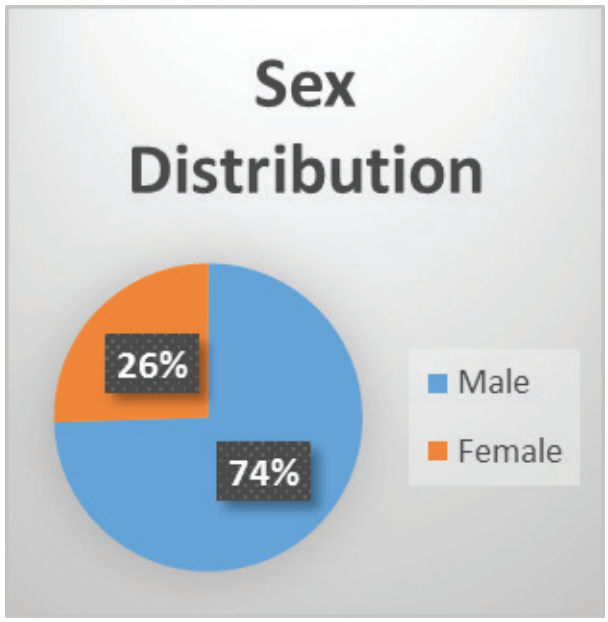
The time lapse between incident and admission in hospital is tabulated in Table 2. Among the 549 cases, 544 were alive and 5 were dead due to treatment failure and 9 cases discharged against medical advice. On the grounds of occupation, 67 cases(12.20%) among professionals, 92 cases(16.75%) among labourers, 81 cases(14.75%) among housewives, 155 cases(28.23%) among students, 42 cases(7.65%) among retired, 61 cases(11.11%) among unemployed, 51 cases(9.28%) among children under 15 years of age were reported. Pie charts 1 and 2 are given to depict the sex distribution and the occupational distribution of poisoning respectively.

Table 1: Injuries occurred in RTA

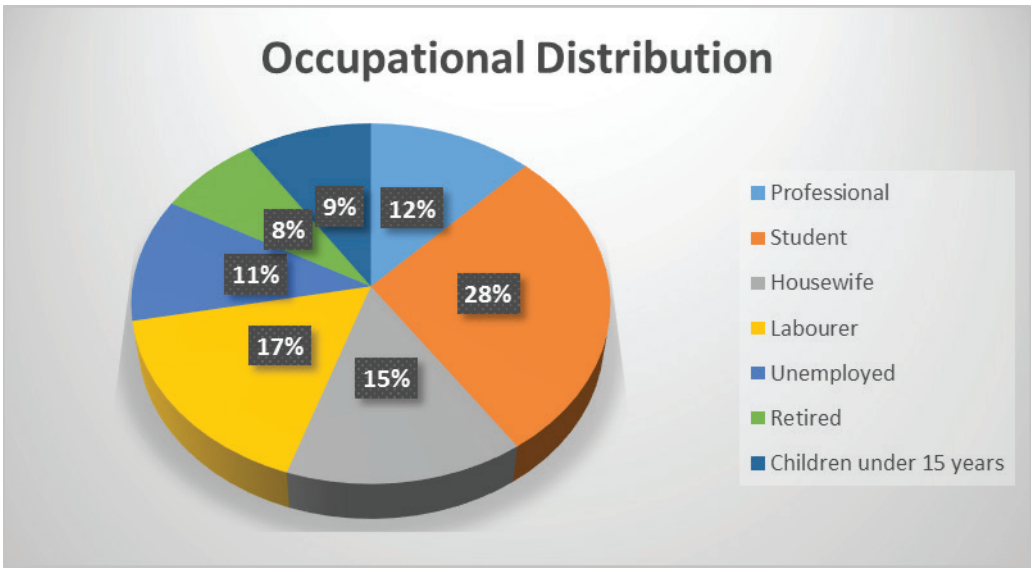
Injuries	Number of cases
Head injuries	182 (29.50%)
Chest injuries	10 (1.82%)
Facial and eye injuries	26 (4.73%)
Limb injuries and fractures	163 (26.04%)
Abdomen and pelvic injuries	37 (6.73%)
Minor injuries	149 (27.14%)
ENT injuries	2 (0.03%)

Table 2: Time lapse

Time lapse	Number of cases (%)
Less than 1 hour	137 (24.95%)
1-6 hours	342 (62.29%)
6-12 hours	49 (8.92%)
>12 hours	21 (3.82%)



Pie chart 2: Occupational Distribution



Pie chart 1: Sex distribution

DISCUSSION

William Haddon (Head of Road Safety Agency in USA) has pointed out that road accidents were associated with numerous problems each of which needed to be addressed separately[9]. Human, vehicle and environmental factors play roles before, during and after a trauma event. Accidents, therefore, can be studied in terms of agent, host and environmental factors and epidemiologically classified into time, place and person distribution[10].

In our study, there was a male preponderance similar to the study done in Delhi[11] and it is due to greater male exposure on urban streets and predominance of male drivers in Indian roads. Also maximum number of cases were recorded in the age group of 16-30 years- the most active and productive years of life similar to a study done by Henricksson et.al[12]. Tendency of this age group to show scarce attention to traffic rules and regulations and nonuse of safety devices such as helmets, seatbelts, restraints, and so on, can be a possible explanation for the same. This reveals that the most active and productive age group of population are affected in RTAs, which poses a serious economic loss to the community[13].

This is in accordance with higher incidence among students in our study (155 cases) similar to an epidemiological study done in South India[14]. The road accidents are happening most often due to the reckless and speedy driving of the vehicles, not obeying or following traffic rules[15] and the adventurous nature of the youth are the main factors behind rise in RTA among student population. The next major affected group is labourers- the reason may be that the labourers travel in trucks carrying bricks, sand and other heavy materials. It is interesting to note that among the type of motorized vehicles trucks were involved in the highest number of accidents, and labourers often travelled in the truck as part of their work[10]. Housewives are affected as they most often travel as pillion riders with their spouse.

Most number of cases occurred post 4pm which is similar to study done by Nilambar et.al[16]. These hours are the busiest as commuters go to and return from the schools, offices, factories and business place. Among the injury profile, head injury remains the most common injury similar to study done in Mangalore[17] which shows the lack of awareness of safety equipments like helmet or wearing a seat belt in a car etc. This was followed by fractures in limbs (163 cases) more commonly seen with two wheeler riders as they tend to fall outwards and stretch their arms or legs. Facial injuries are almost always grievous injuries which may require the treatment of plastic surgery. Minor injuries like abrasions, sprains, contusions are treated with bandages and simple medications.

The time lapse is crucial in RTA because the first hour is crucial in trauma management as cases reaching more than one hour are subjected to more severe morbidity and mortality[18]. Majority of cases were addressed with a time lapse of 1-6 hours (342 cases) in our study. A positive linear trend as well as logarithmic trend was observed with delay in admission to the hospital and severity of outcome[19]. So an effort should be made to provide timely and proper medical services to RTA victims via mobile emergency services, quality trauma centers and proper rehabilitation services. This was evident in our study as 5 cases died due to late admission in the hospital. 9 cases were discharged against medical advice due to lack of adherence, affordability, disbelief in the treatment of the doctor etc.

Human factor contribute significantly to increasing number of road accidents in India. Most drivers continue to be acting like maniacs in a tearing hurry and error in judgment often leads to major accidents. Reckless driving, over speeding, decline to follow traffic rules, and drunken driving are main reasons for road accidents. Small bars along the Indian highways are of prime concern to control drunken driving. India has laws to check the drunken driving but its effective implementation is still to be worked upon.

Realizing this serious Public Health Issue happening globally, the WHO in 2004 came out with a theme of "Road Safety is No Accidents" to highlight the urgency to tackle the issue on a priority basis[20]. Prevention of RTA is a responsibility of various agencies and a multi-disciplinary approach will effectively reduce the incidence of RTA and reduction in injuries and deaths on the roads. "Road Safety Week" is observed throughout the country every year in the month of January in order to highlight and emphasize the need for safe roads by taking up activities to promote the concept[21].

Measures promoting safe driving behavior such as mobile usage, eating, inadequate attention, fatigue, negligence; maintenance of vehicle condition; adequate protection including abs, helmets, safety, and others; promoting licensed vehicle and coping skills when integrated with efficient and effective legislation of traffic regulation and maintenance and implementation by legislation (whose absence has been the influencing factor for increased number of RTA among youths) are bound to have a more pronounced positive effect. Protection is needed for three main vulnerable groups—pedestrians, who in urban areas constitute up to 70% of the fatalities; passengers commuting on buses, trucks, and minibuses, who constitute the next largest population group affected; and cyclists. Addressing the risks of these three groups will require multiple policy initiatives[22].

Conclusion

This study thus analyses various aspects of RTA with head injury being the most common and and its various confounding factors which shows that there is clearly a need for road safety education and it should be directed towards road users, who are frequently involved and injured in RTAs (e.g. students). India's Motor Vehicles Act lagging far behind the needs of a fast-motorizing society is painfully evident from its road safety record. the Bill for creation of a statutory National Road Safety and Traffic Management Board must be speeded up- such an agency is vital to set standards

for road design, inspect existing roads, and investigate accidents scientifically. But strict implementation of traffic rules and stringent punishments alone will not solve the persisting crisis. Change in the mind set of riders and drivers and road users realizing their responsibilities alone will bring about a change. Further large number of prospective studies should be carried out that would assist various organizations to set various causative risk factors, circumstances, chain of events; and the preventive measures accordingly to bring down the incidence of not only RTA but all medicolegal cases and shaping the future generation and society more towards being more humane and reaching the goal of World Peace.

Conflict of Interest: No.

Source of Funding: Nil.

Ethical Clearance: Yes

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A Qualitative Exploration of Substance Abuse among the Nursing Students of Coastal Karnataka

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Abstract

Background: To explore the various perceived causes and solutions for substance abuse among the nursing students in Mangalore, Karnataka, India.

Methods: Group of nursing students belonging to the second year participated in the study. A method of free listing and pile sorting was employed to discover the causes and solutions for substance abuse.

Conclusion: The primary cause of substance abuse was found to be peer pressure with a salience value of (0.945) followed by enjoyment (0.614), family problems (0.486). Cognitive mapping revealed the causes of being grouped under three major headings: psychological imbalance, adaptation to modern lifestyle, and unhealthy family environment. The solutions suggested by the students were counseling and rehabilitation with the highest salience value (0.751), awareness about the adverse effects at an early age (0.637). Cognitive mapping portrayed the solutions grouped into headings like therapies and treatment, external sources, family care, and support. Factors such as peer pressure, academic pressure, and easy availability of drugs can be looked into by external institutions to root out the evils of substance abuse

Keywords: *drug abuse, nursing students, substance abuse*

Introduction

Substance abuse disorder is one of the significant concerns globally. World health organisation (WHO) defines the term substance abuse as "Persistent or sporadic use of a drug inconsistent with or unrelated to acceptable medical practice" [1]. Substance abuse indicates the use of dangerous psychoactive substances such as tobacco, alcohol, and other drugs like heroin, amphetamine, and cannabis [2.] Use of substance has caused intolerable sufferings in terms of mortality and financial crisis causing menace to social life around the world [3.]

The initiation of drug abuse is observed in the period of adulthood, which significantly increases the probability of more severe drug problems later in life [4.] Globalization, urbanization, deteriorating cultural values, conflicts, and violence force young adults to use substances [5.] Studies conducted to determine the prevalence of substance abuse among the various streams, including the medical stream, were found

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to be 20-40 % [6]. Research shows that indulgence in substance abuse can be a result of exposure to violence and post-traumatic stress [5]. The prevalence of substance use among health care students ranges from 5% to 67% [7-12], with higher percentages (67%) being reported in developed countries like the United States [8]. Among developing countries such as Iran [9, 10], Ethiopia [11], Nepal [12], and India [6], substance uses among health care students varies from 5% to 48%.

Taken together, there is a strong need to assess substance use among health care students as they hold greater responsibility in society. The present study was undertaken for the qualitative exploration of perceived causes of substance abuse and possible solutions for the same among nursing students from selected nursing colleges of Mangalore.

Methodology

The present qualitative study was done among 15 second-year students from selected nursing colleges of Mangalore, Karnataka. The sample size of 15 was reached after applying the rule of saturation for the qualitative study. Study was conducted after obtaining the ethical clearance from the institutional ethics committee. **(No: 19050).** Permission was obtained from the heads of the nursing institutes, and consent was taken from the nursing students before the commencement of the study. A method of free listing and pile sorting [13, 14] were employed to discover the perceived causes for initiation of substance abuse and possible solutions to address these problems among students of nursing colleges in Mangalore.

Free listing: For the free listing, students were asked two probe questions:

(1) In your opinion, what do you think are the causes for substance abuse among your age group of students in your field? (2) Suggest the possible solutions to eradicate the use of substance abuse among this age group of students in your field?

Students were asked to provide a list of various perceived causes and possible solutions for substance abuse individually. Statistical program **ANTHROPAC** was used to compute Smith's Saliency Index and frequency for free list data. Smith's saliency index refers to the "importance, representativeness, or prominence of items to individuals or the group. Twenty responses as causes and fifteen solutions were taken for pile sorting. Obtained results were subjected to analysis using Visual Anthropac

Pile sorting: First, the identified salient items were written on cards with their respective numbers. Participants were then allowed to group; selected perceived reasons and solutions based on their own criteria. Participants were asked to explain the reason for piling. Successive pile sorting was done with similar causes and solutions, followed by items with less similarity. Process continues until all the groups are clustered into a single pile.

Ressults & Discussion

Table 1 shows the perceived causes of substance abuse among nursing students. The most predisposing factor for substance abuse is peer pressure with the highest salience value of 0.945, followed by just for temporary enjoyment with the salience value of 0.614.

Perceived causes for substance abuse among the nursing students: TABLE 1

Causes	Salience value
Peer pressure	0.945
Just for enjoyment	0.614
Family problems	0.486
Socio-economic status	0.334
Parental influence	0.254
Stress	0.224
Break-up	0.222
Loneliness	0.214
Curiosity	0.171

Cont...

Easy accessibility	0.165
Anxiety	0.164
Emotional trauma	0.149
Ignorance	0.120
Social media influence	0.120
Temporary happiness - effect of substance abuse	0.118
Inadequate parental supervision and care	0.117
Adaptation to modern lifestyle	0.105
Social gatherings	0.102
Migration from rural to urban area	0.101
Depression	0.085

Cognitive mapping reveals the distribution of various reasons into three major categories.**Figure 1** shows the cognitive mapping of the causes of substance abuse done by nursing students.

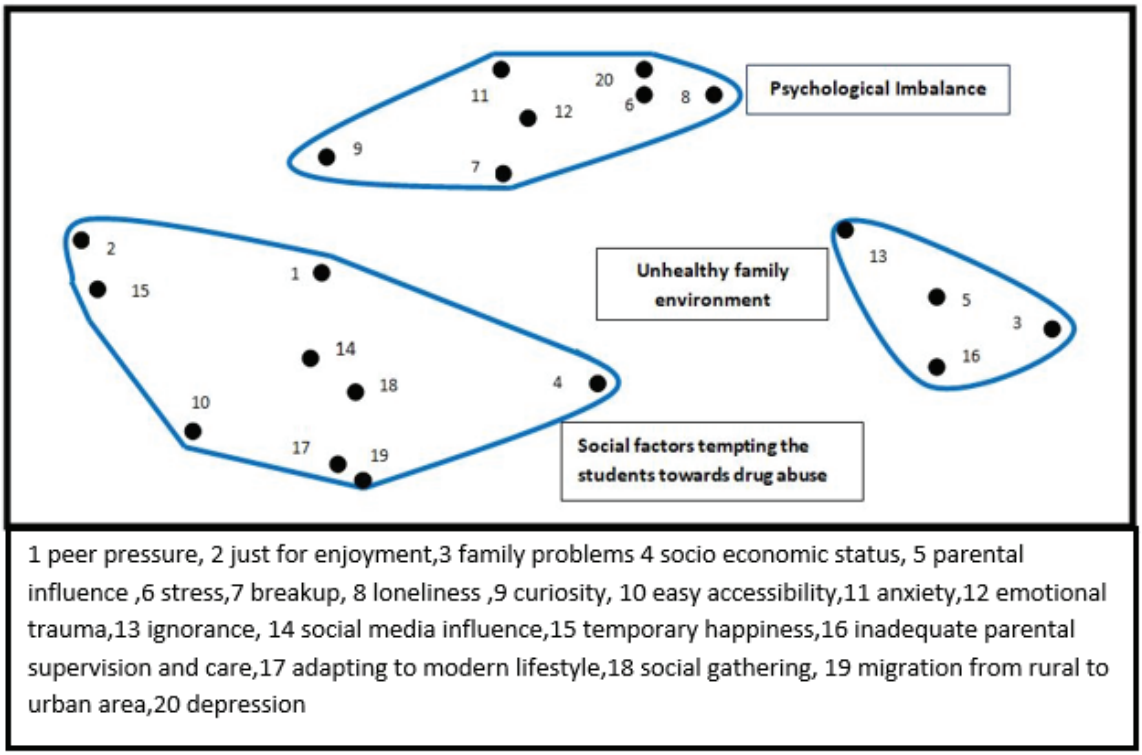

Figure 1 : Cognitive map-causes of substance abuse among nursing students:

Pile 1 includes causes like anxiety, depression, emotional trauma, loneliness, breakup, stress, and curiosity, which were piled up under the title psychological imbalance.

Pile2- Students classified reasons such as peer pressure, temporary happiness, just for enjoyment, easy accessibility, media influence, social gathering, adapting to modern lifestyle, migration from rural to urban areas, and socioeconomic status as social factors tempting the students towards drug abuse.

The rest of the causes, such as ignorance, parental influence, family problems, inadequate parental care, and support were assorted under **pile 3** with headings like family influence, lack of parental support, care, and unhealthy family environment.

From the assorted groups in figure1, it is observed that the major reasons for substance abuse are psychological imbalance, curiosity, and environmental factors such as peer influence and other social factors.

Table 2: Perceived solutions for substance abuse among the nursing students:

Solutions	**Salience value**
Counseling	0.751
Awareness about the side-effects at an early age	0.637
Rehabilitation centre	0.394
Parental support and care	0.369
Behavioral therapy	0.302
Extra-curricular activities	0.211
Limit the availability of drugs near college institutions	0.186
Identify the cause and treat accordingly	0.167
Diversional therapy	0.085
Proper treatment	0.067
Socializing with the right people	0.065
Choose the right friends	0.061
Emotional support	0.033
Set goals and work towards achieving them	0.019
Self-control	0.010

Solutions enumerated by nursing students are depicted in Table 2 in the order of decreasing salience value. It is observed from **Table 2** that counselling, rehabilitation centres, awareness about the side-effects at an early age, parental support, and care were commonly suggested solutions. Students also stated that trying out therapies such as behavioural therapy, diversional therapy, and socializing with the right people will help in preventing the use of substances.

Cognitive map - solutions for substance abuse suggested by nursing students: Figure 2

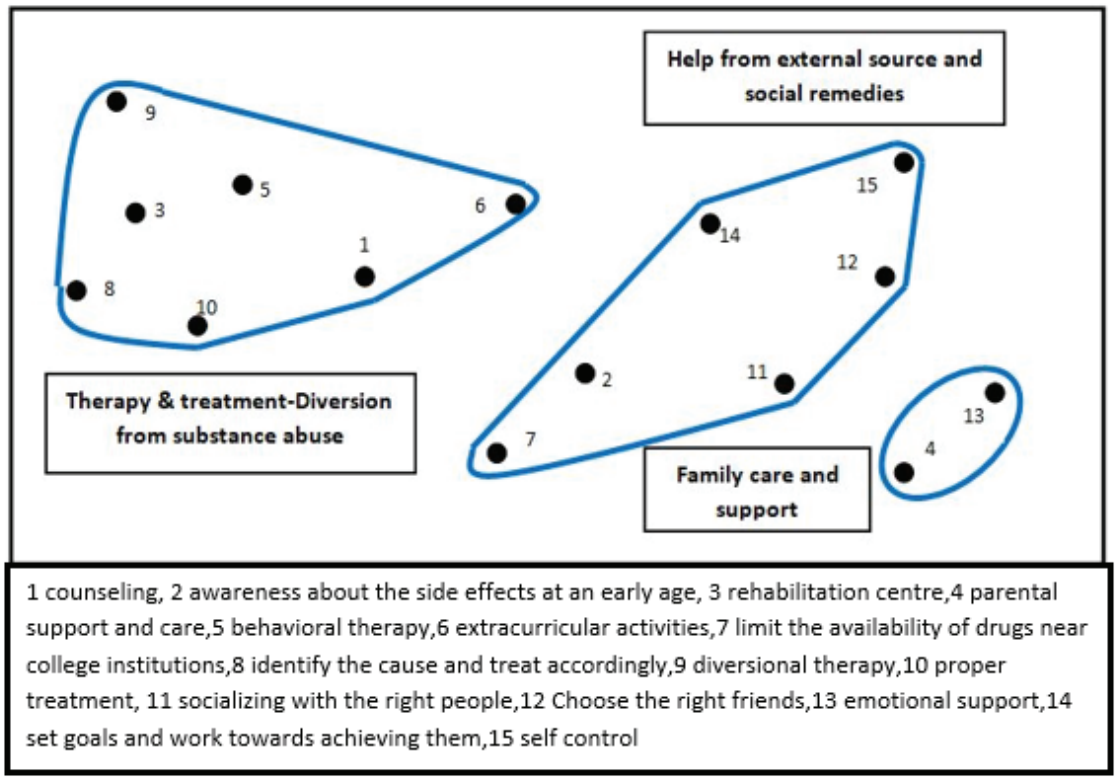

Figure 2 portrays the cognitive mapping of the solutions given by the nursing students.

Nursing students assorted reasons such as diversional therapy, behavioral therapy, rehabilitation centre, counseling, proper treatment, extracurricular activities and identify the cause and treat accordingly into **Pile 1** named therapies and treatment, diversion from substance abuse. Solutions like limiting the availability of drugs near college institutions, awareness about the side effects at an early age, socializing with the right people, self-control, and choosing the right friends were grouped into **Pile 2** under the headings self-help best help, help from an external source and social remedies.

Pile 3 consists of two solutions, emotional support and parental care and support, which were grouped under the title family care and support.

From **Figure 2** it is evident that recreational activities, surrounding yourself with right and positive people, parental care and supervision, and limiting the availability of drugs to students can emerge to be of immense aid to reduce the prevalence of drug abuse among the students.

The present study shows that the predominant perceived cause for substance abuse among nursing students is peer pressure. The present finding is consistent with the study conducted in Nepal by Bimala Panthee et al.(2017) [15] among the health care students. Cognitive mapping depicts reasons such as peer pressure, social media influence as the current trend in the modern era. Few nursing students reported that they used substances for pleasurable purposes in a study conducted by Jashmid Ahamdi et al(2004)[16.] It was also observed that parental influence [17] and inadequate parental support and care were major governing factors in substance abuse initiation. The study conducted by Gouri Kumari Padhy et al.(2014) [18] supports this reason. Family problem was found to be a determining reason for drug abuse. Study conducted by Mohan .D(1980) [21] reveals that students belonging to nuclear families had the least prevalence of drug abuse.

In addition to this, easy accessibility to drugs was found to be a major cause. It was reported that heavy alcohol drinking and cigarette smoking were the significant predictors of substance use among Nepalese health care students [15.] In the present study, students opined that curiosity is also one of the factors to indulge in alcohol abuse. Peer pressure, academic stress, and

social media influence were also found to be the main reasons for initiating drug use in a few published studies [20, 22.] 98% of substance abusers were aware of the adverse effects of substance abuse but were continuing the same. This showed carelessness towards self- health and a lack of proper health education. Previously published studies shows that the college environment favoured substance abuse since many have initiated the use of drugs after joining medical colleges [19, 23.] The most common reasons reported in the present study for using such substances were a relief from psychological stress, occasional celebration followed by to reduce tiredness, peer pressure, easy availability, experimental use and community acceptance [18]

The majority of the students believe indulging in extracurricular activities and exploring your hobbies alleviate stress levels and help them choose healthier options over drugs, which was consistent with the previously published study[26.] The nursing students had suggested therapies such as diversional therapy and behavioural therapy. They also agreed that parental care and attention, healthier family relations would decrease the use of substance abuse, as reported in other studies [18, 24.] Other possible solutions suggested by the students were choosing the right friends circle and attending counselling sessions [25.] Other predominantly stated solutions were limiting the availability of drugs near college institutions and spreading awareness about the toxic effects of substance abuse at an early age. Benegal.V et al. (1998) [20] conducted a study that depicts the commonly reported solutions as similar to these.

Present qualitative study explores the causes of substance abuse among the health professional students. Psychological imbalance and stress due to various external factors forced the students to use various forms of drugs. In addition to this, easy accessibility to drugs was found to be an essential factor in substance abuse initiation. Solutions enumerated by the students include parental support and guidance, help from private organisations, having self-control, indulging in various co-curricular activities, and choosing the right friends. Limiting the availability of drugs near college institutions is a commonly reported solution.

Conclusion

The present qualitative study explores the causes and solutions for substance abuse among nursing students through a method of free listing and pile sorting. It is clearly evident that the most predisposing factor is peer pressure. Limiting the availability of drugs near college institutions was a commonly reported solution. In addition to this, students suggested therapies like diversional therapy and behavioral therapy.

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Conflict of Interest: Nil

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Perspective

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E-learning: A key to sustain learning during COVID-19 pandemic

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On 11th March, the WHO declared the COVID-19 outbreak as a pandemic and exhibits its deep concern regarding the alarming levels of spread and severity of infection.

With nine deaths and 468 COVID-19-positive cases in India, the national resolve of lockdown of the entire country was declared from 24rd March for intensifying the fight against COVID-19 pandemic and alleviating the spread of disease.

Before this resolve as a precautionary measure, all the schools and educational institutes were closed to prevent the spread of disease, and on 20th March, a directive from the ministry of human research department was issued to promote digital learning, so that the students can continue their learning.[1] Through this initiative, the ministry tried to mitigate the impact of lockdown on students' learning and has received an overwhelming response. Although initially the teaching–learning activities have been affected due to the closure of these educational institutes especially for the students of professional courses, it gradually resumed as educators started making use of information technology in most of the educational institutes.

Likewise, medical institutes have also been affected by this critical situation, and as a consequence, it has become rather uncertain when the institutes will able to resume classroom teaching and therefore medical teachers in these institutes started using information technology. These efforts have contributing greatly, meeting the needs of learners, and beginning to provide necessary educational support to the learners. Virtual classroom offers boundless possibilities for faculty and students. Sharing learning materials, displaying concepts or processes with clarity, tailoring instructions to learners' needs, practice skills in a safe environment, standardize assessment activities, above all it offers flexibility in time and space while ensuring self-regulatory learning. Also, today's learners are more tech-savvy and prefer technology-enhanced learning environment. Due to availability of smart phones, medical teachers also increasingly use technology in the teaching learning process. From a simple PowerPoint lecture presentation, to computer-aided instruction, virtual patient and human patient simulation technology offer various choices to enhance the learning experience. The scenario for assessment has also changed with electronic assessments and immediate feedbacks.[2]

In the widest sense, E-learning which is often referred to as online learning is the use of the Internet for education. However, this definition falls short of describing many distinctive characteristics and vital aspects of E-learning.

E-learning does not simply imply a transmission of documents in electronic format to students via the Internet; it includes a pedagogical approach that offers flexible, supportive, and engaging learning environment, promoting self-directed learning, focusing on learner' need and encouraging interaction, collaboration,

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and communication among the teachers and students to kindle a deeper understanding about the subject.[3]

E-learning can be broadly classified as synchronous and asynchronous.

Synchronous learning occurs in a virtual classroom when two or more people are communicating in real time. Synchronous E-learning includes online chats, video conferencing, and virtual classroom (ex. Class taken using Zoom). The important advantage of synchronous E-learning is that it allows learners and teachers to ask and answer questions immediately. Hence, rather than learning on their own, learners are able to interact with other learners and their teachers during the lesson.[4]

Asynchronous learning takes place outside of real time. In this type of E-learning, participants study at a time that is convenient for them, using technology such as E-mail, e-courses, online forums, prerecorded audio/video uploaded on various platforms such as YouTube and Google classroom. With asynchronous learning, learners will typically complete lessons on their own, using the internet as a support tool as opposed to taking part in online interactive classes.

The dilemma for the teachers is which technology to employ and how best to make use of it when employed. Strategic application of online tool should be based on learning objectives, number of learners, the needs and demands of learners, and the quality of their educational experience and availability of resources.

In India, few of the medical institutes are promoting E-learning and providing Learning Management System; however, it is not uniformly practiced. Medical teachers need to do a comprehensive overview of E-learning tools and technologies to understand pedagogical strategies for effective learning. There are many more E-learning tools being available and used by teachers. The following is brief explanation of some commonly used E-learning tools.

Google classroom: It is a free service, nonprofit organizations and anyone with a personal Google account can get the benefit of it. Google Classroom is a simple web app mostly used for creating assignments, submitting assignments, grading, and uploading prerecorded videos and other learning resources. It offers personalized learning and collaborative learning is missing.

Zoom: An educator has to sign up for an account for free. It is ideal for scheduling short meetings. Zoom offers a full-featured basic plan for free with unlimited meetings. The teacher can host a live class for 40 min for 100 participants. He/she can invite students to meetings through an invitation link sent to their E-mail. They can also join the meetings directly on the zoom application. Basic version allows educators to host unlimited number of meetings. However, recently few concerns have been raised regarding the privacy and security.

Google Meet: Google Meet is a tool on the web and video conferencing. It is the business-oriented version of Google's Hangouts platform. It allows users to dial in phone numbers to access meetings, thus enabling users with slow internet connection to call in. If the institute is having G suite, then Google Meet can be a good option as it is free. A faculty can invite up to 250 participants to join a class. The drawback of using Google Meet is presenter is having less autonomy like ending presentation, mute and unmute all and controlled share the screen.

Microsoft teams: It is a hub for teamwork in Microsoft 365. If a teacher is looking for something that has a combination of what both Zoom and Google Classroom offers then Microsoft Teams could be the choice. However, you need to have a paid version of office 365 and better and faster internet connection to enjoy live class.

GoToMeeting: It is an online meeting, desktop sharing, and video conferencing software package that enables the user to meet with other computer users, customers, clients, or colleagues via the Internet in real time.

Skype: Free voice conference calls allow up to 50 people to participate in a video or audio group call simultaneously.

A list of key digital/e-learning platforms which are provided by MHRD for online education is as under:

Swayam: The national online education platform hosting 1900 courses covering both schools(classes IX to XII) and higher education (undergraduate, postgraduate programs) in all subjects including engineering, humanities and social sciences, and law and management courses.[1]

SWAYAM PRABHA: It has 32 DTH TV channels transmitting educational contents and these channels are available for viewing all across the country using DD Free Dish Set Top Box and Antenna. The channel schedule and other details are available in the portal. The channels cover both school education (classes IX to XII) and higher education (undergraduate, postgraduate, engineering, out-of-school children, vocational courses, and teacher training) in arts, science, commerce, performing arts, social sciences and humanities subjects, engineering, technology, law, medicine, and agriculture.[1]

There are many more tools can be used for E-learning such as Cisco Webex, Namaste, Google hangouts, Duo, Discord, and WizIQ.

Apart from focusing on curricular outcome, social interactions must be an integral part of E-learning and efforts should be made for meaningful and appropriate socializing. This aspect of learning should not be overlooked; students should be encouraged to create an online support system for collaboration and growth. Opportunities for socializing should include interactions between teacher and student, student and student.

Eventually, educators need to decide about selection of E-learning tool in context to learning objectives, institutional strategy and resources, number of learners, and assessing learners need by obtaining feedback. So far, E-learning is not widely used platform by medical teachers; thus, this situation can be an opportunity for medical teachers to refine their technological skill to enhance learning among medical students. This approach to teaching-learning will enable learners to maintain social distancing by staying safe at their home during this critical situation.

In conclusion, medical teachers' community must explore various E-learning tools and technologies and utilize it effectively to incorporate the knowledge and skills among the students in the current distressing situation. The support from the institutions is crucial in refining teachers technological skills and inculcating the positive attitude among them. Eventually, it will lead to the development of effective teaching–learning system to sustain learning during this crisis caused by the COVID-19 pandemic.

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Conflicts of interest

There are no conflicts of interest.

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Original Research Article

Knowledge, attitude and practice of post-natal exercises among post-natal women from a tertiary care centre, South India

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ABSTRACT

Background: Stressful puerperal period and its complications can be prevented by adequate care, proper diet and exercises. Though studies have indicated post-natal exercises (PNE) is helpful in reducing the effect of perineal muscle weakness, many women are unaware of its full benefits. This study is planned to know the knowledge, attitude and practice of PNE in post-natal mothers.
Methods: Descriptive cross-sectional study was conducted in department of obstetrics and gynecology for 3 months (November 2019 to January 2020). 160 post-natal women were enrolled with convenient sampling. Structured questionnaire was used to collect socio-demographic and obstetric details, source of information, knowledge, attitude and practice of PNE.
Results: A total 58.8% of this study participants revealed health care professions were the commonest source of information. More than half of them had adequate knowledge but still many were not aware of full benefits of PNE as only 3-5% aware of other benefits like prevention of urinary incontinence. 98.8% of the women's felt PNE is essential and 62.5% felt household work hinder them doing. 92.5% said they will emphasize the importance of PNE to others. No significant correlation found between socio-demographic characters and knowledge, attitude and practice of PNE.
Conclusions: Though most of the study population had adequate knowledge and positive attitude, household activities were the commonest barrier in doing PNE. Educating and creating awareness among family members is essential to improve the adherence. Continuing influence by health care workers during antenatal and postnatal period will be the key for improving adherence.

Keywords: Knowledge attitude and practice, Postnatal exercise, Postnatal women

INTRODUCTION

First six weeks following childbirth known as puerperal period is a stressful for any women due to physiological and psychological adaptations which happens during this period and pelvic organ returns to pre pregnant state.[1] Inadequate care during this period will lead to most of the complications like perineal muscle weakness leading to bladder incontinence, back pain, postpartum psychosis etc.[2-5] These complications can be prevented by adequate care like proper diet and exercises.[5-7]

Post-natal exercises (PNE) like Kegel's, abdominal and breathing exercises helps to improve the pelvic floor and

abdominal muscle tone, bowel and bladder function and cardio vascular fitness.[5,7,8] Also PNE will have the positive influence on preventing depression and other psychological disorders as it keeps the mother more relaxed.[2]

PNE can be started soon after birth with simple exercises and gradually progress to advance depending on the level of comfort.[9,10] Though many studies have indicated that PNE plays the major role in preventing complications like bladder incontinence, many women are unaware of full benefits of postnatal exercise and also some of the customs and superstitions existing in the community will be prohibiting the postnatal women from performing exercises.[5,6,8]

This study is planned to know the knowledge, attitude and practice of the post-natal mothers related to PNE to make a positive culture of adherence to PNE among all of the postnatal mothers.

METHODS

This descriptive cross-sectional study was carried out in the department obstetrics and gynecology of the tertiary care centre, South India, spanned over a period of 3 months (November 2019 to January 2020) after attaining the Institutional Ethics Committee approval. After getting the written informed consent 160 postnatal women who have attended the obstetrics and gynecology and pediatric outpatient department (OPD) were enrolled in the study with convenient sampling. Patient unaware of post-natal exercise, 1st post-natal period and women not willing to participate were excluded from the study

Structured proforma was used to collect socio demographic details like religion, education, occupation, income, type of family and domicile nature of the study participants. Followed by obstetric history like parity, mode of delivery and children were collected.

Source of information for PNE was collected as next part. Knowledge of the participants about PNE were collected with the structured questionnaire which includes when to start, how frequently needed, types of PNE, benefits and disadvantage of PNE. Attitude and practice of the study population also collected with the structured questionnaire which includes which includes barriers preventing PNE, way to improve adherence, health professions and emphasis of PNE during antenatal postnatal visit.

Statistical analysis

Statistical analysis was carried out using SPSS version 20. Descriptive data were expressed as number and percentage. Chi square test was used to analysis the correlation of socio-economic characters with knowledge, attitude and practice of the study population. Each question in the knowledge, attitude and practical was given 1 mark. Total score of 5 was there in each category, mothers those who scored > 3 marks were considered as good.

RESULTS

A total of 160 women who have attended OBG and Paediatric OPD department of the tertiary care centre were enrolled in the study. Age distribution of the study population was 22-38 years with the mean age of 28.2±4.1 years.

Table 1: Socio-demographic characters of the study population.

Socio- demographic status	Number	%
Religion		
Hindu	132	82.5%
Christian	4	2.5%
Muslim	24	15%
Education		
Illiterate	2	1.2%
Primary	2	1.2%
Middle	14	8.8%
High school	60	37.5%
Graduation and above	82	51.3%
Occupation		
Unemployed	72	45%
Govt. service	4	2.5%
Self	14	8.8%
Private employed	70	43.7%
Income in rupees		
Not applicable	72	45%
< 2500	-	-
2501-5000	-	-
5001-10000	42	26.3%
Above 10000	46	28.7%
Type of family		
Nuclear	134	83.8%
Joint	26	16.2%
Domicile		
Rural	-	-
Semi urban	84	52.5%
Urban	76	47.5%

Majority of the participants were belonging to Hindu religion (82.5%). Half of the study population were graduates (51.3%). Unemployed and private employed were distributed equally (45, 43.7% respectively). 55% of the participants had income above Rs. 5000. 83.8% belongs to nuclear family. All of them were either from semi urban and/ or urban area. Table 1 represents the socio demographic status of this study population.

Obstetric history of study participants showed 51.2% had caesarean; 48.8% had normal vaginal delivery. 66.3% of participants had two children and 33.7% had one child.

A total 58.8% of the study participants were given that health care professions as a source of information for PNE followed by TV (12.5%), social media (11.2%) and friends (11.2%). Figure 1 represents the source of information regarding postnatal exercise among this study population.

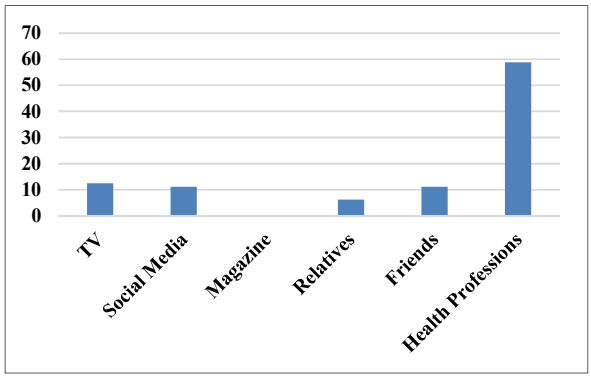

Figure 1: Source of information regarding post-natal exercise.

Table 2: Knowledge about postnatal exercise among the study populations.

Knowledge	Number	%
When to start PNE?		
Immediately	88	55%
After 2 weeks	64	40%
After 1 month	6	3.8%
After 6 months	2	1.2%
How frequently PNE is needed?		
Once a day	106	66.3%
Once a week	30	18.7%
4-5 days/weeks	24	15%
Once a month	-	-
What are the types of PNE you know?		
Breathing exercise	124	77.5%
Kegel's exercise	30	18.6%
Pelvic floor exercise	46	28.7%
Abdominal exercise	88	55%
Benefits of PNE in preventing		
Uterine prolapse	156	97.5%
Diastasis recti	8	5%
Bowel incontinence	8	5%
Urinary incontinence	6	3.7%
Disadvantage of not performing PNE?		
Weight gain	138	86.3%
High BP	-	-
Back pain	34	21.2%
Postpartum depression	20	12.5%

Among the study populations 55% of women were aware of when to start PNE; 66.3% was aware of how frequently PNE needed; breathing exercise (77.5%) followed by abdominal exercise (55%) were the well-known types of exercise among the=is study populations. 97.5% known that prevention of uterine prolapse was one of the benefits of PNE. 86.3% women told that weight gain was the most common disadvantage of not performing PNE. Table 2 represents knowledge about PNE among this study populations.

Table 3: Attitude about postnatal exercise among this study populations.

Attitude	Number	%
PNE is necessary		
Agree	158	98.8%
Disagree	2	1.2%
I adhere to PNE regularly		
Agree	78	48.7%
Disagree	82	51.3%
I feel guilty on omitting PNE		
Agree	98	61.3%
Disagree	62	38.7%
Health professions having positive influence		
Agree	152	95%
Disagree	8	5%
What prevents you to do PNE?		
Pain	14	8.8%
Fear of injury	22	13.7%
Baby care	32	20%
Household work	100	62.5%
Fatigue	14	8.7%
Lack of information	8	5%
How adherence to PNE can be improved?		
Motivation	40	25%
Training and education	20	12.5%
Display boards	4	2.5%
Awareness during antenatal visit	106	66.2%

Table 4: Practice about postnatal exercise among this study populations.

Practice	Number	%
How frequency of you are doing PNE		
Daily	90	56.3%
Once a week	58	36.3%
Occasionally	12	7.5%
Have you experienced benefits of PNE		
Yes	142	88.8%
No	18	11.2%
Antenatal visits having positive influence on PNE		
Yes	98	61.3%
No	62	38.7%
Postnatal visits having positive influence on PNE		
Yes	136	85%
No	24	15%
I will emphasize PNE to others		
Yes	148	92.5%
No	12	7.5%

A total 98.8% of the women's felt PNE is essential but only 48.7% agreed for adherence to PNE. 61.3% said that they feel guilty when omitting PNE. 95% had the opinion that health professions had the positive influence. Analysis of reason which prevents the PNE 62.5% felt that household work followed by baby care (20%) and fear of injury (13.7%). The way to improve adherence 66.2% felt that emphasis during the antenatal visit was important followed by motivation (25%). Table 3 represents attitude about PNE among this study populations.

Table 5: Cross tabulation between socio demographic characteristic and total score of knowledge and practice.

Socio demographic data	Total knowledge		Total practice	
	Test statistic	Sig. (2 tailed)	Test statistic	Sig. (2 tailed)
Age	0.731	0.866	0.566	0.904
Religion	0.380	0.827	1.131	0.568
Education	3.544	0.471	1.045	0.903
Occupation	6.026	0.110	0.952	0.813
Income	3.550	0.169	0.68	0.967
Family type	0.373	0.402	1.035	0.309
Domicile	0.664	0.415	0.334	0.563
Parity	0.396	0.529	0.451	0.502
Mode of delivery	0.090	0.925	0.270	0.603

A total 56% of the women practising PNE daily and 36.3% practicing once a week; 88.8% experienced the benefits; 62% and 85% have felt that antenatal visit and postnatal visit respectively had the positive influence. 92.5% said that they will emphasise the importance of PNE to others. Table 4 represents practice about PNE among this study populations.

Correlation of socio demographic character with knowledge and practice showed no significant association ($p > 0.05$). Table 5 represents cross tabulation between socio demographic characteristic and total score of knowledge and practice.

DISCUSSION

Total of 160 women with the mean age of 28.2±4.1 years were enrolled in this study, of which 66.3% were multigravida, 51.2% had caesarean mode of delivery. This study population group was discordant with the study group of Jawaher et al, Mbada et al, most of their study population were vaginal delivery.[6,8] As caesarean delivery was predominate in this set up, we need to create more awareness among this study population to change the attitude from conservative cultural perceptions and myths that exercise is unsafe for pregnant women which makes them afraid to participate in view of fear that it will have negative impact on their health.

On analyzing the source of information for PNE, 58.8% of this study participants were revealed that health care professions were the most common mode followed by TV and social media (23.7%). This study findings were in discordant with many other study results like Jawaher et al, Ibrahim et al, Alharqi et al, which media was the most common source reported for information of PNE.[6,11,12] This study findings may be attributed to the protocol of the tertiary care centre which is having the practice of getting physiotherapy consultant for all post-natal mother delivered in the hospital and also the consultants and nursing staffs will emphasize the importance of PNE during antenatal and postnatal visit.

On analyzing the knowledge about PNE, 55% of this study population were aware of when to start PNE and 66.3% aware of how frequently it needed. This findings were in concordance with Alharqi et al (65% awareness) but discordant with Sreenivasan A et al, Ashok VG et al, (6.7% and 22% awareness respectively).[4,12,13] Better knowledge in this study may be attributed to the domicile nature of this study population as all of them either from semi urban or urban area and also more than half of this study population were graduates.

Breathing exercises (77.5%) followed by abdominal exercises (55%) were the well-known types of exercises among this study populations. 81.4% and 71.3% not aware of Kegel's and pelvic floor exercises respectively. This results were in concordance with Wojno et al.[14] There was a knowledge gap about other exercises, it may be due to, still people may have belief in the community that pelvic floor exercises should not be carried out after caesarean section, which was the major group who may not interested in knowing other exercises.

A total 97.5% known that prevention of uterine prolapse was one of the benefits of PNE. In contrast only 3-5% aware of other benefits like prevention of bowel, urinary incontinence. On analyzing disadvantage of not performing PNE, weight gain (86.3%) was the most common followed by back pain (21.2%). Here also there was a knowledge gap found among this study populations related to advantage and disadvantage which may be rectified by proper training and education.

On analysis the attitude of this study population about PNE revealed that 98.8% of the women's felt PNE is essential and 61.3% felt that they feel guilt when omitting PNE. This positive attitude may be attributed to the health professions who constantly encouraging and emphasizing the importance of PNE among post-natal mothers which was also indicated by this study group as 95% had the opinion that health professions had the positive influence.

Analysis of barrier which prevents the PNE revealed that 62.5% felt that household work followed by baby care (20%) and fear of injury (13.7%). This was in discordant with study result of Alharqi et al, who reported that lack of information and fear of injury were the most common barrier.[12] This study finding may be attributed due to the nuclear family nature of this study population. So, help from others (friend/family) may have the positive impact in this study setup. Analyzing the way to improve adherence 66.2% felt that emphasis during the antenatal visit was important followed by motivation (25%). This study finding emphasis that gaining the confidence of the mother related to false beliefs regarding PNE is very important during both antenatal and postnatal visit to improve the attitude.

On analyzing the practice of PNE among this study population revealed that 56% practicing PNE daily and 36.3% practicing once a week; 88.8% experienced the benefits; 62% and 85% have felt that antenatal visit and postnatal visit respectively had the positive influence. 92.5% said that the will emphasize the importance of PNE to others. This may be attributed to the antenatal and postnatal health education provided to the women through the health care professions.

In contrast to the other studies Jawaher et al, Alharqi et al, who have reported positive association between women's education and knowledge about PNE, this studies report suggest that there was no significant correlation between any socio demographic character with knowledge, attitude and practice of PNE.[6,12] This may be due to nature of this study population which had more than 50% educated and all of them either from urban or semi urban area and protocol of the health system had the positive influence on adherence to PNE which was shown by the positive attitude almost by all patients.

CONCLUSION

More than half of this study population had adequate knowledge about PNE but still many of them were not aware of the full benefits of PNE. As most of them said health care professions were the main source of information, it is the prime role to throw light on the importance of postnatal exercise and emphasis to adherence to PNE among all the post-natal mothers. Most of study population had the positive attitude but felt that household activities were the most common barrier. Education and creating awareness among family members and friends of the post-natal mothers are also very important to improve the adherence. More than half were also practising the exercises and said that they will emphasise the importance of PNE to others. This culture making will have a positive impact among the community in relation to women health. No association was found among socio-demographic character with knowledge, attitude and practice. So continuing influence by health care workers will be the key for improving the adherence rate among this study populations.

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Profile of Vitamin B12 Deficiency and Analysis of Contributory Factors among Inpatients in a Tertiary Care Hospital in Madurai, South India

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ABSTRACT

BACKGROUND

It is well known that Vitamin B_{12} deficiency is common among vegetarians as Vitamin B_{12} is obtained predominantly from animal sources. However, recent reports show that Vitamin B_{12} deficiency is becoming more common among non-vegetarians too and surprisingly the major factor attributing to this is found to be due to dietary deficiency. We hypothesized that this could also be due to the type of non-vegetarian food consumed, cooking methods, type of utensil used, and other modifiable risk factors like smoking, alcohol and diseases causing Vitamin B_{12} deficiency. We wanted to assess the proportion of vegetarians and non-vegetarians with vit. B_{12} deficiency and analyse the contributing factors among inpatients with vitamin B_{12} deficiency in a tertiary care hospital in South India.

METHODS

This observational, prospective study was done between June and September 2019 & involved 200 Vitamin B_{12} deficiency patients in the age group of 20 - 50 years of both the genders. Patients were identified after reviewing their medical records and laboratory tests for MCV, MCH, MCHC, Hb & vitamin B_{12}. A detailed history of their food habits, practices & other relevant factors was obtained using a questionnaire. Statistical analysis was done using Mann Whitney U test.

RESULTS

There was no statistical difference ($p = 0.379$) in the vitamin B_{12} levels among vegetarians and non-vegetarians. 54.6 % of participants consumed poultry, 32.5 % consumed fruits & vegetables less than 4 times a week, 36 % & 42 % consumed fried & boiled food, 58 % used ever-silver vessels for cooking, 70.6 % used packaged milk, 23 % consumed alcohol & 21 % were smokers.

CONCLUSIONS

Vitamin B_{12} deficiency is common both among vegetarians and non-vegetarians. Among non-vegetarians, deficiency is seen more with poultry eaters, packaged milk consumers, with fried / boiled method of cooking using ever-silver vessels. Alcoholism, caffeinated beverages, smoking, presence of other diseases like diabetes, hypertension, peptic ulcer, drug intake also contributes to Vitamin B_{12} deficiency.

KEYWORDS

Vitamin B12 Deficiency, Non-Vegetarians, Vegetarians, Contributing Factors

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BACKGROUND

It is a well-established fact that vitamin B_{12} is obtained from animal sources and because of this, vitamin B_{12} deficiency is quiet common in vegetarians.[1,2] Despite this, recent findings observed an alarming increase in the incidence of vitamin B_{12} deficiency anaemia even among non-vegetarians.[3] Dietary deficiency of vitamin B_{12} was found to contribute a major role in vitamin B_{12} deficiency anaemia in non-vegetarians.

Following ingestion, vitamin B_{12} is dissociated from food proteins by hydrochloric acid and pepsin secreted by gastric parietal cells. Vitamin B_{12} then binds to salivary protein R-binder or transcobalamin I in stomach. The parietal cells produce intrinsic factor which binds with vitamin B_{12} in the duodenum after cleavage from the R-binder by the action of trypsin and other pancreatic enzymes. This binding is essential for absorption of vitamin B_{12} across the terminal ileum, mediated by the protein cubilin.[4] Any disruption in the above process results in vitamin B_{12} deficiency. A serum B_{12} above 300 pg / mL is interpreted as normal. Patients with B_{12} levels between 200 and 300 pg / mL are considered borderline, and further enzymatic testing may be helpful in diagnosis. Patients with B_{12} levels below 200 pg / mL are considered deficient.

Causes for Vitamin B_{12} deficiency in both vegetarians and non-vegetarians include defective intake, damage to parietal cells in stomach, acidic environment in duodenum and ileal diseases. Source of Vitamin B_{12} in non-vegetarians is animal foods like meat, poultry, eggs & sea foods. Apart from organic causes, in normal non vegetarians, in spite of adequate non-veg food intake, the causes for vitamin B_{12} deficiency could be due to not allowing the indoor factory farmed animals to feed on the soil, use of pesticides in farm which kill Vitamin B_{12} producing bacteria in soil, use of heavy antibiotic in animals which kills Vitamin B_{12} producing bacteria in gut of animals as well as in humans. Lifestyle changes including increased intake of fat rich junk foods, preserved foods, tea, coffee, alcohol, smoking and drugs like proton pump inhibitors, metformin could also contribute to Vitamin B_{12} deficiency.[5&6] Vitamin B_{12} (Cobalamin) is essential for DNA synthesis of red blood cells (RBC's), which helps in nuclear maturation and formation of RBC's. It is also essential for the conversion of homocysteine to methionine. Deficiency of Vitamin B_{12} results in megaloblastic anaemia due to defect in nuclear maturation, producing less & immature RBC's. In vitamin B_{12} deficiency, blood homocysteine level increases leading to atherosclerosis, increasing the risk for myocardial infarction and stroke. Methionine is essential for the methylation of myelin, DNA, RNA & neurotransmitters. Deficiency of methionine affects the myelination of the nervous system resulting in demyelination of corticospinal and dorsal column tracts. Deficiency also causes bone degradation by stimulating osteoclastic activity.

As sufficient amount of vitamin B_{12} is stored in the liver, deficiency symptoms usually take more than five years to develop. Symptoms develop early before a decrease in serum Vitamin B_{12} below the reference value was observed.[7] The onset of anaemia in case of Vitamin B_{12} deficiency is usually insidious and gradually progressive. Typically, the patient presents with smooth, beefy, red tongue often associated with diminished taste sensations. The patient may have shortness of breath, pallor, dizziness, tinnitus, fatiguability, lethargy and palpitations. Since the underlying pathologic process consists of demyelination of peripheral nerves, the spinal cord and the cerebrum, the signs and symptoms include numbness, paraesthesia, weakness, ataxia, poor finger coordination, diminished reflexes and loss of vision. Patients may come up with several mental problems like depression, memory loss, irritability, behavioural changes, panic attacks and insomnia. Untreated Vitamin B_{12} deficiency can cause pulmonary embolism, deep vein thrombosis, suppression of immune system and bone marrow failure.

The prevalence of vitamin B_{12} deficiency in Asian Indians is 70 to 80 %, especially in north Indian population is 47 %.[8] Hence the aim of this present study was to identify the proportion of non-vegetarians having B_{12} deficiency among all vitamin B_{12} deficiency patients in a tertiary care hospital in south India and to analyse the contributing factors.

Among inpatients with vitamin B_{12} deficiency in a tertiary care hospital in South India, we wanted to study the haematological profile, assess the proportion of vegetarians and non-vegetarians and analyse the contributing factors.

METHODS

This observational, cross sectional study involved 200 vitamin B_{12} deficient patients in the age group of 20 - 50 years involving both the genders, who sought admission in the General Medicine Department of a private Medical college& Hospital in South India between June 2019 - September 2019. This study was conducted after obtaining proper Institutional Ethical Committee Clearance. Patients with 1) MCV >100 fl 2) Haemoglobin < 12 gm / dL for female subjects, < 13 gm / dL for male subjects 3) WBC count < 4000 / mm^3 4) Platelet count < 150,000 / mm^3 5) Vitamin B_{12} < 200 pg / ML were included in the study.

Exclusion Criteria

1. Pregnant and lactating women. The Recommended Dietary Allowance (RDA) for vitamin B_{12} is 2.4 µg / d for adults.[9] These requirements become higher during pregnancy and lactation.
2. Elderly people who are over 50 years of age, as the Vitamin B_{12} content of healthy elderly population was found to be lower when compared with the younger age group.[10]
3. Patients with types of anaemia other than Vitamin B_{12} deficiency anaemia.
4. Patients who were on Vitamin B_{12} supplementation.
5. Patients who received blood transfusions within one month.

Data Collection Method & Tools

Medical records and laboratory tests were reviewed for identifying patients with clinical symptoms of Vitamin B_{12} deficiency anaemia and for decreased serum vitamin B_{12} levels, increase in MCV or pancytopenia. Medical records were also reviewed for pallor, glossitis, stomatitis, tingling, numbness, paraesthesia, dietary habits, personal habits, and previous history of blood transfusions, drug intake and other symptoms. Non vegetarians were defined as those consuming some meat (red meat, poultry, at least once per month) and the total of meat and fish > 1 time / week.[11] Serum vitamin B_{12} was estimated using electrochemiluminescence immune assay "ECLIA" intended for use on Elecsys and Cobase immunoassay analysers (Elecsys 2010 Modular Analytics E170 cobas e 411 Cobas E 601). After getting informed written consent from patients, values of Hb, vitamin B_{12}, complete blood count and blood indices were obtained.

Statistical Analysis

Data was analysed using SPSS v 16.0. Proportion of vegetarians and non-vegetarians was compared using Mann Whitney U test. An arbitrary cut off of 0.05 was used to interpret significance of p value.

RESULTS

Vegetarian / Non–Vegetarian	n	%
Vegetarian	92	46.0
Non-Vegetarian	108	54.0
Total	**200**	**100.0**
Gender	**n**	**%**
Male	146	73.0
Female	54	27.0
Total	**200**	**100.0**

Table 1. Proportion of Vegetarians and Non-Vegetarians & Gender Wise Distribution

Test of Normality				
	Veg / Non-Veg	Shapiro-Wilk		
		Statistic	Df	P-Value
Vitamin B12	Vegetarian	.763	92	.000
	Non-Vegetarian	.972	108	.021
Veg / Non-Veg	Vitamin B_{12} Mean Rank	Mann - Whitney U		P-Value
Vegetarian	104.40	4609.5		0.379
Non-vegetarian	97.18			

Table 2. Test of Normality & Mann-Whitney U test

History	n	%
1. Patients with Hypertension	30	15
Hypertensive patients on regular drugs	20	10
2. Patients with Diabetes Mellitus	40	20
Diabetic patients on regular drugs	30	15
3. Patients with H/O any Abdominal Surgery	35	17.5
4. Patients with H/O Peptic ulcer	15	7.5
a. Peptic ulcer patients on proton pump inhibitors	10	5
b. Peptic ulcer patients on antacids	5	2.5
5. Patients with H/O Autoimmune disease	5	2.5
6. Patients with H/O Ileal disorder	5	2.5
7. Patients with H/O Liver disorder	10	5
8. Patients with H/O Any other drug intake	20	10
9. Total number of patients consuming alcohol	46	23
a. Patients who consume brandy	17	37
b. Patients who consume beer	15	33
c. Patients who consume vodka	6	13
d. Patients who consume rum	8	17
10. Total number of smokers Cigarette / Beedi	42	21
Cigarette smokers	17	40.47
Beedi smokers	25	59.53
a. Patients who smoked 1-5 pack years of cigarette*	2	12
b. Patients who smoked 6-10 pack years of cigarette*	4	23
c. patients who smoked 11-15 pack years of cigarette*	5	29
d. Patients who smoked 16-20 pack years of cigarette*	3	18
e. Patients who smoked ≥ 21 pack years of cigarette*	3	18
f. Patients who smoked 1-5 pack years of beedi**	9	36
g. Patients who smoked 6-10 pack years of beedi**	9	36
h. Patients who smoked 11-15 pack years of beedi**	7	28

Table 3. Medical, Surgical and Personal History

* Number of cigarettes per day multiplied by duration of smoking divided by 20.
** In case of beedi smokers, the number of pack years was further divided by 4, as some articles suggest four beedis are equivalent to one cigarette. 13

Dietary Habits	n	%
1. Patients who consume milk (only milk, milk with coffee, milk with tea)	170	85
a. Patients who consume packaged milk	120	70.6
b. Patients who consume milk obtained from dairy farms	50	29.4
c. Patients who consume milk with coffee	50	29.4
d. Patients who consume milk with tea	60	35.3
e. Patients who consume only milk, without coffee or tea	60	35.3
2. Patients who consume fruits & vegetables	35	17.5
a. Patients who consume fruits & vegetables at least 2 times a day, 5 days a week		
b. Patients who consume fruits & vegetables at least once a day, 5 days a week	50	25
c. Patients who consume fruits & vegetables less than 4 times a week	65	32.5
d. Patients who consume fruits & vegetables less than 2 times a week	50	25
3. Patients who consume fish, meat, poultry	21	19.4
a. Patients who consume fish		
b. Patients who consume meat	28	26
c. Patients who consume poultry	59	54.6
4. Patients who consume fresh / preserved non-vegetarian food	99	91.7
a. Patients who consume fresh non-vegetarian food		
b. Patients who consume preserved non-vegetarian food	9	8.3
5. Patients who consume smoked / fried / boiled / grilled / non-vegetarian food	20	18.5
a. Patients who consume smoked non-vegetarian food		
b. Patients who consume fried non-vegetarian food	36	33.3
c. Patients who consume boiled non-vegetarian food	42	39
d. Patients who consume grilled non-vegetarian food	10	9.2
6. Patients who use aluminium / tin / silver / non-stick vessels for cooking	27	13.5
a. Patients who use aluminium vessels for cooking		
b. Patients who use tin vessels for cooking	40	20
c. Patients who use ever silver vessels for cooking	116	58
d. Patients who use non-stick vessels for cooking	17	8.5

Table 4. Diet History

Parameters	Mean
Haemoglobin	6 (±) 0.5 g / dL
MCV	108.4 (±) 2 fL
MCH	44 (±) 1 pg
MCHC	36 (±) 0.5 g / dL

Table 5. Haemogram Values

Shapiro wilk test and box-whisker plot revealed that vitamin B_{12} level data failed to satisfy normality assumptions. Hence, non-parametric test like Mann-Whitney U test was

used to find the difference in vitamin B_{12} level among vegetarian and non-vegetarian. On the basis of statistical significance value ($p > 0.05$), there was no difference in the vitamin B_{12} level among vegetarians and non-vegetarians.

DISCUSSION

In the present study, among the 200 vitamin B_{12} deficiency patients assessed based on their serum vitamin B_{12}, Hb content, MCV, MCH and MCHC (Table 5), 92 were vegetarians and 108 were non vegetarians (Table 1). The study results show no significant difference (p value - 0.379) in vitamin B_{12} level among vegetarian and non-vegetarian population (Table 2). This shows that vitamin B_{12} deficiency is almost equally prevalent in both vegetarian and non-vegetarian population. The results of our study differ from the results of previous studies done on vitamin B_{12} deficiency.[1,4,13] According to these studies, the prevalence of vitamin B_{12} deficiency was higher among vegetarians due to sub optimal intake of vitamin B_{12}.

Plant food is a very poor source of Vitamin $B_{12.}$ Foods rich in vitamin B_{12} include mushrooms (due to contact with B_{12} synthesizing bacteria in the soil), algae and foods fortified with vitamin $B_{12.}$ In vegetarians, deficiency is not only due to lack of non-vegetarian food, but also due to failure of regular and sufficient intake of green leafy vegetables coated with soil bacteria. Thorough washing for fear of pesticides and deep cooking reduces the level of vitamin B_{12}.[14] In our study, 32.5 % of the population consumed fruits and vegetables less than 4 times a week (Table 4).

Good sources of vitamin B_{12} include meat, fish, milk and milk products (yogurt and cheese). According to National Institute of Nutrition, Hyderabad, the amount of vitamin B_{12} for 100 g of edible portion in liver of goat, sheep is 91 mg, goat meat is 2.8 mg, egg yolk (hen) is 4.4 mg, egg whole is 1.8 mg, buffalo meat is 1.7 mg, shrimp is 9 mg, mrigal fish is 1.4 mg, cow milk is 0.14 mg, cow milk curd is 0.13 mg, skimmed milk powder is 0.3 mg.[15] Though B_{12} content of the meat is high, the bioavailability is less. The equal increase in prevalence of vitamin B_{12} deficiency in non-vegetarians could be due to the fact that in developing countries, the consumption of meat is not on a regular basis. They take meat only once a week generally as meat is expensive and the lower / middle class group cannot afford to buy. An average sized steak that is consumed by a single person in western countries will serve 6 - 8 persons after making as curry in the developing countries. Only daily meat eaters in the developing countries will have a vitamin B_{12} level similar to that of a non-vegetarian in the developed countries.[16] Among the animal foods, fish and shellfish are important contributors of vitamin B_{12}.[17] Moreover, most of the non-vegetarian population consumes more poultry when compared to meat and fish. In the present study, 54.6 % of the non-vegetarians consumed poultry and the intake of fish is only 19.4 % (Table 4). The effect of roasting and grilling on vitamin B_{12} content is minimal. However, frying causes a 32 % decrease in cobalamin content. [18] The preferred type of cooking is boiling and frying in the present study (Table 4). Only 8.3 % of the non-vegetarian participants used preserved meat. Processing of raw meat also decreases vitamin B_{12} level.[19] All these would have contributed to vitamin B_{12} deficiency in non-vegetarians.

The B_{12} status of vegetarians was mainly correlated with their intake of milk and milk products. Though vitamin B_{12} content of milk is less, the bioavailability of vitamin B_{12} is greater.[20] Half of the recommended daily intake of vitamin B_{12} is provided by 250 ml of milk. The concentrations of vitamin B_{12} in milk were affected by cow breed, season, cobalt supply, and feeding regimens. Vitamin B_{12} concentrations in milk of cows receiving a daily supplement of cobalt were higher when compared with unsupplemented cows. Heating milk at 95°C for 5 minutes, pasteurization at 75°C for 16 seconds, storing in a domestic refrigerator for nine days and day light exposure do not potentially alter vitamin B_{12} content. Whereas 30 to 40 % loss of vitamin B_{12} was observed in milk after boiling for 30 minutes or microwave heating for 5 minutes.[21] Fermentation during yogurt formation and storage of yogurt at 4° C for 14 days results in a 25 % & 26 % loss of vitamin B_{12} content. In the present study, patients who consume milk without coffee or tea is only 35.3 % and almost 70.6 % of this is packaged milk (Table 7). Coffee consumption was associated with reduced vitamin B_{12} concentration and increased homocysteine levels.[5] Coffee might increase the excretion of B-vitamins in urine. Increased consumption of coffee (29.4 %) and tea (35.3 %) by both vegetarians and non-vegetarians also could have contributed to Vitamin B_{12} deficiency.[5] Peptic ulcer especially due to *Helicobacter pylori* infection can lead to vitamin B_{12} deficiency. The infection leads to atrophic gastritis and hypochlorhydria, which results in failure of splitting of vitamin B_{12} from the food proteins and subsequent binding with R-binder.[22] Proton-pump inhibitors can also lead to vitamin B_{12} deficiency by impairing the release of vitamin. In the present study, 7.5 % of the participants had peptic ulcer (Table 3). The prevalence of vitamin B_{12} deficiency is very high among both Type I and Type II diabetes mellitus. In Type I diabetes, auto antibodies are formed against intrinsic factor and parietal cells resulting in pernicious anaemia. In Type II diabetes, vitamin B_{12} deficiency is due to the drug metformin. It causes anaemia by stimulating bacterial overgrowth in small intestine, by competitively inhibiting vitamin B_{12} absorption, by altering the intrinsic factor level and by preventing the absorption of vitamin B_{12} across ileum by binding with the cubilin receptor.[23] Out of the 200 participants in our study, almost 20 % had diabetes. Our results coincides with the results of a study conducted on the effect of metformin on vitamin B_{12} in diabetic population, where vitamin B_{12} deficiency was common among both the vegetarian (56.52 %) and non-vegetarian (35.71 %) population and the difference is not statistically significant.[24] The level of homocysteine is regulated by vitamin B_{12} and deficiency of vitamin B_{12} is associated with increased levels of homocysteine, which is an independent risk factor for high blood pressure. In our study, about 15 % of the participants were hypertensive. According to Table 3, the presence of hypertension (15 %), peptic ulcer (7.5 %), autoimmune diseases (2.5 %), abdominal surgery (17.5 %), ileal disorder (2.5 %) and drug

intake (10 %) among the study participants would have reduced the vitamin B_{12} level in both the population.

Smoking decreases serum Vitamin B_{12} concentration. In tobacco smoking patients, vitamin B_{12} levels are decreased as high amount of cyanide in tobacco smoke affects vitamin B_{12} metabolism. In smokers, there is also increased excretion of vitamin B_{12} in urine.[25] In the present study, 21 % of the male participants were smokers (Table 3). Vitamin B_{12} acts as a cofactor for the enzymes regulating homocysteine metabolism. Previous study on the effect of smoking on vitamin B_{12} in 300 male subjects showed a significant decrease in vitamin B_{12} concentration in chronic smokers as when compared with non-smokers.[26] Homocysteine was doubled. 23 % of the participants of this study were alcoholics (Table 3). Alcohol consumption reduces serum vitamin B_{12} concentration.[27] Functional B_{12} deficiency was also observed in alcoholics. They respond to vitamin B_{12} treatment inspite of normal cobalamin levels.

The type of cooking utensil used may cause changes to the contents of vitamins. Chronic use of aluminium vessel for cooking all the three meals a day for more than 10 years results in anaemia.[28] But in our study, majority of the participants used only ever silver utensils (Table 10). In the present study (Table 1), the prevalence of vitamin B_{12} deficiency was more common among male participants (73 %) when compared to female participants (27 %). The results of our study coincides with the results of two previous Indian studies which showed that men are more susceptible to vitamin B_{12} deficiency.[29 & 30] Strength of the study: The first study of its kind to measure the prevalence of vitamin B_{12} deficiency among the non-vegetarian population in south India. Limitation of the study: Because of small sample size, to extrapolate the findings to general population, large scale multicentric studies are required in the future.

CONCLUSIONS

The present study results show that the prevalence of vitamin B_{12} deficiency was nearly equal among both vegetarian and non-vegetarian population. Increasing prevalence of vitamin B_{12} among the non-vegetarian population could be predominantly due to reduced, regular consumption of milk and fish, frying of non-vegetarian food, increased consumption of beverages like coffee, smoking and alcoholism, and increased prevalence of diabetes and hypertension. It was found to be more prevalent among males than females. Identifying this deficiency in non-vegetarians could help improve their anaemia and prevent the development of long-term complications.

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Relation of Serum Cholinesterase with Clinical Severity and Treatment Outcomes of Organophosphorus Poisoning in a Tertiary Care Center, a Prospective Observational Study

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ABSTRACT

Introduction: Acute organophosphorus (OP) pesticide poisoning is widespread and is the most common poisoning in many developing countries and vary in different geographic regions. Organophosphorus compounds are anti acetylcholinesterase's which exert their toxicity by interfering with the normal function of acetylcholine. So the present study was done to assess the serum cholinesterase levels correlation with clinical severity to determine the treatment outcome (Need for mechanical ventilation and mortality).

Material and methods: A cross-sectional study was conducted among 100 patients admitted with OPC poisoning in the department of general medicine, Velammal Medical College Hospital and Research Institute, Madurai from January 2016 to July 2019. The diagnosis was made based on history or evidence of exposure to OP compound within 24 hours; Clinical severity was assessed and categorized according to POP scale. Serum Cholinesterase values were defined as per Proudfoot classification. IBM SPSS version 22 was used for statistical analysis.

Results: OP poisoning predominantly affected males in the age group 21 to 40 years. The majority had a moderate grade of poisoning with Serum cholinesterase levels between 2001 to 5000 (IU/l). In this study, the mortality was 25%, and 40% of patients had to be ventilated. There was no statistically significant relationship between age, gender, clinical severity, time-lapse, Serum cholinesterase levels, mortality with mechanical ventilation. Mortality rate showed a statistically significant relation with clinical severity ($p<0.001$).

Conclusion: Clinical severity was associated with treatment outcomes. No particular trend of the association was observed between clinical severity and serum cholinesterase levels. Serum cholinesterase levels had shown no association with outcomes

Keywords: Clinical severity, Organophosphorus, Poisoning, Serum Cholinesterase

INTRODUCTION

Acute organophosphorus (OP) pesticide poisoning is widespread and is the most common poisoning in many developing countries and vary in different geographic regions.[1] Accidental and occupational exposures were estimated to cause 1 million cases with 200,000 deaths.[2] Recent data from the National crime bureau of India shows a mortality rate of 26.6% (34,869) in the year 2017 by consumption of pesticides. Accidental Intake of Insecticides was reported among 1403 males, 812 females in the age group of 18 -30 years. The majority of suicides were reported in Maharashtra (17,646) followed by 14,459 suicides in Tamil Nadu, 12,014 suicides in West Bengal.[3] Poisoning is the fourth most common cause of mortality in rural India. In North India aluminium phosphide and organophosphate, poison is common. Aluminium phosphide or organophosphate, these substances were developed to control insects and pests and have become major contributors in the causation of poisoning death.[4]

Organophosphorus compounds are anti acetylcholinesterase which exert their toxicity by interfering with the normal function of acetylcholine, an essential neurotransmitter throughout the autonomic and central nervous system. OP acts by inhibiting the enzyme cholinesterase, results in accumulation of acetylcholine at synapses and myoneural junction leading to cholinergic overactivity.[5] The manifestations of toxicity are a result of this effect, affecting the patient's physiology. The anticholinesterase effects can be evidenced biochemically by suppression in the serum levels of serum cholinesterase and of red cell cholinesterase. Previous studies associating the severity or prognosis of Organophosphorus poisoning with an estimation of serum cholinesterase have been contradictory. According to the study Senayeke et al[6] serum cholinesterase level is depressed after OP poisoning. The Peradeniya Organophosphorus Poisoning scale assesses the severity of poisoning based on the symptoms at presentation and is simple to use. Noiura S et al[7] reported that serum cholinesterase levels have no prognostic value in acute OP poisoning.

Owing to the limited availability of resources, all OP poisoning patients are not managed in ICUs in the Indian setup. So the present study was done to assess the serum cholinesterase level, and it's a correlation with clinical severity among

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cases of organophosphate poisoning. Secondly, to determine the treatment outcome (Need for mechanical ventilation and mortality) and analyze the factors associated with treatment outcome among the OP poisoning cases.

MATERIAL AND METHODS

A cross-sectional study was conducted among 100 patients with OPC poisoning in the department of general medicine, Velammal Medical College Hospital and Research Institute, Madurai from January 2016 to July 2019. Prior approval for the study and the protocol was obtained from the institutional ethical committee. Informed consent was obtained from the patient's attendant. All patients in whom a provisional diagnosis of OPC poisoning was made based on the patient's clinical presentation/history as recorded from the patient's attendant/details of poison containers were included in the study.

Multiple compound/tablet poisoning, contradictory diagnosis regarding the compound, patients with a history of bronchial asthma/cardiac illness or neuromuscular diseases, Patients who died within few minutes of hospitalization even before the initial treatment could be given were excluded from the study.

A detailed case history was taken as per the proforma, general physical examination and systemic examination was done soon after admission. Laboratory investigations such as Complete blood count, Random blood sugar, Renal function test, Liver function test, were done at the time of admission. The patients were monitored regularly until the outcome.

Clinical severity was assessed and categorized according to POP scale. A score of 0 to 3 is considered as mild poisoning, 4 to 7 as moderate poisoning and 8 to 11 as severe poisoning.[6] The score was obtained at initial presentation before any medical intervention, and it represented the muscarinic, nicotinic and central effects of the acute cholinergic manifestations of OP poisoning.

Serum cholinesterase was measured by kinetic/DGKC calorimetric method using EDTA samples. The results are expressed in KU /, L, which is U / L x 1000. The laboratory reference range used in the present study for serum cholinesterase: 5100 to 11700 IU / Ltr. Based on the Serum Cholinesterase values, the severity of poisoning may be defined as per (Proudfoot classification) with above normal range:[8]

- Mild poisoning: SCE. level 20 - 50% of normal / > 2001 IU / L
- Moderate poisoning: SCE. level 10 - 20% of normal /1001 -2000 IU / L
- Severe poisoning: SCE. level is < 10% of normal / < 1000 IU / L

Qualitative variables were gender, serum cholinesterase levels, clinical severity grade. Quantitative variables include age. The major outcome variable is the severity of poisoning. P value of less than 0.05 is considered a statistically significant value. IBM SPSS version 22 was used for statistical analysis.[9]

RESULTS

A total of 100 subjects were included in the final analysis. Majority of (66%) participants w were aged between 21 to 40 years, followed by 41 to 60 years (23%), < 20 years 9 (9%) and >60 years was (2%). Males constituted 80% of the study population fiftieth(58%) participants had clinical grade II, 25 (25%) participants had grade I, I 17(17%) participants and I had clinical-grade I poisoning. Time-lapses between consumption and reporting to the hospital was 61 to 180 minutes in 51% of the subjects. The lapse was 181 to 300 minutes in 21% and > 300 minutes in 6% of subjects. Only 17% reached in < 60 minutes to the hospital. Six (6%) participants had serum cholinesterase level <1000 (IU/l), in 18 (18%) subjects it was 1001 to 2000 (IU/l), in 68(68%) subjects it was 2001 to 5000 (IU/l) and 8 (8%) subjects had >5000 (IU/l). Among the study population, 40 (40%)

Parameters	Number (%)
Age group	
<20	9(9%)
21-40	66(66%)
41-60	23(23%)
>60	2(2%)
Gender	
Male	80(80%)
Female	20(20%)
Clinical severity grade	
I	17(17%)
II	58(58%)
III	25(25%)
Time-lapses duration in minutes	
<60	17(17%)
61-180	51(51%)
181-300	26(26%)
>300	6(6%)
Serum cholinesterase level (IU/l)	
<1000	6(6%)
1001-2000	18(18%)
2001-5000	68(68%)
>5000	8(8%)
Mortality	
Yes	25 (25%)
No	75 (75%)
Mechanical ventilation	
Yes	40 (40%)
No	60 (60%)

Table-1: Summary of baseline characteristics (N=100)

(Serum Cholinesterase Level (Iu/L)	Clinical Severity		
	Grade 1 (N=17)	Grade 2 (N=58)	Grade 3 (N=25)
<1000	0 (0%)	5 (8.62%)	1 (4%)
1000 To 2000	2 (11.76%)	12 (20.69%)	4 (16%)
2000 To 5000	13 (76.47%)	35 (60.34%)	20 (80%)
> 5000	2 (11.76%)	6 (10.34%)	0 (0%)
*No statistical test was applied- due to 0 subjects in the cells			

Table-2: Correlation between clinical severity and serum choline esterase levels

subjects needed mechanical ventilation, and 25 (25%) met with mortality. (table 1)

When the association between clinical severity and serum choline esterase levels was assessed, no particular trend was observed. But as compared to grade 1, a higher proportion of subjects with clinical-grade 2 & 3 had shown lower levels

Parameters	Study group		Chi square	P value
	Mechanical ventilation (N=40)	No Mechanical ventilation (N=60)		
Age group				
<20	1 (2.5%)	8 (13.33%)	*	*
21-40	22 (55%)	44 (73.33%)		
41-60	15 (37.5%)	8 (13.33%)		
>60	2 (5%)	0 (0%)		
Gender				
Male	38 (95%)	42 (70%)	9.375	0.002
Female	2 (5%)	18 (30%)		
Clinical severity				
grade I	1 (2.5%)	16 (26.67%)	*	*
grade II	14 (35%)	44 (73.33%)		
grade III	25 (62.5%)	0 (0%)		
Time lapse duration in minutes				
<60	8 (20%)	9 (15%)	2.869	0.412
61-180	23 (57.5%)	28 (46.67%)		
181-300	7 (17.5%)	19 (31.67%)		
>301	2 (5%)	4 (6.67%)		
Serum cholinesterase level (IU/l)				
<1000	2 (5%)	4 (6.67%)	*	*
1001-2000	5 (12.5%)	13 (21.67%)		
2001-5000	33 (82.5%)	35 (58.33%)		
>5000	0 (0%)	8 (13.33%)		
*No statistical test was applied- due to 0 subjects in the cells				

Table-3: Comparison of parameters between mechanical ventilation (N=100)

Parameters	Study group		Chi square	P value
	Mortality (N=25)	No Mortality (N=75)		
Age group				
<20	1 (4%)	8 (10.67%)	*	*
21-40	8 (32%)	58 (77.33%)		
41-60	14 (56%)	9 (12%)		
>60	2 (8%)	0 (0%)		
Gender				
Male	23 (92%)	57 (76%)	3.000	0.083
Female	2 (8%)	18 (24%)		
Clinical severity				
I	1 (4%)	16 (21.33%)	61.888	<0.001
II	3 (12%)	55 (73.33%)		
III	21 (84%)	4 (5.33%)		
Time lapse duration in minutes				
<60	6 (24%)	11 (14.67%)	5.866	0.118
61-180	15 (60%)	36 (48%)		
181-300	2 (8%)	24 (32%)		
>301	2 (8%)	4 (5.33%)		
Serum cholinesterase level (IU/l)				
<1000	1 (4%)	5 (6.67%)	*	*
1001-2000	3 (12%)	15 (20%)		
2001-5000	21 (84%)	47 (62.67%)		
>5000	0 (0%)	8 (10.67%)		
*No statistical test was applied- due to 0 subjects in the cells				

Table-4: Comparison of parameters between mortality (N=100)

of serum cholinesterase. Out of 17 participants with grade I clinical severity, 13 (76.47%) participants were serum cholinesterase level 2000 to 5000, 2 (11.76%) participants each had 1000 to 2000 and >5000. Out of 58 participants with grade II clinical severity, 35 (60.34%) participants had serum cholinesterase level of 2000 to 5000, 12 (20.69%) had 1000 to 2000, and 6 (10.34%) participants had level >5000. Out of 25 participants with grade III clinical severity, 20 (80%) participants were serum cholinesterase level 2000 to 5000, and 4 (16%) participants had serum cholinesterase level 1000 to 2000. (Table 2)

Among the 40 participants needing mechanical ventilation, a higher proportion of them was in the older age groups (37.5% in 41 to 60 years and 5% in above 60 years) as compared to people who did not need mechanical ventilation. The proportion of Males was higher among subjects with mechanical ventilation (95% Vs 70%, P value 0.002) Out of 40 participants with mechanical ventilation, majority of 25 (62.5%) participant had grade III clinical severity, and 14 (35%) participant were grade 2 clinical severity—Time-lapsed showed no significant association with mechanical ventilation. Out of 40 participants with mechanical ventilation, majority of 33 (82.5%) participants had serum cholinesterase level was from 2001 to 5000 and 5 (12.5%) participants were serum cholinesterase level 1001 to 2000. (table 3)

Out of 25 people met with mortality, the majority of 14 (56%) participants were aged between 41 to 60 years, and 8 (32%) participants were aged between 21 to 40 years. Out of 25 people met with mortality, 23 (92%) participants were male, and 2 (8%) participants were female. The difference in the proportion of gender between mortality was statistically not significant (p value 0.083). The difference in the proportion of clinical severity between mortality was statistically significant (p value <0.001). The difference in the proportion of time-lapse duration between mortality was statistically not significant (p value 0.118). Out of 25 people met with mortality, the majority of 21 (84%) participants had serum cholinesterase level 20001-,5000 and 3 (12%) participants had serum cholinesterase level 1001-2000. (table 4)

DISCUSSION

Organophosphate poisoning is a serious clinical entity and causes considerable mortality and morbidity. In the present, study OP poisoning predominantly infected males in the age group 21 to 40 years. The majority ha ad moderate poisoning with Serum cholinesterase levels between 2001 to 5000 (IU/l). In this study, the mortality was 25% a, 40% of patients to be ventilated. There was no statistically significant relationship on age, gender, clinical severity, time-lapse, Serum cholinesterase levels, mortality with mechanical ventilation. Mortality rate showed a statistically significant relation with clinical severity (p<0.001).

In the current study according to the POP scale, 17% of patients had a mild grade of poisoning, 58% had a moderate grade of poisoning, 25% patients had severe poisoning with scores more than 8. In a study conducted by Honnakatti et al[10], almost of them belonged to mild grade of poisoning (55%). Similarly, Kh et al[11] reported in a study out of 80 patients, 29 were classified as mild poisoning, 31 as moderate poisoning and 20 as severe as per POP scale.

Serum cholinesterase levels were assessed in all patients at admission to hospital, and it was classified according to Proudfoot. A classification of subclinical (normal), mild, moderate and severe poisoning. Serum cholinesterase levels were < 1000 (IU/l) in 6(6%) participants, 1001 to 2000 (IU/l) in 18(18%), 2001 to 5000 (IU/l) in 68(68%) participants were and>5000 (IU/l) in 8 (8%) participants. Results are in line with Honnakatti et al[10]. reported 48% of patients had >5000 (IU/l) and 7% had < 1000 (IU/l) had serum cholinesterase levels. Both serum cholinesterase and POP scale are an important tool for the diagnosis of the severity of OP poisoning. The higher the POP scale, the higher was the degree of derangement in the serum cholinesterase level. In the present study, increased clinical severity had a statistically significant relationship mortality rate. A study by Goswamy et al[12]. stated that the measurement of serum cholinesterase was useful in predicting the prognosis in OP poisoning. This finding is supported by Chaudhary et al[13] who observed that serum cholinesterase levels between 870 and 1200 on admission were associated with prolonged ventilation and high mortality. However, Aygun et al[5]. have reported that low levels of s. acetylcholinesterase support the diagnosis of acute OP poisoning but was not related to clinical severity. Rehiman et al[14] in 2008 reported that the Peradenya organophosphorus poisoning scale and serum cholinesterase at presentation might be useful to assess the severity of and prolonged duration of hospital stay.

In the current study, the mortality rate was 25%, and 40% were on mechanical ventilation. From previous studies, the estimated mortality from OP ingestion ranges from 10% to 20%.[15] In another study by Sungur et al[17] mortality was 50% in patients requiring mechanical ventilation.[16] In contrast to these observations, Hussain *et al*. reported 8% mortality in patients who received mechanical ventilation. In the present study the overall mortality was 25% which was within the range of the previous studies. A high mortality rate might be due to the greater time taken for admission in the hospital in the present study. Most of the duration from the ingestion of poisoning to initiation of treatment was spent travelling/ arranging transport to the hospital. Efforts to minimize the period between ingestion of poison and initiation of specific treatment may help to decrease the chance of death.

There was no statistically significant relationship on between age, gen time-lapse lapse, Serum cholinesterase levels, mechanical ventilation with death. Only clinical severity had significant relation with mortality. This signifies that death due to OP poisoning is not dependent on a single predictor as age, serum cholinesterase levels and duration of mechanical ventilation etc. Death in OP poisoning is rather due to the overlapping of all these factors.

CONCLUSION

Clinical severity was associated with the treatment

outcomes, including the need for mechanical ventilation and mortality among OP poisoning cases. No particular trend of association was observed between clinical severity and serum cholinesterase levels. Serum cholinesterase levels had shown no association with outcomes. Hence timely administration of antidote dose based on meticulous clinical assessment can minimize the mortality and adverse outcomes among patients with OP poisoning. Such patients need to be monitored closely with good supportive care. Similarly, strict implementation of the pesticide act and involving a new policy by the government to educate the public and youth in large about the dangerous, life-threatening effects of Organophosphorus compounds could help ameliorate the harmful effects of such poisoning.

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Clinical profile and outcome of organophosphorus poisoning in a tertiary care centre, a prospective observational study

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Introduction: Acute organophosphorus (OP) pesticide poisoning is widespread in the developing world. Being predominantly an agricultural country, pesticides and insecticides are used abundantly for cultivation, and access to these poisonous chemical substances by the population is easy. The objectiveof the study was to identifythe nature of the demographic profile, type of compound, clinical manifestations, and outcome of organophosphate poisoning presenting to a tertiary care teaching hospital in India. **Material and methods:** A cross-sectional study was conducted among 100 patients admitted with OPC poisoning inthe department of general medicine,Velammal Medical College Hospital and Research Institute, Madurai from January 2016 to July 2019. The diagnosis was made based on history or evidence of exposure to OP compound within 24 hours; characteristic manifestations of OP poisoning include, miosis, fasciculations, excessive salivation, improvement of signs and symptoms with administration of atropine were recorded. IBM SPSS version 22 was used for statistical analysis. **Results:**The majority of the subjects were males(80%). The majority (66%) were in the age group of 21-40 years. The most common OPC to be consumed was Methyl parathion (27%), followed by chlorpyrifos (22%). The major GIT complications were abdominal pain/cramps (100%), followed by nausea and vomiting (83%). Mechanical ventilation was needed in 40% and mortality was reported in 25% of the subjects. **Conclusion:**OP poisoning affects resonantly males in their economically productive phase of life. Considering the high mortality, adequate strengthening of health services, especially at the primary level is the need of the hour.

Keywords: Organophosphorus, Pesticides, Muscarinic manifestations, Nicotinic manifestations, Poisoning

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Introduction

Acute organophosphorus (OP) pesticide poisoning is widespread and is the most common poisoning in many developing countries and varies in different geographic regions. Accidental and occupational exposures were estimated to cause 1 million cases with 200,000 deaths [1]. Recent data from the National crime bureau of India shows a mortality rateof26.6% (34,869) in the year 2017 by the consumption of pesticides. Accidental Intake of Insecticides was reported among 1403 males, 812 females in the age group of 18 -30 years. The majority of suicides were reported in Maharashtra (17,646) followed by 14,459 suicides in Tamil Nadu, 12,014 suicides in West Bengal [2]. Poisoning is the fourth most common cause of mortality in rural India. In North India aluminum phosphide and organophosphate, poison is common. Aluminum phosphide or organophosphate, these substances were developed to control insects and pests and have become major contributors in the causation of poisoning death [3].

Organophosphorus (OP) compounds are used as pesticides, herbicides, and chemical warfare agents in the form of nerve gases. Being predominantly an agricultural country, pesticides and insecticides are used abundantly for cultivation, and access to these poisonous chemical substances by the population is easy [4]. More than 100 different OP compounds have been synthesized. Most of the OP pesticide poisoning and subsequent deaths occur in developing countries following a deliberate self-ingestion particularly in young, productive age groups, as highly toxic pesticides are readily available at the moments of stress.The most well-known are malathion, parathion, fenthion, diazinon, dimethoate, chlorpyrifos, paraoxon, and soman [5].

Organophosphorus compounds are anti acetylcholine sterases which exert their toxicity by interfering with the normal function of acetylcholine, an essential neurotransmitter throughout the autonomic and central nervous system. OP acts by inhibiting the enzyme cholinesterase, results in the accumulation of acetylcholine at synapses and myoneural junction leading to cholinergic overactivity [6]. Patients die mostly from respiratory failure and lung injury, although there is variability in the clinical symptoms and signs depending on the nature of compounds, amount consumed, severity, the time gap between exposure, and presentation in the hospital.

Owing to the limited availability of resources, all OP poisoning patients are not managed in ICUs in the Indian setup. In view of this, a study was conducted to assess the nature of the compound, profile of clinical manifestations, and outcome of organophosphate poisoning presenting to a tertiary care teaching hospital in India.

Materials and Methods

Setting: Department of General Medicine, Velammal Medical College Hospital and Research Institute, Madurai.

Duration and type of study: A cross-sectional study conducted from January 2016 to July 2019

Sample size calculation: The sample size was calculated assuming the proportion of outcome of OP poisoning as 35.74% as per the study by Banerjee et al et [7]. The other parameters considered for sample size calculation were 10% absolute precision and a 95% confidence level. The required sample size would be 88. To account for a non-participation rate of about 10 %, another 8, subjects will be added to the sample size. Hence the final required sample size would be 96 which was rounded to 100 participants.

Inclusion criteria: All patients in whom a provisional diagnosis of OPC poisoning was made based on the patient's clinical presentation/history as recorded from the patient's attendant/details of poison containers were included in the study.

Exclusion criteria: Multiple compound/tablet poisoning, contradictory diagnosis regarding the compound,patients with a history of bronchial asthma/cardiac illness or neuromuscular diseases, Patients who died within few minutes of hospitalization even before the initial treatment could be given were excluded from the study.

Data collection procedure: A detailed case history was taken as per the proforma, general physical examination and systemic examination was done soon after admission. Laboratory investigations such as Complete blood count, Random blood sugar, Renal function test, Liver function test, were done at the time of admission. The patients were monitored regularly until the outcome. The diagnosis was made based on history or evidence of exposure to OP compound within 24 hours; characteristic manifestations of OP poisoning include, miosis, fasciculations, excessive salivation, improvement of signs and symptoms with administration of atropine

Were recorded. It was represented as the muscarinic, nicotinic, and central effects of OP poisoning.

Ethical consideration: Prior approval for the study and the protocol was obtained from the institutional ethical committee.

Statistical analysis: Frequency and descriptive analysis are done using IBM SPSS version 22 statistical software.

Results

A total of 100 subjects were included in the final analysis.

Table-1: Descriptive analysis of age and gender distribution. (N=100)

Parameter	Number (%)
Age group	
<20	9(9%)
21-40	66(66%)
41-60	23(23%)
>60	2(2%)
Gender	
Male	80(80%)
Female	20(20%)

The majority of the subjects were males (80%) with maximum belonging to the age group of 21-40 years (66%)(Table 1).

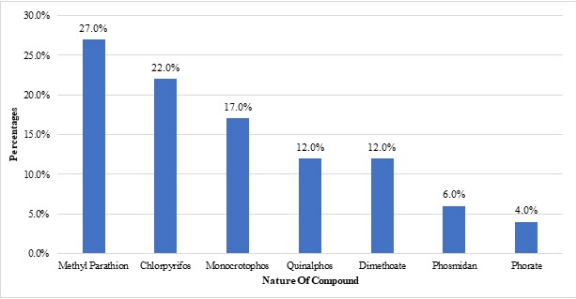

Fig-1: Nature of compound in the study population (N=100)

The most common OPC to be consumed was Methyl parathion (27%), followed by Chlorpyrifos (22%) The least common compound was Phorate (4%) (Figure 1).

Table-4: Descriptive analysis of clinical presentation in the study population (N=100)

Clinical manifestations			
Muscarinic manifestations		Nicotinic manifestations	
GIT	Number (%)	Skeletal muscle	Number (%)
Nausea and vomiting	83 (83%)	Fasciculations	28(28%)
Abdominal pain/cramps	100 (100%)	Paralysis	40(40%)
Diarrhea	18 (18%)	Autonomic nervous system	
Respiratory system		Tachycardia	4(4%)
Oronasal froth	27 (27%)	Hypertension	4(4%)
Cyanosis	8 (8%)	CNS manifestations	
Pulmonary edema	26 (26%)	Altered consciousness	48(48%)
Cardiovascular system		Coma	18(18%)
Bradycardia	36 (36%)	Intermediate syndrome	5(5%)
Hypotension	7 (7%)	OPIDPN	0(0%)
Eyes			
Miosis	72 (72%)		
Normal pupil	28 (28%)		
Exocrine glands			
Increased sweating	60 (60%)		
Urinary bladder			
Incontinence	21(21%)		

Among the muscarinic manifestation, the major GIT complications were abdominal pain/cramps in 100%, followed by nausea and vomiting in 83% participants and diarrhea in 18% participants. Among respiratory system complications, 27 (27%) participants had Oronasal froth, 26 (26%) participants had Pulmonary edema and 8 (8%) participants had Cyanosis. Among cardiovascular complications, 36 (36%) participants had Bradycardia, and 7 (7%) participants had hypotension.

72% of participants had miosis, 28% of participants had normal pupil, 60% of participants had increased sweating and 21% of participants had urinary bladder incontinence. Among nicotine manifestations, 28 (28%) participants had fasciculations in skeletal muscle and 40 (40%) participants had Paralysis. Autonomic nervous system complications, 4 (4%) participants had tachycardia and hypertension. CNS complications include, 48(48%) had altered consciousness, 18 (18%) had Coma and 5 (5%) had Intermediate syndrome.

Fig-2: Mechanical ventilation in the study population (N=100).

Out of 100 patients included in the current study, 40 (40%) required mechanical ventilation (Figure 2).

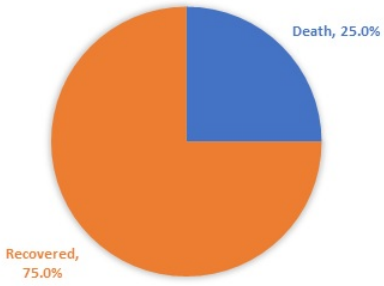

Fig-3: Mortality in the study population (N=100).

Out of 100 patients included in the current study, 25 (25%) met with mortality, and the remaining 75 (75%) of the patients recovered (Figure 3).

Discussion

Organophosphates are frequently used pesticides can result in serious morbidity and mortalitywith over 50,000 organophosphorus compounds have been synthesized since the first one by Clermont in 1857. The clinical symptoms range from the classic cholinergic syndrome to flaccid paralysis and intractable seizures,with mortality ranging from 10 to 22% [8].

In the present study, two-thirds (66%) of poisoning cases were in the age group 21-40 years. In the studies conducted by George et al [8], Selvaraj et al [9]. 60-80% of patients were in the 21-40 years age group with a peak incidence between 21-30 years.The people in this age group are described to be the most stressful, emotionally weak, and vulnerable to minor conflicts, failures, or disappointments during this phase of life.

The present study showed male predominance in OP poisoning. The incidence of poisoning was higher in males than in females (80% vs 20%). The male to female ratio in the present study was 4:1. A similar trend was also observed by Padmanaba et al [10] and Joshi et al [11] where the male to female ratio is 1.2:1.The reason behind this may be males are the main working group in the outdoor field, i.e. they are more involved in spraying crops in the farms. Methyl parathion was the most common poison consumed (27%) followed by Chlorpyrifos (22%) in this study. Methyl parathion was also

The most common poison detected in the studies of Banerjee et al [7]. Dimethoate was most common in the studies of Banday et al [9]. This variation in the type of poison consumed can be attributed to the regional availability of pesticides in different regions.

Among the muscarinic manifestation, the major GIT complications were abdominal pain/cramps in 100%, followed by nausea and vomiting in 83% participants and diarrhea in 18% participants in this study. 27 (27%) participants had Oronasal froth as a respiratory complication. 36 (36%) had Bradycardia, 72% had miosis, 60% had increased sweating. Among nicotinic manifestations, 28 (28%) participants had fasciculations in skeletal muscle and 40 (40%) participants had Paralysis.

CNS complications include, 48(48%) had altered consciousness.Khan S et al[10]in their study also reported that most common symptoms were excessive salivation (100%), agitation (87.5%), disturbances of consciousness (75%), abdominal pain (62.5%) and abdominal cramps (50%) which was comparable to the present study. Chintale et al[11] reported that excessive salivation was the most common symptom observed (72.05%) followed by Miosis (71.32%), fasciculation (63.23%), increased bronchiolar secretions (39.70%), bradycardia (57.35%), neck muscle weakness (16.91%) and oronasal frothing (10.29%).Noshad et al[12] observed Meiosis (82%), excessive salivation (70%), decreased levels of consciousness (70%), Agitation (58%), fasciculation (42%),Tachycardia (25%), muscle weakness (22%).

In the current study, 40% of the subjects were on mechanical ventilation. The study was inline withSinghal A et al[13]where 51% of patients were on mechanical ventilation.The mortality rate in the present study was 25%and 75% have recovered from organophosphorus poisoning.Similar results were reported by GV Rao et al, where amortality rate of 27 % was observed [14]. Banerjee et al reported 5.78%of subjectsdied with respiratory failure being the primary cause of death followed by CNS depression, cardiac arrest, and septicemia [7].

Sungur et al [15] reported a mortality rate of 50% for the patients who were mechanically ventilated and 21.6% for the patients who are not mechanically ventilated in their study.Shah et al[16] in their study observed Complete recovery and mortality rate as 66.47% and 16.47% among cases respectively.

A high mortality rate might be due to the greater time taken for admission in the hospital in the present study. Most of the duration from the ingestion of poisoning to initiation of treatment was spent traveling/arranging transport to the hospital. Efforts to minimize the period between ingestion of poison and initiation of specific treatment may help to decrease the chance of death.

The cross-sectional and descriptive nature of the study was the chief limitation, precluding us from performing any hypothesis testing. Assumption of the nature of the compound based on the history and description in few cases would have introduced some bias. Considering the smaller sample size and limited catchment area, the generalizability of the study findings is limited.

Conclusion

It can be concluded that OP poisoning is more common among the younger population, below 40 years with male preponderance.The majority had a moderate grade of poisoning with a high mortality rate.Timely administration of an antidote insufficient dose and duration are much more important in the patients with evidence of a moderate and severe degree of OP poisoning. Such patients need to be monitored and observed closely with good supportive care. Similarly, strict implementation of the pesticide act and involving a new policy by the government to educate the public and youth in large about the dangerous life-threatening effects of Organophosphorus compounds could help ameliorate the harmful effects of such poisoning.

What does the study add to the existing knowledge

A high mortality rate was observed with OP poisoning. Measures to be taken to reduce the time taken for admission in the hospital.

Author Contributors

Dr. Yuri Gagarin has conceptualized the study and played a primary role in compiling analysis, and interpretation of the data. All the drafts were prepared, reviewed and the final draft was approved by **Dr. R. Lavanya Rajagopal** have contributed tothe fine-tuning of the proposal, contributed to data collection and entry,reviewed the results and contributed to preparation and review of drafts. All the authors have read and approved the final Version of the manuscript. All the authors take complete responsibility for the content of the manuscript.

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Role of Mean Platelet Volume (MPV) as a Predictive Marker for Hypertensive Vascular Complications - A Cross-Sectional Study in a Tertiary Care Hospital

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ABSTRACT

BACKGROUND

Hypertension alone or in various combinations has been a major risk factor in ischaemic and haemorrhagic strokes. The mean platelet volume is a laboratory marker associated with platelet function and activity. Mean platelet volume is independently associated with Peripheral Artery Disease (PAD) and uncontrolled hypertension. We wanted to study the associated MPV levels in different grades (Grade I and Grade III) of hypertension in comparison with those of healthy normotensives.

METHODS

The current study was an analytical cross-sectional study, conducted in Velammal Medical College Hospital, Madurai, India, from October 2019 to December 2019. Patients with grade 1 and grade 3 hypertension as cases, and healthy individuals as controls were included in the study. Platelet parameters were assessed by the Beckman Colter haematology analyser (LH 750) by impendence technology. ANOVA was used to assess statistical significance. p-value < 0.05 was considered as statistically significant. IBM SPSS version 22 was used for statistical analysis.

RESULTS

Among the study population, 200 (57.14%) participants were controls, 100 (28.57%) participants were graded as 1 HT and 50 (14.29%) participants were grade as 3 HT. The Mean MPV (fL) among controls was 7.63 ± 1.13; it was 8.04 ± 0.91 in grade 1 HT group, and it was 10.05 ± 0.73 in grade 3 HT group and was statistically significant. The mean platelet count (1000 cells /cu. mm) among controls was 256.96 ± 62.78; it was 290.96 ± 79.77 in the grade 1 HT group and it was 295.68 ± 60.55 in grade 3 HT group and was statistically significant.

CONCLUSIONS

We conclude that MPV levels and platelet counts were increased with increasing severity of hypertension. MPV, as an important indicator of platelet activation can be used as a cost-effective diagnostic tool to identify hypertensive patients who are at increased risk for thrombotic vascular complications.

KEYWORDS

Mean Platelet Volume, Platelet Count, Hypertension, Thrombosis, Vascular Complications

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BACKGROUND

Hypertension alone or in various combinations has been a major risk factor in ischaemic and haemorrhagic strokes. In an analysis of worldwide data for the global burden of HTN, 20.6% of Indian men and 20.9% of Indian women were suffering from HTN in 2005. The rates for HTN in percentage are projected to go up to 22.9 and 23.6 for Indian men and women, respectively by 2025. Recent studies from India have shown the prevalence of HTN to be 25% in urban and 10% in rural people in India.[1] According to the WHO 2008 estimates, the prevalence of raised BP in Indians was 32.5% (33.2% in men and 31.7 % in women). However, only about 25.6% of treated patients had their BP under control, in a multicenter study from India.[2]

The ICMR multi-centric prospective case-control study of ischaemic strokes revealed that hypertension along with raised blood sugar, tobacco use, and low haemoglobin are important risk factors.[3] It is well known that up to a third of cardiovascular deaths can be avoided by proper treatment and control of hypertension and by addressing this risk factor we can significantly prevent premature (cardiovascular diseases) CVD mortality in India.[4] Suboptimal BP control is the most common attributable risk factor for CVD and cerebrovascular disease, including haemorrhagic (58%) and ischemic (50%) stroke, ischemic heart disease (55%), and other forms of CVD (58%), including heart failure and peripheral arterial disease.[5,6] Public health, health systems based as well as clinic-based interventions are needed to increase awareness, treatment, and control of hypertension.[7]

The mean platelet volume is a laboratory marker associated with platelet function and activity.[8] It is a blood parameter used for measuring platelet size and can be determined in routine blood tests. It is cost-effective and yields results in a short amount of time.[9] Increased MPV in thromboembolic disease is reflected as an important risk factor. Elevated MPV is associated with other markers of platelet activity, including increased platelet aggregation, increased thromboxane synthesis, increased β-thromboglobulin release, and increased expression of adhesion molecules.[10] MPV is a determinant of platelet activation and high sensitive C-reactive protein (hs-CRP) is the best candidate assay to identify and monitor the inflammatory response.[11] It is independently associated with peripheral artery disease (PAD and platelet size is an independent predictor of increased risk for PAD.[12] Varol E et al. showed that MPV was also higher in patients with hypertension than in patients with prehypertension.[13]
Patients with uncontrolled hypertension are at increased risk for cardiovascular events. MPV can be a useful screening test to antiplatelets for preventing cardiovascular diseases in uncontrolled hypertension patients. This study aims to assess the association of MPV levels in different grades (Grade I and Grade III) of hypertensive patients in comparison with healthy normotensive individuals.

METHODS

This is an analytical cross-sectional study conducted in Velammal Medical College Hospital, Madurai, Tamilnadu, India from October 2019 to December 2019.

Inclusion Criteria

Patients with Grade 1 hypertension and Grade 3 hypertension as cases and healthy individuals as controls were included in the study.

Exclusion Criteria

Subjects with renal diseases, pre-operated patients for CVD, on antiplatelet therapy, participants not willing to participate in the study.

Study Area

Patients reporting to the general medicine department of the Velammal Medical College Hospital, Madurai, Tamilnadu, India. Participants were randomly selected in that time frame who reported to the hospital. Controls were 200 (57.14%) participants, 100 (28.57%) participants were with grade 1 HT and 50 (14.29%) participants were with grade 3 HT.

Grading of hypertension was done by the following grading system (ESH/ESC 2013).[14]

Category	Systolic	Diastolic
Optimal	<120	<80
Normal	120-139	80-84
High normal	130-139	85-89
Grade 1 hypertension	140-159	90-99
Grade 2 hypertension	160-179	100-109
Grade 3 hypertension	≥180	≥110
Isolated systolic hypertension	≥140	<90

Grading of Hypertension (ESH / ESC 2013)

Study Procedure

The following information was collected from each subject through a validated questionnaire administered by the volunteers: name, age, sex, occupation, weight, height, history of diabetes, family history of hypertension, history of any examination of blood pressure and hypertension, or any it's complications, any symptom referable to target organ dysfunction, previous and present treatment profile, and addictions. Blood pressure was recorded in the sitting position for the right arm to the nearest 2 mmHg using the Mercury Sphygmomanometer (Diamond Deluxe BP apparatus, Pune, India). Blood pressure is measured for each participant, using the palpatory and auscultatory methods with a standardized calibrated mercury column type sphygmomanometer and an appropriate sized cuff encircling at least 80% of the arm in the seated posture, with feet on the floor and arm supported at heart level. Following a standardized protocol, three separate measurements with an interval of 5 minutes are recorded and the average of the three measurements after proper rest and due explanation to the examined participants about the

objective of the study. Blood samples are obtained after overnight fasting from mid-cubital vein in antecubital fossa making the subject sit comfortably in a chair. Through a sterile Dispovan syringe under sterile precautions, about three millilitres of blood is collected in EDTA coated vacutainers. Platelet parameters were assessed by the Beckman Colter haematology analyser of model number LH 750 by impendence technology.

Ethical Consideration

The study got approval from the institutional human ethics committee. Informed written consent was obtained from the participants and the confidentiality of the study participants was maintained throughout the study.

Statistical Analysis

Platelet count, MPV were considered as the primary outcome of interest. Descriptive analysis was carried out by frequency and proportion for categorical variables. The association between categorical explanatory variables and quantitative outcome was assessed by comparing the mean values. The mean differences along with their 95% CI were presented. ANOVA was used to assess statistical significance. The association between explanatory variables and categorical outcomes was assessed by cross tabulation and comparison of percentages. A Chi-square test was used to test statistical significance. P-value <0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis.

RESULTS

A total of 350 patients included in the final analysis. Among the study population, 200 (57.14%) participants were controls, 100 (28.57%) participants were graded 1 HT and 50 (14.29%) participants were grade 3 HT. The Mean age within controls was 48.62 ± 13.82, it was 53.79 ± 11.98 in grade 1 HT group and it was 59.22 ± 10.22 in grade 3 HT group. Taking controls as a baseline, the mean difference of age in grade 1 HT and grade 3 HT group was statistically significant (P-value <0.05). The difference in gender across the study groups was found to be insignificant with a P-value of 0.637, with a majority of 64% of participants were grade 1 HT group. (Table 1)

The Mean systolic blood pressure within controls was 117.6 ± 8.96, it was 140.6 ± 6.33 in grade 1 HT group and it was 193.6 ± 15.49 in grade 3 HT group. Taking controls as a baseline, the mean difference of systolic blood pressure in grade 1 HT and grade 3 HT group was statistically significant (p-value <0.05). The Mean diastolic blood pressure within controls was 74 ± 4.91, it was 89.2 ± 3.82 in grade 1 HT group and it was 105 ± 10.74 in grade 3 HT group. Taking controls as the baseline, the mean difference of diastolic blood pressure in grade 1 HT and grade 3 HT group was statistically significant (p-value <0.05). (Table 2)

The Mean MPV (fl) within controls was 7.63 ± 113, it was 8.04 ± 0.91 in grade 1 HT group and it was 10.05 ± 0.73 in grade 3 HT group. Taking controls as the baseline, the mean difference of MPV (fl) in grade 1 HT and grade 3 HT both were statistically significant (p-value <0.05). The Mean platelet count (1000 cells /cu. mm) within controls was 256.96 ± 62.78, it was 290.96 ± 79.77 in the grade 1 HT group and it was 295.68 ± 60.55 in grade 3 HT group. Taking controls as a baseline, the mean difference of platelet count (1000 cells /cu. mm) in grade 1 HT and grade 3 HT group was statistically significant (p-value <0.05). (Figure 3)

Parameter	Study Group Controls (N=200)	Grade 1 HT (N=100)	Grade 3 HT (N=50)	P-Value
Age (in years) (Mean ± SD)	48.62 ± 13.82	53.79 ± 11.98	59.22 ± 10.22	<0.001
Gender				
Male	122 (61%)	64 (64%)	28 (56%)	0.637
Female	78 (39%)	36 (36%)	22 (44%)	

Table 1. Comparison of Gender across the Study Groups (N=350)

Study Group	Mean ± SD	Mean Difference	95% CI Lower	95% CI Upper	P-Value
SBP in mm of Hg					
Controls	117.6 ± 8.96		(Baseline)		
Grade 1 HT	140.6 ± 6.33	23	20.70	25.30	<0.001
Grade 3 HT	193.6 ± 15.49	76	73.03	78.97	<0.001
DBP in mm of Hg					
Controls	74 ± 4.91		(Baseline)		
Grade 1 HT	89.2 ± 3.82	15.20	13.79	16.61	<0.001
Grade 3 HT	105 ± 10.74	31	29.18	32.82	<0.001

Table 2. Comparison of Mean SBP and DBP across the Study Groups (N=350)

Study Group	Mean ± SD	Mean Difference	95% CI Lower	95% CI Upper	P-Value
MPV (fl)					
Controls	7.63 ± 1.13		(BASELINE)		
Grade 1 HT	8.04 ± 0.91	0.41	-0.66	-0.17	0.001
Grade 3 HT	10.05 ± 0.73	2.42	2.10	2.73	<0.001
Platelet Count (1000 cells /cu. mm)					
Controls	256.96 ± 62.78				
Grade 1 HT	290.96 ± 79.77	34.005	17.68	50.33	<0.001
Grade 3 HT	295.68 ± 60.55	38.725	17.65	59.80	<0.001

Table 3. Comparison of Mean MPV (fl) and Platelet Count across the Study Groups (N=350)

DISCUSSION

Hypertension is an important risk factor for heart attack, stroke, and other vascular diseases.[15] Mean platelet volume (MPV) shown to be significantly increased in patients with hypertension, acute ischaemic stroke, especially in non-lacunar strokes.

Many indexes of platelet function have appeared as underlying prognostic markers of cardiovascular disease. However, most of the techniques used to analyse platelet activity are costly and time-consuming and require specialized techniques. In contrast to these methods, an approach considering MPV could be easily and cheaply made available. Elevated MPV indicates the presence of larger, more reactive platelets.[16] Larger and activated platelets secrete more prothrombotic material and express more substances than small platelets, which accelerate the formation of thrombus and increase the risk for several diseases. In fact, over the past decade, an accumulating

body of evidence has demonstrated that MPV is a predictive marker for stroke and coronary artery disease.[17]

In the current study, we observed that MPV levels were significantly increased in both grade 1 and 3 of hypertension when compared to controls. It is in line with Varol et al who conducted a case-control study and reported that the MPV values of patients with prehypertension and hypertension were significantly higher than those of the control group (8.4 ± 0.8 and 8.8 ± 0.7 versus 7.9 ± 0.5; $p<0.05$ and $p<0.001$ respectively). It was also higher in hypertensives than in pre-hypertensives (8.8 ± 0.7 versus 8.40.8; $p < 0.05$).[13] Similarly, Ian et al.[18] Conducted a case-control study investigated resistant hypertension and showed that MPV values in cases of resistant hypertension are higher than those in controlled-hypertensive cases or normotensive cases. These studies have shown that MPV is positively correlated with blood pressure. Whereas in a study conducted by Bath et al MPV was 7.7 fl vs. 7.8 fl, and platelet count 242 x 10(9)/l vs. 243 x 10(9)/l (2P=0.68) were similar in the hypertensive patients and normotensive subjects.[19] Another study by Butler et al concluded that there was no correlation between MPV and markers of end-organ damage in hypertensive patients which is not in line with our study.[20] In a study done by Pusuroglu H et al. on non-dipper and dipper hypertensive groups, they found significantly higher MPV levels than normotensives (8.4 ± 1 fL, 8.3 ± 1 fL, and 8.1 ± 0.6 fL, respectively, $p<0.001$) which is similar to our study.[21]

MPV, has been significantly higher in patients with prehypertension compared with control subjects and also in patients with hypertension than prehypertension.[13] MPV is one of the important platelet production indices that may relate to platelet function. It has been shown that platelet size, measured as MPV, correlates with their reactivity.[22] Larger and hyperreactive platelets accelerate intracoronary thrombus formation, which leads to a cascade of clinical events, such as acute coronary syndromes.[23] Nadar et al.[24] demonstrated that hypertensive patients with target organ damage including stroke, previous MI, angina microalbuminuria/proteinuria, and left ventricular hypertrophy, had higher MPV levels than hypertensive patients without target organ damage. There is also a role for evaluating MPV in patients with peripheral artery disease, unprovoked deep vein thrombosis, and pulmonary embolism.[25,26]

The present study showed significantly increased platelet count among grade 3 hypertensives which is in line with Gomi et al who reported increased platelet activation in hypertensive patients.[27] Shear forces, the renin-angiotensin system, endothelial dysfunction, elevated catecholamine levels, and the presence of comorbid conditions promotes the increased activation of platelets in hypertensive patients.[28] In a systematic review done by Chu SG et al. found that elevated MPV is associated with AMI, mortality following myocardial infarction, and restenosis following coronary angioplasty. It suggested that MPV is a potentially useful prognostic biomarker in patients with cardiovascular disease.[9] In a study done by Ntiaos et al on 636 subjects, they found that glucose, serum creatinine, haemoglobin, platelet count, and history of arterial hypertension were found to be significantly associated with MPV. On multivariate regression analysis, hypertension and platelet count remained as independent determinants of MPV.[29]

There is a lack of universal external calibration for MPV analysis. There can also be variability in the measurement of MPV depending on the instrument used.[30]

Platelet activation is believed to contribute importantly to the increased risk of thrombosis in essential hypertension, and this may be mediated through a variety of mechanisms. Neurohumoral activation is believed to play an important role in this. Increased activity of the sympathetic nervous system facilitates norepinephrine release from adrenergic nerve terminals and enhances the responsiveness of adrenergic receptors.[31] Importantly, increased sympathetic tone activates platelets, contributing to the hypercoagulability observed in hypertension.[32]

Although several authors have described MPV as a marker of platelet reactivity and risk factor for cardiovascular diseases, there is a higher variability in the literature. Although preanalytical variability is known from its introduction as standard laboratory value, no preanalytical standards have been introduced.[33]

The limitation of the study was that we did not evaluate other platelet activation markers such as mean platelet component, platelet component distribution width, and ADP or collagen-induced platelet activation. Secondly, the number of individuals in each group is different from each other. This case may attenuate the power of the statistical analyses which were used. And the smaller sample size affected the generalizability of results.

CONCLUSIONS

MPV levels and platelet counts were increased with increasing severity of hypertension. MPV, as an important indicator of platelet activation, can be used as a cost-effective diagnostic tool to identify hypertensive patients who are at increased risk for thrombotic vascular complications, and further studies are required to determine as to whether therapeutic modification of this marker will reduce these risks in hypertensive patients.

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Original Research Article

Self-gripping mesh versus polypropylene mesh in ventral hernia repair: an observational study

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ABSTRACT

Background: To compare clinical outcomes following sutureless Parietex ProGrip™ mesh in ventral hernia repair to traditional lightweight polypropylene mesh secured with sutures.
Methods: This was a study conducted at the Department of General Surgery in Velammal medical college from August 2019 to February 2020. This prospective observational study involved, 60 patients, 30 each undergoing ventral hernia repair with polypropylene mesh with suture fixation and Parietex ProGrip™ precut mesh (P group) without fixation. The primary outcome measure was postoperative pain using the visual analog scale were assessed prior to surgery and up to 3 months postoperatively (VAS, 0-150 mm); other outcomes (duration of surgery, wound infection and recurrence of hernia) were assessed up to 3 months postoperatively.
Results: Compared to baseline (preoperative), pain score below four on the visual analogue scale was higher in the test group at discharge (76.7%) and 24 hours (96.7%), while the pain was more in the study group at discharge (43.3%) and seven days (70%). The difference between groups was significant at both time points. In the test group, patients without fixation suffered less pain compared to those with single-suture fixation (48 hours: 100% versus 86.6%, p=0.038; 3 months: 100% versus 100%, p≤0.001). Surgery duration was significantly shorter in the test group (<60 minutes) (66.7% versus 40%; p<0.038). No recurrence was observed at three months in both groups.
Conclusions: A self-gripping mesh for ventral hernia repair may result in less pain in the early postoperative phase. Recurrence rates reduce as well as the patient's quality of life improves.

Keywords: Polypropylene mesh, Self-gripping mesh, Ventral hernia, Quality of life

INTRODUCTION

Ventral hernias are one of the most common challenging problems which the general surgeons confront. The rate of incidence of ventral incisional hernia in the long term after laparotomy has been reported to be as high as 20% to 25%.[1]

Prior to 1993, all ventral and incisional hernias were repaired with open exposure. Primary suture repair remains one of the oldest techniques. Still, it has been shown to have a high recurrence rate with wide variability, ranging from 8% to 63%.[2,3] The invention of prosthetics has revolutionized ventral hernia repair, leading to a significant reduction in the recurrence rates, ranging as low as 1% to 14% in some studies.[4] Later, randomized controlled trials of mesh-based ventral incisional hernia repair, the recurrence rate was found to be 24% with an appropriate follow-up period of 3 years.[3] This gold standard repair widely reinforces or bridges the defect, with mesh placed posterior to the fascia either in retro rectus, preperitoneal, or intraperitoneal anatomic space. This takes advantage of LaPlace's Law, distributing intra-abdominal pressure across the overlapping mesh instead of only at the hernia defect.[5,6]

The downside of the use of these meshes induced by sutures for ventral hernia repair is the increase of

complications like infections, seroma, fistulas and chronic pain.[7-9] Chronic pain, in particular, is thought to be caused by nerve entrapment or nerve irritation induced by sutures fixing the mesh.[10]

Because of the above mentioned mesh-related complications induced by sutures, especially chronic postoperative pain, a self-gripping mesh (Parietex ProGrip™, Medtronic, Trévoux, France) has been developed.[11] This ProGrip™ mesh combines the properties of a well-known lightweight polyester mesh with a surface of absorbable, polylactic acid microhooks for mesh fixation. Clinical (randomized) studies of this mesh in inguinal hernia repair have shown promising results in terms of infection, chronic pain and recurrence rates.[12-15]

This mesh has shown promising results in several different kinds of abdominal wall hernias.[15,16] To date, there are very few studies which have been conducted on the use of this self-gripping mesh in ventral hernia repair cases. Hence, the aim and objectives of this study were to compare clinical outcomes (postoperative pain, duration of surgery, wound infection and recurrence of hernia at the end of 3 months) following sutureless Parietex ProGrip™ mesh in ventral hernia repair to traditional lightweight polypropylene mesh secured with sutures.

METHODS

Patients

This was a study conducted at the Department of General Surgery in Velammal medical college from August 2019 to February 2020. All research performed in this study was in strict accordance with a common, pre-defined protocol that was approved by a local institutional review board. All patients provided informed consent before any study-related procedures were performed. This prospective observational study consecutively enrolled 60 patients (above the age of 18 years) with an uncomplicated ventral hernia. The main entry criteria were adults with a ventral hernia (width or length ≤5 cm) who required primary elective repair. Exclusion criteria included patients with a recurrent or complicated hernia (obstruction and strangulation), ventral herniae defect more than 5 cm and patients less than 18 years of age.

Patients were divided into two groups, namely; the control group included 30 patients in whom polypropylene mesh was used with suture fixation for ventral hernia repair, and the study group included 30 patients in whom suture less self-gripping (polyester) mesh was used for ventral hernia repair.

Procedures

Patients who met all study entry criteria underwent preoperative history and physical examination. Patients were electively treated by a single surgeon. The hernia sac was dissected. The open primary repair was first performed with as little tension as possible using a double-stranded 0-nylon continuous closure. ProGrip mesh is a large-pore knitted fabric of monofilament polyester that incorporates resorbable microgrips of polylactic acid on one side that facilitate placement and positioning by encouraging immediate tension-free fixation to surrounding tissue. The resorbable microgrips endow the mesh with self-gripping properties during the first several months after implantation and eliminate or reduce the need for fixation by suture, which may penetrate underlying tissue and damage cutaneous nerves. Mesh density is 75 g/m^2 at implantation and 40 g/m^2 after absorption. The mesh was placed using the onlay technique over the abdominal wall closure in the subcutaneous prefascial space extending 4-5 cm beyond the wound margins. The grips were placed facing down towards the fascia. To standardize mesh fixation and facilitate mesh placement, the mesh was minimally fixated in four quadrants with resorbable sutures, although this step is not required. A Jackson Pratt subcutaneous drain was placed in 15 patients. After recovery, patients were discharged that day or admitted to the hospital for 24 hour observation.

Outcomes

Patients returned for follow-up visits at 24 hours, 48 hours and three months after surgery which included a patient interview and physical examination.

Pain score

In the postoperative period, the pain was measured in both the study groups by using visual analog scale 17 were 0 (no pain) to 10 (worst pain imaginable) scale. Patients with pain score four or more as per the visual analog scale were taken as significant in the study. Other parameters analyzed were duration of surgery (less than or more than 60 minutes), wound infection and hernia recurrence.

Statistical analysis was performed by an independent biostatistician, who received all data for analysis directly from an electronic database. Continuous variables were reported as mean±standard deviation (SD), and categorical variables were presented as n (%). Longitudinal outcomes were analyzed with repeated measures analysis of variance (ANOVA). Statistical significance was set at $p<0.05$. Statistical analyses were performed using predictive analytics software (version 22; IBM, Inc., Armonk, New York, USA).

RESULTS

A total of 60 patients (Mean age 62±12 years) with uncomplicated ventral hernia (mean defect size: ≤5cm) were treated. Baseline patient characteristics are presented in Table 1.

Among the control group, the majority were 12 (40%) in the 41-50 years age group followed up by 51-60 years

(23.34%) and 61-70 years (16.67%). Among the study group, majority 10 (33.33%) were in 31-40 years age group and the proportion of 51-60 years and 61-70 years age group was 9 (30%) and 6 (20%) respectively (Table 1).

Table 1: Age distribution in the study between study groups (n=60).

Age groups (in years)	Control (n=30) (%)	Study group (n=30) (%)
20-30	2 (6.67)	1 (3.34)
31-40	2 (6.67)	10 (33.33)
41-50	12 (40)	2 (6.67)
51-60	7 (23.34)	9 (30)
61-70	5 (16.67)	6 (20)
71-80	2 (6.67)	0 (0)
81-90	0 (0)	2 (6.67)

Majority 18 (60%) people reported duration of surgery as >60 minutes in the control group, but in the study group, majority 20 (66.7%) reported it as <60 minutes. The difference in duration of surgery between groups as statistically significant (P value=0.038) (Figure 1).

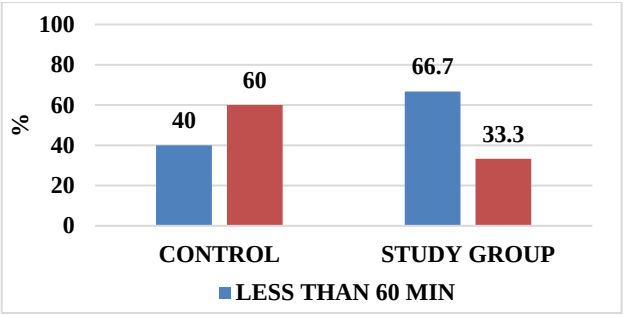

Figure 1: Distribution of duration of surgery between study groups (n=60).

In controls pain score was >4 in majority 17 (56.7%) people at baseline, 21 (70%) reported <4 pain score at 24 hours, 26 (86.7%) reported <4 pain score at 48 hours and all 30 (100%) reported at 3rd month. In study group pain score was >4 in majority 23 (76.7%) people at baseline, 29 (96.7%) reported <4 pain score at 24 hours and all 30 (100%) reported at 48 hours and 3rd month (Table 2).

There was no wound infection and recurrence observed in both the groups (Table 3).

Table 2: Comparison of pain score between the study groups.

Pain score	Study group (n=30)		Chi square	P value
	Control group (%)	Study group (%)		
Baseline				
Less than 4	13 (43.3)	23 (76.7)	6.944	0.008
More than 4	17 (56.7)	7 (23.3)		
At 24 hours				
Less than 4	21 (70.0)	29 (96.7)	7.680	0.012
More than 4	9 (30.0)	1 (3.3)		
At 48 hours				
Less than 4	26 (86.7)	30 (100)	*	*
More than 4	4 (13.3)	0(0)		
At 3rd month				
Less than 4	30 (100)	30 (100)	*	*
More than 4	0(0)	0(0)		

*No statistical test was applied-due to 0 subjects in the cell.

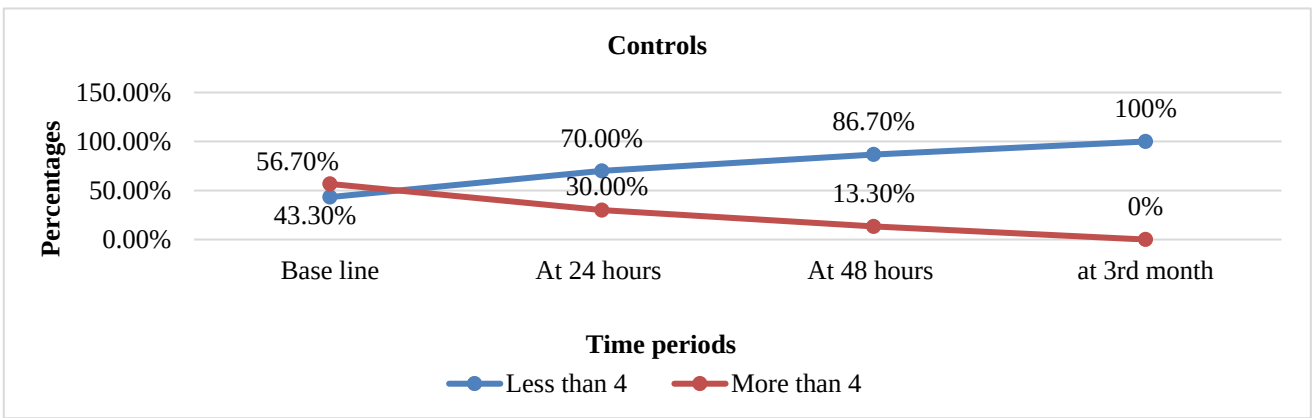

Figure 2: Pain score distribution in control group (n=30).

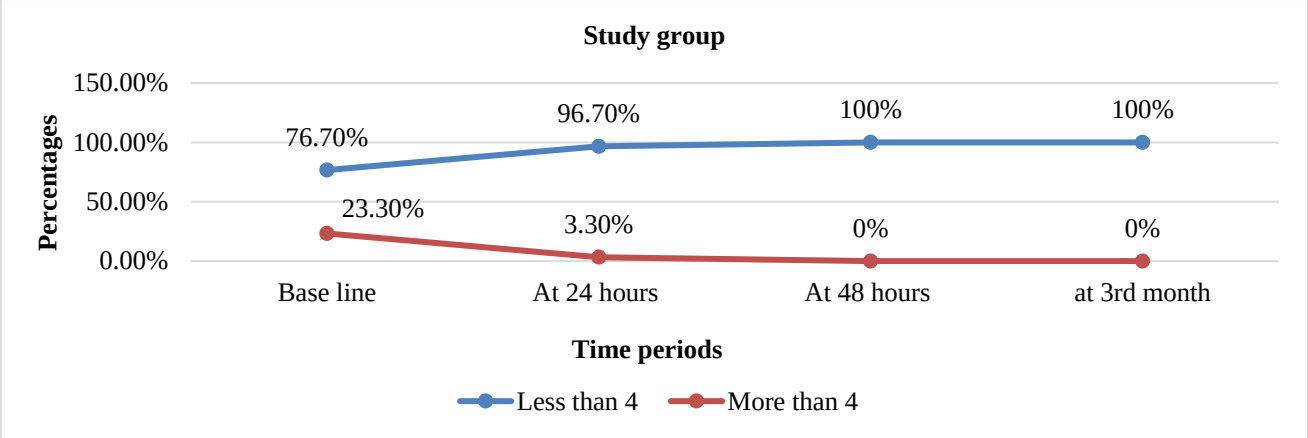

Figure 3: Pain score distribution in the study group (n=30).

Table 3: Comparison of diagnosis between the study groups (n=60).

Parameter	Study group (n=30)	
	Control group (%)	Study group (%)
Wound infection		
Present	0 (0)	0 (0)
Absent	30 (100)	30 (100)
Recurrence		
Present	0 (0)	0 (0)
Absent	30 (100)	30 (100)

No statistical test was applied-due to 0 subjects in the cell

DISCUSSION

The preliminary results of this study are promising and show advantages over the innovative self-gripping mesh. Duration of surgery is significantly shorter. The time necessary to spread out the mesh and fix it is less than 1 minute with the described technique. This short time necessary for mesh fixation reduces the time of mesh exposure and could reduce sepsis complications. This is in accordance with a study done by Wang who said that the mean operation time in for all their hernia repairs using the self-gripping mesh was only 32±8.15 minutes.[17]

The immediate postoperative pain and pain at discharge was reduced in comparison with the control group as described by the patients. This can be attributed to the lack of tension during mesh positioning and closure that can reduce the pain generated by the tension created on surrounding tissues and more particularly, the sutures are avoided. The grip fixation provides the advantage of obtaining fixation on the whole surface of the mesh. At three months from the time of surgery, no patient-reported pain. Chronic pain is perhaps the most serious adverse outcome after ventral hernia repair. With this mesh, we noticed an improved quality of life of the patients by a reduction in the postoperative pain.

In our study, it was noted that on post-operative day (POD) 0, a pain score of less than four was seen in 13 patients in the control group and 23 patients in the study group. A pain score of more than four was seen in 17 patients and seven patients in the control and study group, respectively. These findings are in accordance with observations done by Hopson and Miller.[18]

In our study, it was noted that the pain scores up to 24 hours, a pain score of less than four was seen in 21 patients in the control group and 29 patients in the study group. A pain score of more than four was seen in 9 patients and one patient in the control and study group, respectively. A similar observation was noted in a study done by Hopson and Miller.[18]

In our study, it is observed that the pain scores up to 48 hours, a pain score of less than four was seen in 26 patients in the control group and 30 patients in the study group. A pain score of more than four was seen in 4 patients in control, and none in the study group. Observations were noted in a study done by Hopson and Miller had a similar outcome which is in accordance with our study. In our study, the pain score after three months of surgery, all the patients in the control group and study group had the pain score less than 4. Similar observations are noted in a study done by Hopson and Miller.[18]

In our study, it is noted that there is no incidence of wound infection. This is in contrary to the study done by Hopson and Miller. We observed that there is no incidence of mesh rejection or foreign body sensation in our study. Similar results were noted in studies done by the same group of researchers.[18]

In our study, the duration of surgery was observed to be 12 patients in the control group, and 20 patients in the study group were operated in less than 60 minutes, and 18 patients in the control group and ten patients in the study group were operated for more than 60 minutes. This shows a statistical significance of less operating time in the study

population with a P value of 0.038. Similar observations were noted in studies done by Hopson et al and Peter.[19].

CONCLUSION

This study shows the promising use of the ProGrip™ mesh for ventral hernias. Because of the self-gripping surface of the mesh, use sutures or tackers can be omitted. This makes the mesh easy and fast to use. Furthermore, it decreases the chance of postoperative pain and discomfort. It improves the quality of life of the patients by decreasing the recurrence of hernias as well. Future long-term studies on a larger sample population can be conducted to validate further and analyze the efficacy of the ProGrip™ mesh.

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ACUTE PANCREATITIS IN CHILDREN - A RETROSPECTIVE OBSERVATIONAL STUDY IN A SOUTH INDIAN TERTIARY CARE HOSPITAL

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ABSTRACT Background & Aims: Acute pancreatitis is usually rare in childhood but probably more commonly diagnosed nowadays. This condition should be considered in the evaluation of children with vomiting and abdominal pain. In this study, we analyse the clinical presentation and outcome of children presenting with acute pancreatitis in a tertiary care centre. **Materials & Methods:** All children less than 15 years of age, admitted to the paediatric ward of a tertiary care hospital in South India between January 2016 to December 2018 were included in the study. Acute pancreatitis was diagnosed based on the INSPPIRE (International Study Group of Pediatric Pancreatitis: In Search for a Cure) Group criteria. **Results:** The etiology of acute pancreatitis could be identified in 13 out of 30 patients.The most common etiology was gallstones/ gallbladder sludge (7/30). Overall the incidence of pancreatitis had significant female preponderance 23:7. The average duration of hospital stay was 15 days. Seven patients had mild acute pancreatitis, 18 had moderately severe pancreatitis and 5 had severe pancreatitis. One child with severe acute pancreatitis died. Two of them had pseudocyst formation requiring percutaneous drainage under ultrasound guidance. There was no requirement of surgery in the study group. **Conclusion:** Our study provides data about the etiology and clinical course of acute pancreatitis in children in southern part of India. Unlike the previous studies, where most of the patients had mild acute pancreatitis, we had more patients with moderately severe and severe acute pancreatitis requiring more interventions and ICU care.

KEYWORDS Acute pancreatitis children, Acute pancreatitis India., Acute pancreatitis etiology

Introduction

Acute Pancreatitis (AP) occurs in all age groups, even in infants. Acute pancreatitis is usually rare in childhood but probably more commonly diagnosed nowadays. This condition should be considered in the evaluation of children with vomiting and abdominal pain because it can cause significant morbidity and mortality. Acute episodes of pancreatitis can cause significant morbidities like prolonged hospitalization resulting in school absenteeism and weight loss due to prolonged starvation or dietary restrictions. Recent single centre[1] and multicentre studies[2,3] have reported an increasing incidence of acute pancreatitis in all pediatric age groups across the globe over the past two decades. Unless we find the predisposing factors for pancreatitis and associated risk factors for severe or recurrent pancreatitis, we cannot prevent the rising trend of this serious illness in children. There are not much data available on the clinical presentation and etiology of acute pancreatitis in children in the southern part of India.

Material and Methods

In our study, we assessed the demographic characteristics, clinical presentation, biochemical, radiological and treatment details of children diagnosed as acute pancreatitis.

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All children less than 15 years of age, admitted to the pediatric ward of a tertiary care hospital in South India between January 2016 to December 2018 were included in the study. Acute pancreatitis was diagnosed based on the INSPPIRE (International Study Group of Pediatric Pancreatitis: In Search for a Cure)4 Group criteria. It was defined reversible inflammation of the pancreatic parenchyma when two of the three following criteria are present: a) abdominal pain compatible with acute pancreatitis, b) serum amylase or lipase value $\geq$ 3 times the upper limit of normal and c) imaging findings consistent with acute pancreatitis[4].

The clinical details of the children fulfilling the inclusion criteria were collected from the hospital records, along with blood investigations and radiologic imaging reports. The treatment is given to the children from admission to discharge need for intensive care treatment, and details of procedures done during the hospital stay and duration of hospital stay were noted. Proforma was filled, and data entered in Microsoft excel. No ethical issues were involved as this was an observational retrospective study, and the case details were collected from the hospital records only.

Results

Thirty children were diagnosed as pancreatitis based on clinical symptoms, laboratory and imaging findings during the study period of 3 years. The Various age range of presentation was 2 to 15 years, with a median age of 12. Five children were between 1 to 5 year of age, 4 were between 6 to 10 years, and 21 were between 11 to 15 years. Most of them were adolescent females (15/21). Overall the incidence of pancreatitis had significant female preponderance 23:7.

The most frequently reported clinical symptom of AP was abdominal pain(100%), which occurred in all patients, other common symptoms being vomiting(83%), fever(30%) and abdominal distension(16.6%). Jaundice(6.6%) was the presenting symptom in 2 children, of which 1 had a fatal course. Twelve of them(40%) were provisionally diagnosed as gastritis on admission, and due to persistent symptoms beyond 48 hours of hospitalisation, Serum amylase and lipase were done which confirmed the diagnosis. Serum amylase was elevated more than three times the upper limit in 22/30 patients. Serum lipase was elevated more than 3 times the upper limit in 14/30 patients. Blood investigations showed leucocytosis (16/30), raised C-reactive protein(8/30) and hemoconcentration in 9/30. Ultrasound abdomen was the first imaging done in all the patients, which was normal in 6 of them (20%) at admission. Contrast-enhanced CT abdomen was taken in 18 out of the 30 children, few of them requiring repeat imaging on follow up also due to complications. MRCP was taken in 8 children, primarily in recurrent cases, to identify any structural abnormality in the biliary tree.

Etiology

The etiology of acute pancreatitis could be identified in 13 out of 30 patients. The most common etiology was gallstones/ gallbladder sludge (7/30), the others being Pancreas divisum, Hypertriglyceridemia, choledochal cyst and cystic fibrosis. The rest of the patients were labelled as Idiopathic acute pancreatitis. The etiological spectrum of acute pancreatitis has been given in figure 1.

The average duration of hospital stay was 15 days. According to Revised Atlanta Classification5 for the severity of acute pancreatitis, seven patients had mild acute pancreatitis, 18 had moderately severe pancreatitis, and 5 had severe pancreatitis. In the analyzed period, ten children were hospitalised more than once due to AP. 6 were diagnosed as recurrent acute pancreatitis. 2 children progressed on to developed features of chronic pancreatitis in imaging, and one girl developed insulin-dependent diabetes mellitus.

Most of them(26/30) were kept nil per mouth for 24 to 48 hours. Antibiotics were given in 75% of cases, especially in patients with radiologic evidence of necrotizing pancreatitis. For analgesia, Diclofenac suppository was commonly used and very few required narcotics like buprenorphine patch. Severe acute pancreatitis patients were admitted in the pediatric intensive care unit, with an average ICU stay around five days requiring oxygen and noninvasive ventilation.

Complications

Most of our patients (23/30) has acute peripancreatic fluid collections, and two of them developed pseudocysts. One patient had splenic vein thrombosis, and one patient had pleuro pancreatic fistula. Ten cases had pleural effusion, out of which six were symptomatic. Three children presented with multi-organ dysfunction, oliguria and jaundice of which one child succumbed to the illness, while others improved with supportive care in ICU. The complications are listed in Table 1.

Interventions

Two of them had symptomatic fluid collections requiring percutaneous drainage under ultrasound guidance. ERCP with pancreatic stenting was performed in a 12-year-old girl with pancreatic duct disruption who had persistent pseudocyst collections not settling from percutaneous drainage for more than 2 weeks. None of the patients required surgical interventions.

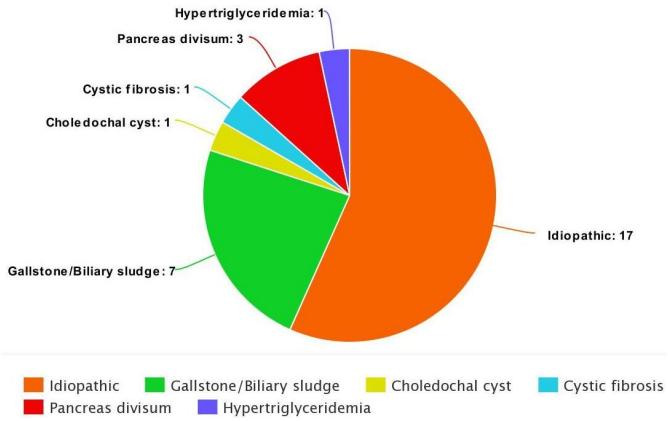

Figure 1: Etiology of Acute pancreatitis in children.

Discussion

Acute pancreatitis in children is an increasingly recognized disease. Its incidence is increasing in the paediatric age group both in the developed and developing countries. It might be due to improved diagnosis by newer imaging modalities or increasing incidence due to changing dietary habits in children. It is estimated that 2–13 new cases occur annually per 100,000 children. Nearly one-quarter of children with acute pancreatitis

Table 1 Complications of Acute pancreatitis

Complications	
Local	Acute Peripancreatic fluid collection - 23
	Pseudocyst - 2
	Pleuro pancreatic fistula -1
	Splenic vein thrombosis -1
Systemic	Pleural effusion -10
	Acute Respiratory Distress Syndrome -3
	Acute Kidney Injury -3
	Shock -1

develop a severe complication, and the mortality rate is approximately 4–10% despite significant advances in the treatment of this disease[4].

In a meta-analysis that spanned almost 4 decades and generated data that included 589 children with acute pancreatitis, the mean age of patients with the disease was 9.2 ± 2.4 (SD) years (range, 1 week–21 years) and the male-to-female ratio was 1:2.[6] In a more recent study that included 55,012 children with acute pancreatitis, the disease was found to be more likely to occur in children older than 5 years old (median age, 17 years) and to occur slightly more frequently in girls than in boys.[7] In our study, the mean age of the children was 9.5 years with female preponderance.

43% of our children had an identifiable cause- either structural or biochemical abnormality during evaluation. Out of the 7 adolescents who were obese, 3 had raised triglycerides while 1 of them had recurrent episodes of pancreatitis during the next 1-year followup. A 2-year-old girl who was diagnosed to have severe hyperglyceridemia was suspected of having familial chylomicronemia but further genetic studies could not be done due to financial reasons. Although the clinical picture of hypertriglyceridemia related acute pancreatitis is similar to the other etiology forms, it seems that its severity may be accentuated. In a recent systematic review of literature on hypertriglyceridemia associated acute pancreatitis(HAP)[8], there was mixed evidence regarding a worse prognosis for patients with HAP. They have advised that pharmacologic and mechanical techniques should be added to lower the serum triglycerides as soon as initial management of acute pancreatitis is done.

Though pancreatitis in children is widely known to be milder variant without much complication, in our study only 23% had mild acute pancreatitis, of which more than 50% were boys. Many children had both local and systemic complications requiring intensive care during the hospital stay. Few of the adolescent girls had persistent problems like rupture of the main pancreatic duct, pseudocyst formation requiring interventional procedures.

Conclusion

Our study provides data about the etiology and clinical course of acute pancreatitis in children in the southern part of India. Our study shows that there is a clear female preponderance, especially adolescent girls. Etiology could be identified in only 43% of the children. Unlike the previous studies, where most of the children had mild acute pancreatitis, we had more patients with moderately severe and severe acute pancreatitis requiring more interventions and ICU care.

Discussion

Intestinal involvement with endometriosis is found in about 5% of premenopausal women, mainly affecting the rectosigmoid colon [8]. Uncommonly, the caecum, transverse colon, terminal ileum can be affected and, in these cases, can lead to intestinal obstruction as seen in this patient. In 15-35% of patients with endometriosis, there is multifocal involvement [5,9]. About 5-15% of patients with pelvic endometriosis also have intestinal involvement suggesting a close relationship between the two, although isolated cases of intestinal endometriosis have been reported [8,9].

The aetiology of endometriosis is still largely unknown; however, many theories have been postulated. These include Sampson's theory of transplantation and implantation, Meyer's theory of coelomic metaplasia and Halban's theory of haematogenous and lymphatic spread [7].

While most intestinal endometriosis are asymptomatic and incidentally found during laparotomy or laparoscopy, symptoms and signs are usually non-specific. Hence it mimics many other gastrointestinal conditions making the diagnosis of endometriosis to be delayed. Also, clinical or laboratory investigation for diagnosis of intestinal endometriosis is difficult. Endometriotic nodules of intestinal walls may not be easily visualized on CT-scan or MRI images, and intestinal mobility makes their localization difficult [10]. According to a study by Kaufman et al., colonoscopy with biopsy confirmed the diagnosis in 29.6% of patients tested, and only 15% of patients with endometriosis had lesions involving the mucosa [11]. Malignancy was considered nearly as frequently as intestinal endometriosis preoperatively, and 90.4% of patients underwent laparotomy as the initial surgical approach, as evident in this patient [11].

The previous history of surgery in this patient would suggest an adhesive intestinal obstruction but for the occlusion of the rectum and pelvic mass. Since the initial suspicion is usually a carcinoma, most cases are diagnosed during the histopathological assessment as seen in this patient, with microscopic examination showing endometrial glands and stroma within the submucosa and muscularis propria and the mucosa usually intact.

Immunohistochemistry can be used to confirm the diagnosis. A panel of immunologic markers including CK7, CA125, ER and CD10 allow for optimal yield [12].

The symptomatic disease should be treated by resection of the involved intestine or by local excision if the latter is feasible, and primary colonic carcinoma can be excluded with confidence. Decisions regarding concurrent treatment for the underlying endometriosis must be based on the patient's menstrual status, age, and desire for future pregnancy.

Conclusion

This case illustrates the occurrence of endometriosis in the caecum and ascending colon mimicking colonic tumour. It is advised that endometriosis should be part of differential diagnosis in a young woman presenting with recurrent signs and symptoms of intestinal obstruction and colonic mass, especially on a background of dysmenorrhea. Histological evaluation of the tissue is essential to rule out malignant bowel disease.

Informed consent and patient details

The authors declare that this study does not contain any personal information that could lead to the identification of the patient(s) and/or volunteers.

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Conflict of interest

There are no conflicts of interest to declare by any of the authors of this study.

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Case Report

Hyperpigmentation in a newborn: Not to forget this common cause in tropical countries: A case report

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Abstract

Neonatal hyperpigmentation secondary to chikungunya infection is very common in tropical countries where chikungunya is endemic. Acquired infection in the perinatal period should be suspected in all neonates presenting with neurological or dermatological manifestations in the immediate postnatal period. We present a newborn baby who had hyperpigmentation which started from day 5 of life with lethargy and on extensive evaluation was found to have neonatal chikungunya. Babies with perinatal chikungunya infection are prone to developmental delay and require long term neuro-developmental follow-up. Hence the importance of following appropriate preventative vector measures and prompt diagnosis of infective conditions in tropical countries.

***Keywords**: Hyperpigmentation, Newborn, Chikungunya, tropical infections*

Introduction

Differential diagnosis of hyperpigmentation in a neonate includes congenital skin disorders and metabolic and endocrine causes. However, in tropical countries, infections, especially chikungunya, presents with skin hyperpigmentation with or without other systemic features. Chikungunya may also mimic neonatal sepsis, meningitis or purpura fulminans. A high degree of suspicion, with a proper history and investigations are needed to arrive at the right diagnosis as the various etiologies have different management and prognosis. In addition, any diffuse dermatological manifestation in a newborn is associated with social stigma and mental stress for the family. A proper diagnostic workup and management of neonatal hyperpigmentation is therefore essential.

We present a newborn baby who had hyperpigmentation which started from day 5 of life with lethargy and on extensive evaluation, was found to have neonatal chikungunya.

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Case report

A term male baby with a birth weight of 2.5 kg born to a 25 year old primigravida mother with no antenatal complications by normal vaginal delivery presented on day 5 of life with complaints of lethargy, poor feeding and progressive darkening of the skin since birth. On examination, the baby was dull, cry and activity were weak, with diffuse hyperpigmentation of the skin (Figure 1) predominantly over the face and ears, and sparing the buccal mucosa, palms and soles. The baby was hypotonic with depressed neonatal reflexes. His anterior fontanelle was depressed and there were no meningeal signs. The baby weighing 2.1 kg at presentation had lost around 400 grams since birth in the past 4 days. The possibility of late onset neonatal sepsis with or without meningitis, purpura fulminans, congenital adrenal hyperplasia (salt losing form) and metabolic disorders like alkaptonuria were considered.

Fig 1. Baby on day 7 of life showing diffuse hyperpigmented maculopapular rash with occasional peeling of skin

On investigation, the baby had a total white cell count of 4600 with 40% neutrophils and no immature forms. His CRP and procalcitonin were normal. The platelet count was 130,000/µL, with normal serum electrolytes, urea, creatinine, thyroid profile and 17 hydroxy progesterone levels. The CSF was acellular, with normal protein and sugar. Blood and urine cultures were sterile.

The baby was started on cefotaxime and amikacin on the day of admission along with intravenous fluids. His feeding and activity improved by day 4 after admission and gradually fluids were stopped and replaced with exclusive breast feeding. Repeat hemogram on day 4 of hospital stay showed mild thrombocytopenia (110,000/µL). In view of negative cultures, antibiotics were stopped on day 5 of admission. However, the skin hyperpigmentation was worsening, becoming more prominent over the tip of the nose and ear auricle. A dermatology opinion was obtained, and we were advised to do a skin biopsy and IgM and IgG chikungunya antibody in both mother and baby. On reviewing the history, we discovered that the mother had fever with arthralgia 4 days before delivery. The skin biopsy was therefore not done. Anti-chikungunya IgM was positive in the baby and IgG was positive in the mother, resulting in the diagnosis of neonatal chikungunya. The baby was treated with emollients and topical steroids for 1 month with clinical improvement (Figure 2).

Fig 2: Baby on day 20 of life showing resolving hyperpigmentation

Discussion

Neonatal chikungunya is a well-known cause of skin hyperpigmentation in the neonatal period as shown by various case reports.[1,2,3] The typical characteristic feature is the perioral predilection

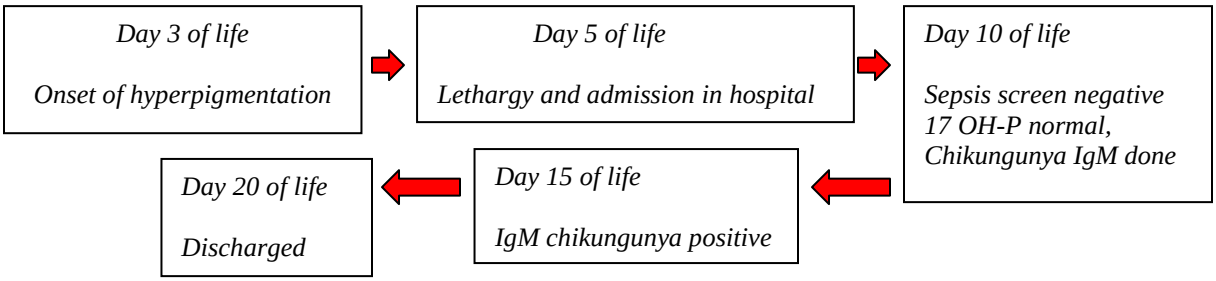
which can spread to the entire body. In countries like India, where vector borne diseases are endemic, infectious causes should be considered before evaluating for metabolic disorders.[1]

Neonatal chikungunya was quite common during the chikungunya outbreak in many tropical countries. Congenital infection was more frequent than acquired. Postnatal chikungunya is rare but vertical transmission has been described. Fetal risk is rare if the gestation period is less than 22 weeks. Maximum transmission is during birth if mother had acquired infection a few days before delivery. Other than hyperpigmentation, another striking clinical feature is neurotropism, which was evident in many cases in as refusal to feed, lethargy and seizures.[2,3] Laboratory features were characterized by thrombocytopenia and positive serum anti chikungunya IgM. Some atypical dermatological manifestations have been described in the literature.[4] More severe neonatal chikungunya with apnea, seizures with encephalitic picture have also been reported.[5]

Dermatological manifestations of the disease have been reported in about 40-50% of patients. The hypermelanosis appears to be post inflammatory in nature and may develop rapidly. The hyperpigmentation may be of different types including Centro-facial and freckle-like, diffuse pigmentation of face, pinna, and extremities, flagellate pigmentation, and pigmentation of existing acne lesions.[6]

Babies with perinatal chikungunya infection are prone to developmental delay and require long term neuro-developmental follow-up.[7,8] Hence the importance of following appropriate preventive vector measures and prompt diagnosis of infective conditions in tropical countries.

Timeline of events



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Original Research Paper

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Pediatrics

SCREENING FOR CONGENITAL HYPOTHYROIDISM USING CORD BLOOD TSH IN RESOURCE LIMITED SETTINGS- AN OBSERVATIONAL RETROSPECTIVE STUDY

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ABSTRACT Newborn screening for multiple metabolic and genetic disorders are available worldwide but they are not routinely done in many developing countries. Newborn thyroid screening can be done either with cord blood or heel prick tests in the neonate. Out of the 2,280 babies who were screened using cord blood TSH, 50 babies had abnormal values (TSH more than 20) and on evaluating the babies further, 6 of them required treatment with thyroxine from the neonatal period, Early initiation of thyroxine is essential to prevent long term morbidity in future. Cord blood TSH is a convenient, cost effective method to identify an easily treatable cause for developmental delay and intellectual disability in children. This signifies the importance of decision to be taken by the government to include cord blood TSH as a universal screening in all hospital delivered babies of developing countries.

KEYWORDS : Newborn screening, cord blood TSH

INTRODUCTION :

Newborn screening is a comprehensive public health prevention system that seeks to identify newborns at increased risk for certain inherited congenital conditions. These screening tests have the potential for preventing catastrophic health outcomes to newborns and their family when they are properly timed and performed. Institutionalizing and sustaining this system presents a formidable challenge within developing public health systems often competing with other healthcare priorities and political agendas in developing countries with resource limited settings.[1]

Congenital hypothyroidism is the most commonly seen endocrine disorder of childhood period in the world. The incidence of CH was found to be 1/4000 in the 1970s when the screening program was firstly used.In the last 20 years, increase in the prevalence of CH has been reported worldwide (2). The absence of the disease-specific clinical manifestation in CH at the birth and prevention of complications with the early initiation of treatment when the diagnosis was made within the first few weeks after the delivery, effectiveness and inexpensiveness of treatment, made the necessity of screening program a current issue.(2)

However, in many developing Asian countries, mothers and their infants are often discharged from hospital within 24 hours of delivery and would return to their hometowns [4, 5, 13].Therefore we should consider the value of cord blood TSH for screening rather than the more ideal use of TSH at 72 hours after birth (3-6).

Also, an effective social system whereby babies could be reached at home is practically non-existent. Thus cord blood remains a very practical alternative for screening purposes, and thus is the practice in some Asian countries. Mixed cord blood samples for TSH values have compared well with filter paper samples taken in the first few days of life. The Indian Academy of Pediatrics recommends the use of cord blood samples for screening for CH(7-11). Very few reports of cord blood values of TSH or T4 exist in Indian literature(12,13) and thus this study was carried out to find the values of TSH in term babies and screening cutoff values to confirm congenital hypothyroidism.

The aim of this study was to determine the incidence of congenital hypothyroidism for a period of 4 years (January 1st 2015 to December 31st 2018) in a tertiary hospital in South Tamil Nadu.

MATERIALS AND METHODS:

The study is retrospective in nature. It was carried out from January 2015 to December 2018. All deliveries during this period were considered for this study.

Details of babies screened for congenital hypothyroidism during this period were obtained from the hospital information system and medical records of babies with confirmed congenital hypothyroidism were retrospectively reviewed.

During this time all blood samples were collected in a sterile container drawn from a 15-20 cm length of the umbilical cord incised while severing it at the time of birth of the baby. A mixed cord blood sample including both from the umbilical artery and vein was obtained of atleast 3ml.

Serum analysis for TSH was done with this sample using an automated immune chemiluminescence assay system (Siemens).The results were stored in the hospital information system. These results were accessed by the paediatrics department and babies screened positive were followed up by the same department.

Based on the criteria given in ISPAE ; the following cord blood values were considered as cut off values for screening of congenital hypothyroidism

i. Cord blood TSH >35mIU/L previously followed
ii. Cord blood TSH >20mIU/L according to new guidelines

For those babies screened positive the following venous sample values taken after 72 hours of age were used to confirm the diagnosis.

- venous TSH >20 if tested <2 weeks
- venous TSH >10 if tested >2 weeks
- FT4 < 1.17ng/dl
- T4 < 10µg/dl

Babies who were confirmed to have congenital hypothyroidism received treatment with L-thyroxine (10–15 mcg/kg/day) as soon as the diagnosis was made and had been followed up until one of the following end points occured

i. confirmation of congenital hypothyroidism
ii. death
iii. discharge from clinician care and
iv. lost to follow up.

Children who had confirmed permanent CH at 2 years if a persisting requirement for T4 was confirmed by a trial off therapy (withdrawal of T4 replacement therapy and re-evaluation of thyroid function tests to confirm or exclude CH), or radioisotope or ultrasonography scan results confirming thyroid agenesis or ectopic thyroid, or continuing requirement for high-dose levothyroxine (≥50 µg per day) indicated by regular review of thyroid function by pediatricians.

Babies born before arrival at the hospital were excluded from the study. Premature babies of less than 37 weeks gestational age were also excluded from the study.

RESULTS:

Two thousand two hundred and eighty babies were screened for congenital hypothyroidism during the 4 year period from January 1st 2015 to December 31st 2018.

Out of which 10 babies were reported with values of TSH >35 mIU/L. 40 babies were reported with TSH range of 20 to 35.On repeating the thyroid profile beyond 48 hours of life, 27 out of the 50 had normal values.10 babies had repeat values between 6 to 10 which normalized within the next 2 weeks. Out of the remaining 10 babies whose values were 10-20 mIU/L, 7 were lost to follow up and 2 were started on thyroxine supplements while the other has a normal value on Day 3 of life. Among the 10 babies with TSH >35 mIU/L, 3 babies were diagnosed to have confirmed congenital hypothyroidism by repeating the test on day 3 and day 14 of life. One baby had associated cleft palate and choanal atresia requiring NICU care in the immediate neonatal period. Another baby who has cord blood TSH value of 18 and Day3 venous sample of 8.5 mIU/L had prolonged neonatal jaundice beyond day 14 of life, which settled after starting thyroxine supplements.

6 out of the 50 babies who had Cord blood TSH more than 20 mIU/L had required thyroxine supplentation within the first month of life. 3 of these babies are still on Thyroxine for more than 1 year, developmentally normal. and under regular followup. 2 babies were evaluated at the end of 2 years with radioisotope scan and found to have thyroid agenesis, hence advised life long thyroxine supplementation. 1 baby was lost to followup. No mortality was documented as all babies enrolled were healthy term neonates and the sick term neonates like asphyxia or preterm babbies were excluded from this study.

Out of the 50 babies with abnormal cord blood TSH values, 8 were lost to follow up as parents were not happy to do repeated blood sampling in their babies, though the postnatal Day 3 venous sample was borderline abnormal(TSH 6 to 10 mIU/L).

Table 1: Cord blood TSH values in total 2280 babies screened

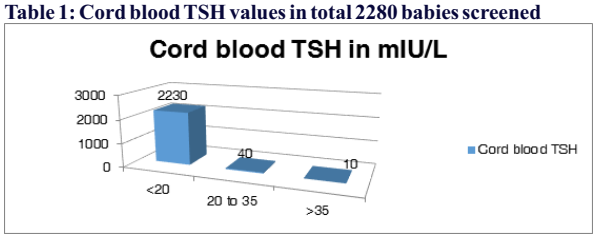
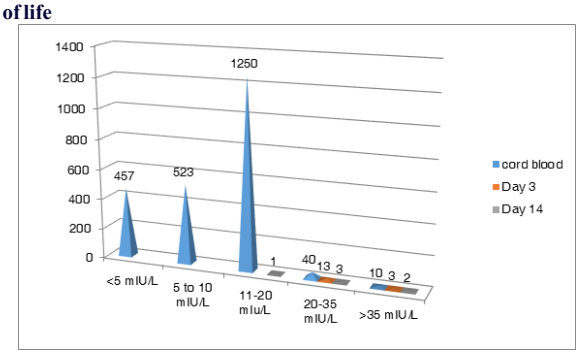


Table 2: TSH values in cord blood, venous samples on day 3 and 14 of life



INFERENCE:

Incidence of congenital hypothyroidism in our study is 2 to 3 per 1000 live births. This is higher compared to other studies in India which have given incidence as 1 in 1874(14); 1.37 per 1000 live births in a study in western rajasthan(15)

Other studies in asian countries show an incidence of 4.13 per 10,000 live births in china (17); 1 per 2238 in southern thailand(18)

This incidence is also significantly higher than studies in western countries which show 0.65 per 1000 live births in Ireland(16); 1:11,438 in a study in USA(19)

Cord blood TSH cutoff of 20 is better than 35 mIU/L as we will not miss any baby with hypothyroidism. The need for repeating thyroid tests at 2 weeks of life if the previous values were borderline or after hemodynamic stabilization of preterm babies should be remembered by all pediatricians.

DISCUSSION :

This study shows higher incidence of congenital hypothyroidism in developing countries necessitating proper screening methods. This study was done among the low to middle income families, predominantly from rural background and with increased prevalence of consanguineous marriages. Increasing incidence of congenital hypothyroidism in recent years may be also due to decrease in threshold of TSH used for detection and more babies being screened.

As congenital hypothyroidism is a preventable cause of mental retardation, implementation of screening programs in hospitals nationwide is vital.

Although there are universal screening guidelines available, there are also various strategies for screening based on timing and approach. Cord blood TSH sampling is compared against sampling the baby on day 3 of life along with the other common inborn errors by dry blood spot test using tandem mass spectroscopy(20). Inspite of multiple trials in the past 2 decades, these tests are available only to the affluent and in private hospitals. There is no proper newborn screening program available in our country for congenital hypothyroidism. As there is early discharge of patients and extreme difficulty in call back of patients after discharge , using cord blood analysis of TSH has proven to be very effective as a screening tool. But this is possible only for in hospital births. Out of hospital births still remain a challenge.

At present, screening programs are existing in certain academic and private settings only. So their integration into public health system at national level requires recognition by the health ministry. The need to diagnose treatable metabolic disorders at the earliest to prevent lifelong morbidities is quintessential. These changes will be brought into practice only when they are declared as universal screening program by the government for all hospital deliveries.

CONCLUSIONS:

This study provides insight into the incidence of treatable congenital hypothyroidism in south India where such data was previously unavailable. As comment to the feasibility of newborn screening in the region we confirm that screening based on mixed cord blood sampling for TSH continues to be the most acceptable modality to parents in these resource limited settings. Acknowledged barriers include early infant discharge, which may affect the reliability of initial screening thresholds to determine disease risk. We further highlight the importance of continuing efforts in developing countries to identify infants with congenital hypothyroidism by implementation as universal screening for all hospital deliveries by the governments.

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Case Report Open Access

Unusual Cases of Abscess Involving Head and Neck Region Caused by *Burkholdreria* Species

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Abstract

Burkholdreria cepacia complex refers to a group of aerobic, gram negative, non-fermenting bacilli that commonly causes opportunistic infections in patients with cystic fibrosis and chronic granulomatous disease. They thrive well in commonly used disinfectants, intra venous fluids and anti-septic solutions, thus have a tendency to cause outbreak in intensive care units and haematology wards. Sporadic cases occur very rarely and may manifest as skin & soft tissue infections, lung infections, urinary infections, peritonitis etc. Infections usually spreads very fast and it shows resistance to most of the commonly used antibiotics. Laboratory isolations is at times delayed and they are wrongly labelled as *Pseudomonas* species. All these factors make treatment more challenging. Here we present two cases of pyogenic infections involving head & neck region caused by *Burkholderia* species with two different clinical presentation in diabetic patients treated in our tertiary care institute in India.

Keywords: *Burkholderia*; Head & neck infections; Antibiotic resistance

Introduction

Burkholderia cepacia complex (Bcc) refers to a group of gram negative, lactose non-fermenting bacilli which are abundant in soil. They act as plant pathogens and also have anti-fungal, plant growth promoting and bio-remediation properties [1]. Human infection with *Burkholderia* species is very rare and is quite difficult to treat. They cause opportunistic infection in immune compromised patients, hospitalized patients and in patients with cystic fibrosis. They thrive well in commonly used intra venous fluids, disinfectants, ventilators, mattresses [2], etc. and hence have the tendency to cause hospital outbreaks in intensive care units or specialized wards. In the laboratory settings, many a times they are wrongly labelled as *Pseudomonas* species, which alters the treatment plan completely [3]. Here we present two cases of *Burkholdreria* infection with two different presentations, treated successfully in our tertiary care set up.

Case Reports

Case 1

69 year old gentleman presented to our emergency department with complaints of pain and swelling in right side of cheek for 1 week duration. On eliciting further history, it was noted that patient developed pain and swelling in the cheek region around one week back. It was associated with fever. He consulted his physician and was diagnosed to have facial cellulitis with abscess formation. Incision and drainage (I&D) was done for the same. Even after I&D, he continued to have pain, and the swelling progressed to involve temporal region also. He has been taking medications for diabetes mellitus for the past 10 years. In view of rapid disease progression, he was referred to our tertiary care centre for further management. At presentation, he was febrile with elevated blood sugar levels. Detailed clinical examination revealed the presence of a large linear wound at the site of incision and drainage in right side cheek and there was copious pus discharge from the wound. It was associated with a large fluctuant, warm and tender swelling in temporal and zygomatic region. Rest of the head & neck examination was unremarkable. Imaging revealed the presence of inflammation with pus collection in facial soft tissue over right maxillary, zygomatic region extending up to temporal fossa (Figure 1). He was taken up for drainage of pus collection under general anaesthesia. Thorough wound wash and debridement was done through previous I&D site. Regular wound care was continued in the post-operative period. Culture & sensitivity of the pus revealed the presence *Burkholdreria cepacia* and it was resistant to most of the commonly used penicillin's and cephalosporin. He was started on intra venous ceftazidime. Despite receiving regular wound care, with culture sensitive antibiotics and strict glycaemic control he did not show any significant improvement. Patient continued to have persistent pain, copious pus discharge, progressive swelling and inflammation. Inflammation extended further in the scalp region up to vertex in midline (Figure 2).

In view of disease progression, he was taken up for wound exploration and debridement again for the third time. To gain access to collection in scalp region, previous incision was extended up to temporal fossa. There was presence of copious pus discharge with diffuse inflammation eating away most of the fascia and fibres of temporalis, masseter, pterygoid and scalp muscles. Complete wound debridement was done after removing the diseased fascia and muscle fibre till bleeding margins (Figure 3). Wound was partially closed after a thorough wound wash with antibiotics. In the post-operative period, he continued to receive intra venous antibiotics with regular wound care. Now the antibiotic has been changed to a combination of intravenous meropenem and oral doxycycline. He started showing signs of recovery in the form of improved pain score with a well granulating wound. He was discharged with oral antibiotics. Secondary suturing of the wound was done four weeks after last surgery. He was kept on oral antibiotics (Trimethoprim-Sulfamethoxazole) for another 12 weeks. He did not develop any signs of recurrent infection during the follow up period.

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Figure 1: CT scan of head showing loculated collection in masseteric space and temporal fossa (yellow arrow).

Figure 2: CT scan of head showing collection beneath scalp (yellow arrow).

Figure 3: Intra operative picture-after debridement of involved fascia and muscles in temporal region of scalp and cheek (yellow arrow).

Case 2

53 year old gentleman presented with complaints of pain and swelling over right side of neck for one month duration. It was associated with fever for the last one week. He has taken few courses of antibiotics for the problem. At presentation, he had tender and fluctuant swelling in the neck and imaging was suggestive of lymphadenitis with abscess formation. Pus collection was let out after doing incision and drainage at the abscess site. Pus and the lymph nodal tissue was sent for gram`s stain, ziehl neelsen stain, KOH mount, culture & sensitivity and histopathological analysis. Initial report did not reveal presence of any type of bacteria, *Tuberculous bacilli* or fungal hyphae. Culture report was initially negative and at 1 week later, it revealed growth of *Burkholdreria pseudomallei*. He was started on injection ceftazidime based on sensitivity pattern. Surgical wound healed completely with proper wound care, better glycaemic control and adequate antibiotic cover. Intravenous ceftazidime was continued for 2 weeks and later antibiotic was switched over to oral co-trimoxazole. He has been advised to continue oral antibiotics for 20 weeks period. Patient did not develop any recurrent infection or swelling during the follow up period.

Discussion

Burkholdreria cepacia complex refers to a group of aerobic, gram negative, non-fermenting bacilli that shows resistance to most of the commonly available antibiotics. It shows intrinsic resistance to many disinfectants, antiseptic solutions and antibiotics, which makes infection control particularly problematic [4]. In 1980`s they emerged as dreadful pathogen causing life threatening lung infections in patients with cystic fibrosis [5]. They commonly cause opportunistic infection in immunocompromised patients, hospitalized patients and in patients with cystic fibrosis. However, both the cases discussed here did not fit into this category. Incidences of isolated head & neck infection caused by *Burkholdreria* species in otherwise healthy patients is sparsely reported in literature [6].

They are facultative intra cellular pathogens capable of invading and replicating within both epithelial cells and macrophages. The virulence factors of *Burkholdreria* species includes; three type III secretion systems (T3SS), six type VI secretion systems (T6SS), multiple polysaccharide loci, and a number of secreted effectors. Poly saccharide capsule and lipopolysaccharides help them evade defence mechanism [7]. They are highly virulent, have tendency to spread very fast and becomes lethal at times. In both of our cases, *Burkholdreria* infection caused extensive tissue destruction involving skin, fascia, muscles and lymphnodes. There was rapid local spread despite under culture directed antibiotic cover, requiring repeated wound debridement.

B. cepacia complex isolates are frequently misidentified in the clinical laboratory by conventional manual biochemical or automated testing methods. Sometimes they are wrongly labelled as *Pseudomonas* species [3]. In our second case, it took us a week time to diagnose *Bukholdreria* species from the pus culture and sensitivity. Initially we suspected it to be a tuberculous lymphadenitis and investigations for tuberculosis like Ziehl-Neelsen staining for AFB, HPE of the excised node, Genexpert study was done and all of those reports came negative for tuberculosis. From the pus culture, we could not isolate any organism initially. We were able to identify *Burkholdreria* species only after 1 week time and antibiotic sensitivity a little later.

Burkholderia cepacia complex strains have been shown to be intrinsically resistant to aminoglycosides, first-and second-generation cephalosporins, polymyxins, and traditional antipseudomonal β-lactams, including piperacillin and ticarcillin [8,9]. The multiple-antibiotic resistance of *B. cepacia* has been attributed to an impermeable selective outer membrane, an efflux pump mechanism, and/or the production of an inducible chromosomal beta-lactamase

[10]. The organism is intrinsically resistant to most antibiotics, and even if individual strains show *in vitro* susceptibility to an antibiotic, there is little clinical response [11]. Even in our patients, culture directed antibiotic did not help in controlling infection during initial stage of treatment. Patient started showing response only after repeated debridement along with change of antibiotic combinations.

As such, recommended first-line therapy includes ceftazidime, TMP-SMX, minocycline, chloramphenicol, and meropenem or a combination of two or more of these agents in light of increasing resistance [12]. However, *in vitro* resistance to TMP-SMX and ceftazidime in *Bcc* isolates has been reported at approximately 10% to 40% and 30% to 40% cases respectively [13,14]. Data from synergy studies and the potential for emergence of resistance while on monotherapy suggest that therapy of serious *B. cepacia* complex infection should include at least two parenteral antimicrobial agents administered at standard doses. The choice of agents should be guided by results of *in vitro* susceptibility testing, and the duration of therapy should be based upon clinical assessment and microbiologic response [15]. For serious infection with susceptible strains, a two-drug combination of parenteral trimethoprim-sulfamethoxazole (5 mg/kg trimethoprim component every 6-12 hr) plus a β-lactam (e.g., ceftazidime, piperacillin, meropenem) or a fluoroquinolone should be utilized. For serious infection with trimethoprim-sulfamethoxazole-resistant strains or sulfa drug allergy, combination therapy guided by *in vitro* susceptibility results should be administered [16].

Sporadic cases of *Burkholdreria* infection are quite uncommon. They should be kept as a differential diagnosis in patients with rapidly progressive infection, not showing much improvement with commonly prescribed drugs and also in situations where in culture reveals the presence of gram negative, non-fermenting bacilli. *Burkholdreria* infection once diagnosed must be treated with culture sensitive antibiotics and treatment must be continued for few months to achieve complete cure.

Conclusion

Sporadic cases of *Burkholderia* infection, especially in the head & neck region are quite uncommon. However, *Burkholderia* infection should be suspected in cases with rapidly spreading and progressive skin and soft tissue infection and in situations, where in the response to antibiotic therapy is very minimal. In laboratory diagnosis, *Burkholderia* species should not be confused with *Pseudomonas* species as both of them show similar features in culture and sensitivity testing. Long term oral antibiotic therapy is needed for complete disease eradication and to prevent disease recurrence.

Conflict of Interest

None.

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