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Textile Workers and Musculoskeletal Disorders: An Anthropo-Medical Analysis

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Abstract

Background: Musculoskeletal disorders are quite common work associated health problem amongst textile workers. Work-related musculoskeletaldisorders are conditions in which: The work environment and performance of work contribute significantly to the condition; and/or the condition is made worse or persists longer due to working conditions, textile workers may be denied of their fundamental basic rightsand not much importance is given to their health. Textileworkers are among the maximumsusceptible as they must have to work for lengthy hoursor duration in perilous posture.

Objectives: Present paper aims to study the anthropo-medical profile of textile workers especially in the context of musculoskeletal disorders among the textile workers.

Methodology: A cross-sectional study was conducted among 215 workers working in textile industries especially silk sarees (Banarsi saress) of district Bhadohi, Uttar Pradesh over a period of more than three months. Data collection was done after taking the ethical clearance using a semi-structured interview schedule and statistical analysis was done using SPSS.

Results: The result of this study shows that there were 48.5 percent of respondents found to be suffering from musculoskeletal disorders. The most common affected site was low back and shoulder. Most of the workers experienced that their pain occurred occasionally during heavy workload.

Conclusion: Hence, the musculoskeletal disorders were found to be associated in age group, sex and educational status. So, Health problems among textile workers are one of the areas of public health concern in the country. Reducing the work strain and providing a supportive workplace environment will have a favorable impact on work productivity.

Keywords: *Musculoskeletal disorders, Textile Workers, Occupational health, Industrial Health*

Introduction

Occupational health is defined as the highest degree of physical, mental and social well-being of workers in all occupations. It is the branch of healthcare which deals with all aspects of health and safety at the workplace. It lays strong emphasis on the prevention of hazards at a primary level. Occupational health is essentially preventive medicine[1]. Consider the demographic facts from India like total population is more than 1.3 billion; gross national per capita income (PPP) is 6490$; life expectancy at birth (Male/Female) is 67.3/69.8 years; probability of dying under the age of five (per 1000 live births) is 48; total expenditure on health per capita is 75$; and total expenditure on health as a percentage of GDP is 4.7[2].

World Health Organization (WHO)[3] expresses occupational health as all aspects of health and safety in the workplace and has a strong focus on primary prevention of hazards. The health of the workers has several determinants, including several risk factors at the workplace leading to cancers, accidents, musculoskeletal diseases, respiratory diseases, hearing loss, circulatory diseases, stress-related disorders and communicable

diseases and others[3]. Textile industries especially silk sarees (Banarsi saress) and carpet are the main source of earning in district Bhadohi, accounting for over 75% of the total export earnings which employed around more than 70 percent workers in district Bhadohi[4,5,6].

Musculoskeletal disorders are injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and spinal discs. Work-related musculoskeletal disorders are conditions in which: The work environment and performance of work contribute significantly to the condition; and/or the condition is made worse or persists longer due to working conditions[7]. According to the National Institute for Occupational Safety and Health, musculoskeletal disorder is a damage that affects the musculoskeletal system of the human body, especially at bones, spinal discs, tendons, joints, ligaments, cartilage, nerves, and blood vessels. Such injuries may result due to repetitive motions, forces, and vibrations on human bodies during executing certain job activities[8,9]. Previous injuries, physical condition, heredity, pregnancy, lifestyle, and poor diet are the factors that contribute to the musculoskeletal symptoms[10,11].

Work at a silk sarees production unit represents a complex multifaceted physical work environment with interactions among the various dimensions of workplace, inappropriate non-neutral awkward postures and rapid piece-rate production[12]. Musculoskeletal problems are the most common problem among silk sarees production workers or textile workers. Work-related musculoskeletal disorders are often overlooked despite being very common among textile workers. Likely explanations for the high prevalence of work-related musculoskeletal disorders include repeated movement, static posture for a long time; prolong exposure to ergonomic risk factors[13,14]. Work-related musculoskeletal disorders (MSD) accounts for a substantial portion of post-workday illnesses and injuries. Hence, it constitutes a major proportion of temporary or permanent disability among textile workers in many countries[12,15,16,17].

In most countries, Lower back and neck pain was the leading global cause of disability in 2015[18,19]. Generally, in India, the textile workers suffer from vertigo, headache, low backache, joint pain, respiratory distress, anemia, female diseases, and dysentery[20]. They also suffer from needle prick injury, cut injury and burn injury. The competitiveness of the different sector of textile garment industry like cloth, sarees, carpet, sarees, thread etc. in the world market is seriously affected by the ill health of the workers since ill health decreases the labor productivity to a great extent[19,21]. There are risks of injuries and diseases in any occupational setting where men and machine are involved. The causes of these injuries pertain to unsafe work, machine, equipment, material and/or unsafe acts. These causes of injuries and diseases present in the work and workplace may develop physical and mental stress in workers, which may result in loss of production and productivity. Moreover, thousands of toxic chemicals pose serious health threats potentially causing cancer, respiratory and skin diseases as well as adverse effects on reproductive function. Workers can be and often are exposed to hazardous chemical agents such as solvents, pesticides and metal dust[11,22].

In India, major occupational diseases are pneumoconiosis (including silicosis, bagassosis, anthracosis and byssinosis), asbestosis, other chronic lung diseases, musculoskeletal injuries, noise-induced hearing loss, pesticide poisoning and accidents. Occupations related to construction, mining, agriculture and textile have high levels of related diseases. Occupational health professionals are the largest single group of health professionals involved in delivery of health services at the workplace. They are at the front line in helping to protect and promote the health of working population[23]. The concept of occupational health is new to India. It is non-existent in unorganized sectors. Even the public sector and private employers have not yet realized its importance. There is a need to create awareness about this issue amongst all stakeholders[11].

There is number of lacunae in Occupational Health system in India like a very large proportion of the workforce is in the unorganized sector (more than 90% vs. less than 10% in the organized sector)[24]. The occupational health management system, implementation and beneficiaries are limited largely to the organized sector, even today, after years of advancements in every field and lack of trained occupational health manpower with deficient institutions, qualification courses, training modules, infrastructure, facilities and budgetary provisions make the implementation of legislation a challenge. There is low priority and spending on public health, which is

reflected in the field of occupational health as well[11].

By clear data and information, occupational hazards and injuries is a bulging issue in national and international level and musculoskeletal disorders are one of most alarming health issues in textile industries but India has not been able to address these emergencies so far[11,25]. The aim of this study was to determine the prevalence and types of musculoskeletal disorders among the workers of textile industries at Bhadohi district of Uttar Pradesh, India i.e. An Anthropo-medical Analysis of musculoskeletal disorders among textile workers.

Materials and Methods

This cross-sectional study was conducted among the textile industrial workers especially working in silk sarees (Banarsi saress) production unit of district Bhadohi, Uttar Pradesh, from May to December, 2019. Considering the prevalence of musculoskeletal problems 77.6% with 95% confidence interval and a 5% margin of error, sample size for the study was calculated by using cross-sectional formula for the infinite population[26]. The total sample size was 215 with 1.5 design effect. Data were collected by Face to face interview with a pretested tools (Semi- structured interview schedule). English tools also translated into Hindi for the better understanding of the respondents. Prior to the data collection, proper motive behind such data collection was explained to each respondent along with oral as well as written consent were taken from each respondent of the textile Industry. Participants who were willing to give consent and they were asked for the interview. Those who refused to provide information consents and interview simply they were excluded from the study. Participants had the right to withdraw themselves from any point of the study. All interviewed questionnaires were checked for its completeness, accuracy, and consistency to exclude missing or inconsistent data. The analyzed data were presented in tables, descriptive statistics performed at the aim of interpretation of the findings. Bivariate analysis was performed to determine the association among variables. The data were analyzed by using the software SPSS version 21.

Inclusion criteria: -1. Age-group: More than 15 years workers, 2. Apparently Textile Workers, 3. Workers of only district Bhadohi, Uttar Pradesh, 4. Subjects who voluntarily gave an Assent toparticipate in the study and, who also provided a writteninformedconsent.

Exclusion criteria: -1. Workers of other industry, 2. Subjects with earlier or permanent musculoskeletal disorder, 3. Child workers.4. History of any other acute/ chronic illness, 5. Subjects on regular medication, especially on any drugs, 6. Workers of any other district other than Bhadohi, Uttar Pradesh, 7. Workers having less than three months of exposure.

Result

The result of the An Anthropo-medical Analysis of musculoskeletal disorders among textile workers with the aim to determine the prevalence and types of musculoskeletal disorders among the workers of textile industries at Bhadohi district of Uttar Pradesh, India were reflected in table 1, 2 and 3.

During data collection, it was observed that the ventilation and housekeeping of the industry were poor, and situated mostly in a rented house. The industries were overcrowded; the floor space for each worker was very small which is 12-16 sq. feet. The provision of lightening was not sufficient and no medical facilities, restroom, adequate latrine, canteen facilities in almost all the textile industries.

Table 1 Distribution ofTextile Workers According to Their Socio-Economic Characteristics

Socio-Economic CharacteristicsVariable		**Number (215)**	**Percent**
Age Group (Years)	15-24	46	21.4
	25-34	120	55.8
	35-44	26	12.1
	45-54	19	8.8
	More than 54	4	1.9
Mean Age± S.D.	30.84± 6.33		
Gender	Male	151	70.2
	Female	64	29.8
Religion	Hindu	97	45.1
	Muslim	75	34.9
	Christian	28	13.0
	others	15	7.0
Education status	Illiterate	96	44.6
	Literate	119	55.4
Education level	Can read and write	60	50.4
	Primary level	23	19.3
	Secondary level	34	28.6
	Higher secondary level/above	2	1.7
Employment Position	Textile weaving Operator	181	84.2
	Ironing and Finishing operation	6	2.8
	Helper	14	6.5
	Supervisor	8	3.7
	Other	6	2.8
Nature of Work	Mild	11	5.2
	Moderate	187	86.9
	Heavy	17	7.9

Cont... **Table 1 Distribution ofTextile Workers According to Their Socio-Economic Characteristics**

Length of Job (in years)	1-5	178	82.8
	6-10	32	14.9
	16-20	3	1.4
	More than 20	2	1.0
Mean length of job± S.D.	3.87± 3.43		
Working hour	6-8	111	51.6
	9-12	76	35.4
	More than 12	28	13.0
Mean working hours± S.D.	9.45± 2.14		
Overtime	Yes	104	48.4
	No	111	51.6
Overtime per week (hours)	5-10	7	6.7
	11-15	76	73.1
	16-20	18	17.3
	21-25	3	2.8
Mean Overtime per week ± S.D.	12.24± 2.26		

Above table shows the distribution of Textile Workers according to their socio-economic characteristics. Among the total 215 respondents, the mean age of the textile workers was 30.84± 6.33 years.More than 70% of the respondent were belongs to less than 35 years old and around 20% respondent were belongs to an age range of 35 to 54 years while only 1.95% of respondents were of more than 54 years age groups. Majority of the respondents i.e. 70.2% were male and only 29.8% were female respondents. Similarly, the around 44.6% respondents were Hindu by religion followed by 34.9% were Muslim, 13.0% were Christian while only 7% of the respondents werebelongs to other religious group like Buddhist, Jainism,Sikhism etc. Among the total respondents, 55.4% were literate out of which 50.4% were found to be able to read and write followed by secondary level and primary level of education while only 1.7% respondent completed their higher secondary level or above and around 44.6% respondents, were illiterate

Regarding the nature of the job of the workers, it was found that majority of the workers i.e. 84.2% work as banarasi saree weaving operator. While 2.1% of the workers categorized under other position like machine maintenance related work. The mean working year was found to be 3.87 and standard deviation was 3.43. Majority of the respondents i.e. 82.8% had been working for 1-5 years in the same industries followed by 14.9% respondent were working for 6-10 years while only 1.0% had been working formore than 20 years. The mean working hour per day was 9.45 and standard deviation was 2.14. Among the total respondents, 51.6% were found to be working for 6-8 hours per day. Among the total respondents, 48.4% were found to be working overtimei.e., more than eight hours. The mean overtime

working hour per week was 12.24 while the standard deviation was ±2.26. The majority of overtime workers i.e. 73.1% worked for 11-15 hours per week while only 2.8% of overtime workers worked for 21- 25 hours per week.

Musculoskeletal disorders

Table 2 Distribution of Textile Workers According to Their Characteristics of Musculoskeletal Disorders

Characteristics of Musculoskeletal Disorders		**Number (215)**	**Percent**
Occurrence of Musculoskeletal Disorders	Yes	104	48.4
	No	111	51.6
Frequency of Pain (n=104)	Occasionally	85	81.7
	Regular	15	14.4
	Invariably	4	3.8
Sites of pain (n=104)	Neck	5	4.8
	Waist and backbone	69	66.3
	Hand	1	1.0
	Shoulder	28	26.9
	Legs	1	1.0

Table 2 depicts the distribution of Textile Workers according to their characteristics of musculoskeletal disorders. About half of the respondents i.e. 48.4% were found to be experiencing some kind of musculoskeletal discomforts. Among the total respondent experiencing musculoskeletal discomforts, the maximum respondents i.e. 66.3% had experienced waist and back pain followed by shoulder pain at 26.9% while only 2.0% of respondents had experienced hand and legs discomforts. Most of the respondents i.e. 81.7% of the respondents reported that their pain occurred occasionally during heavy workload followed by 24.4% respondents reported that their pain occurred regularly during heavy workload while only 3.8% of respondents had experienced invariably pain. The musculoskeletal disorders were found to be significantly higher in age group, gender and educational status (Table 3).

Table 3: Statistical Demographic Relationship between Textile Workers Having Musculoskeletal Problems and Non Musculoskeletal Problems

Variables		Musculoskeletal Problems (104)		Non-Musculoskeletal Problems (111)		χ^2	p-value
		N	%	N	%		
Age Group (Years)	15-30	49	22.79	69	32.09	5.145	p<0.05
	31 years and Above	55	25.58	42	19.53		
Gender	Male	69	32.09	85	39.53	2.891	p<0.05
	Female	35	16.28	26	12.09		
Education Status	Illiterate	19	8.83	12	5.58	6.783	p<0.05
	Literate	85	39.53	99	46.05		
Nature of Work	Mild	5	2.33	7	3.26	0.309	p>0.05
	Moderate	93	43.26	97	45.12		
	Heavy	6	2.79	7	3.26		

Statistical demographic relationship between Textile Workers having musculoskeletal problems and non musculoskeletal problems showed, that the maximum i.e. 25.58% of the respondent who was experiencing some kind of musculoskeletal discomforts were belongs to age group of 31 years and above. Maximum respondent who was experiencing some kind of musculoskeletal discomforts were male (32.09%), who is bit literate (39.53%) and working moderate work (43.26). The musculoskeletal disorders were found to be significantly higher in age group, gender and educational status.

Discussion

The textile industries are growing without a proper plan and adequate occupational health and safety facilities. The provisions as mentioned in Labour Act 1992[24]regarding health, hygiene, safety, and welfare has not been found to be implemented as desired. In this study it has been found that in the studied banarasi sarees production industries there was no adequate space for each worker and about half of the workers were working more than eight hours a day which results in decrease in the efficiency of the workers and also affects the physical and mental health of workers. In order to earn more, the garment factory workers are compelled to work for long hours in a day resulting in them to develop various musculoskeletal discomforts.

It has been found that about 77.2% of the workers were less than 35 years old and 17.3% of workers had been working for more than 5 years in the same factory. In a similar kind study conducted in Varanasi, Uttar Pradesh in 2015-16 revealed that most of the workers 62.1% were in the age group of 20-34 years and 20.5% workers had been working for more than 10 years which indicates that the young people are coming more in the production life which is important for economic development of the country[19,31]. This study also revealed that about 12% illiterate and 50% of the workers were literate who can only read and write. For skilled manpower and to maintain proper Occupational Safety

and Health in the factory, education of the workers is one of the important factors, so, necessary measures, as well as motivational activity, should be undertaken to increase the educational level in the community.

In this study, it was found that about half of the respondents of the respondents were suffering from some sort of musculoskeletal disorders and the most common musculoskeletal disorders was found in the wrist and back pain. It has been reported that occupational musculoskeletal disorders are associated with physically heavy work, manual material handling, repetitive work and unsuitable work posture[11,27,28].

A study conducted in Bangladesh during 2013[29] and Nepal during 2020[11], the respondents experiencing shoulder pain and back pain were more than 50% and there was a significant relationship between the length of job (in years) and musculoskeletal discomforts[29,11.] While in the present study there was no establishment of any statistical significance between working years and musculoskeletal discomforts. Analysis of the results of the study was significant with age group, gender, and educational status. A research conducted in Jaipur, India in 2012 revealed that in stitching section majority of workers (55%) complained about a musculoskeletal problem which is similar to this study where the majority of the respondents working in stitching section (49.4%) complained about musculoskeletal discomforts[27]. A study conducted in 2011 among female garment factory workers in Sri Lanka revealed that the majority of the respondents (63.7%) worked as a sewing machine operator. 15.6% were found to be reporting musculoskeletal problems, the most prevalent complaint being lower back problems among the respondents[30]. In comparison to present study, the 58.2% of the female respondent were reported to experience musculoskeletal problems. This study gave quite similar results in terms of specific musculoskeletal discomforts of the lower back pain among the respondents. These comparisons so far show an alarming condition of workplace injuries and health hazards.

Conclusion

In this study, it is evident that half of the workers had been suffering from some kind of musculoskeletal disorders. The musculoskeletal disorders were more among the workers who worked in the weaving section. The occurrence of musculoskeletal disorders is significantly associated with age, sex, and educational status. The working space per worker was extremely inadequate. There were no medical facilities and proper toilet facilities. Almost every day the workers had to work overtime. To protect and promote the health of the workers, necessary measures should be undertaken as soon as possible to provide proper health, hygiene, and medical facilities to the workers. In order to improve the condition of workers there is a need of the acceptance of modern techniques and making machine work-friendlyshould help in improving the health conditions of textile workers. Health examinations of workers should be done on a regular basis and adequate precaution should be taken by workers to ensure safe health.

Limitations: Findings in the present study were obtained with a relatively small sample size. Future studies should be carried out on a larger and more diverse population to generalize the findings obtained here. In order to further validate the above findings, a more precise anthropometric measurement and parameters should be taken in future studies using better tools.

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Source of Funding: Self

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Study of the Lung Function Tests in Healthy Non-Smoking Women Using Different Cooking Fuels

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Abstract

Background: In developing country like India still a large group of women use biomass as the cooking fuel in a poorly ventilated cooking area and it is considered as a major risk factor for respiratory diseases. Throughthis study we sought to find the effect of biomass and LPG fuel use on the lung function by stud spirometry.

Method: This cross-sectional study was conducted in the rural and urban areas of Ghaziabad. We assessed the lung function in 100 non-smoker females (50 biomass and 50 LPG fuel users) and studies the presence of any correlation between lung function and the duration of exposure.

Results: Compared to LPG users biomass fuel users had significantly lower values of FVC ($p = 0.007$), FEV1 ($p = 0.0024$), FEV1/FVC ($p < 0.0001$) and PEFR ($p = 0.007$). Statistically significant negative correlation was also found between exposure index and spirometry values in both the groups.

Conclusion: Biomass fuel has a more adverse effect on the lung function and the lung function decline is associated with the exposure duration.

Key words: *Biomass, LPG, Exposure index, spirometry*

Introduction

Biomass fuels such as crop residues or wood are used in more than half the world's households and a significant proportion of this activity takes place in conditions where much of the airborne effluent is released in the living area. The majority of the solid fuels are burnt in inefficient traditional cooking stoves located in places without adequate ventilation. Biomass, including wood, agricultural residues, charcoal and dung, is widely used for cooking in developing countries.[1]

Pollutants from biomass combustion are a complicated mixture of aerosol (droplets and solid particles) and gases such as CO, PM, hydrocarbons, NO_2, SO_2 and others.[2]Indoor air-pollution by use of biomass fuels is found to have a serious impact on lungs function with a strong association found between length of exposure and respiratory problems. It leads to increase in the incidence of chronic bronchitis, chronic obstructive pulmonary diseases and respiratory infections like pneumonia, tuberculosis. [3,4]

Wood smoke associated toxins causes epithelial cell lining desquamation, pulmonary edema, peribronchial& perivascular infiltration of Polymorphonuclear cells. These pulmonary lesions worsen dramatically with increasing exposure duration.[5]

More than half of the world's population (52%) use biomass fuel for cooking. Beside morbidity, burning biomass fuels such as wood, crop waste and dung, or coal is responsible for annual deaths of an around 1.6 million people.[6]Exposure to indoor air pollution may be responsible for about 4% of the global health burden.[7]In India 400 –550 thousand premature deaths occur annually due to use of biomass fuels.[8]

The present study intended to study the effect biomass fueland LPG (Liquefied petroleum gas) on

pulmonary function in non-smoking healthy women and to study any association if present between exposure duration and lung function decline.

Materials and Methods

The study was conducted in the department of physiology in association with the department of TB and chest in Santosh medical college and hospital, Ghaziabad. This cross-sectional study was conducted on 100 healthy non-smoking females with no history of cigarette smoke exposure. Among them 50 were biomass fuel users and 50 LPG users. Following approval of the ethical board of institution volunteers were selected randomly from rural as well as from urban area of Ghaziabad through camps conducted. After an informed consent from the subject history was taken which included any history of smoking, location of the kitchen, adequacy of ventilation, type of cooking fuel used, income and any clinically diagnosed disease. Subjects with Cardio respiratory disease, DM, Hypothyroidism, Hypertension, rheumatic disease, collagen vascular disease or any other systemic disease were excluded from the study. Conditions where spirometry is contraindicated like recent surgery, infection, Pneumothorax, thoracic, abdominal or cerebral aneurysms were also excluded from the study.

Standing height was recorded without shoes and with light cloths on a wall mounted measuring tape to the nearest of centimeters. The range of scale was 140-190 cm in standing posture. Sensitivity of scale was 0.5 cm. Body weight was recorded in Kg (with shoes off and empty bladder) by using Avery machine, capacity was 120. Body mass index was computed as body weight in kilograms divided by the square of standing height in meters (kg/m^2).

Exposure index was calculated as[9]-

EI: number of Hrs for cooking / day × number of years of Cooking.

SPIROMETRY[10]: Spirometry was performed with Medspiror which displays spirometry parameters as actual, predicted and percentages predicted values. The subjects were asked to avoid the activities like performing vigorous exercise within 30 min of testing, wearing clothing that substantially restricts full chest and abdominal expansion and eating a large meal within 2hrs of testing. All the subjects were given time to acclimatized themselves to environmental conditions. Adequate rest was allowed before the test. The nature of the study was explained to the subjects beforehand to avoid any apprehension which could alter the values of the tests. All the readings were taken in the sitting posture and in morning between 10 AM - 2 PM. They were demonstrated the procedure with the emphasis on the importance of taking a full breath and blowing out as fast and hard as possible. Three reading were taken. Highest amongst the three readings was taken as subjects lung function values. Following PFT parameters were analysed for the study:

FVC: Forced Vital Capacity is the total volume of air that the patient can forcibly exhale in one breath.

FEV1: Forced Expiratory Volume in 1st sec. is the volume expired in the first second of maximal expiration after a maximal inspiration and is a useful measure of how quickly full lungs can be emptied.

FEV1/IVC: It is the FEV1 expressed as a percentage of the IVC and gives a clinically useful index of airflow limitation.

PEF: Peak Expiratory Flow. It is the highest flow achieved during the FVC maneuver. It is effort dependent value and reflect subject's effort.

Statistical Analysis

The data was subjected to statistical evaluation using Graph Pad Prism Version 6 software. Intergroup comparison was done using unpaired 't' test. Intergroup comparison for non-parametric data was done using Mann-Whitney U test. Correlations were assessed with Pearson correlation co-efficient and Spearman correlation co-efficient as and when applicable. Results were expressed as mean ± standard deviation (Mean ± SD). The p-value < 0.05 was considered statistically significant.

Results

TABLE 1: Shows the basic demographic profile of Biomass users and LPG users.

PARAMETERS	BIOMASS USERS (n=50)	LPG USERS (n=50)	p VALUE
AGE (years)	33.84 ± 6.50	33.60 ± 5.632	0.897
HEIGHT (cm.)	156.4 ± 4.436	156.3 ± 4.278	0.864
WEIGHT (kg.)	53.82 ± 7.537	53.98 ± 6.441	0.977
B.M.I. (kg/m2)	22.01 ± 3.175	22.01± 3.175	0.738
Income (Rs per month)	2590 ± 550.4	9500 ± 1898	<0.0001****

*p<0.05-significant, **p<0.01- highly significant, ***p<0.001-very highly significant

No statistically significant difference was present in the age, height, weight, BMI among the two groups. But the income was significantly lower in biomass users.

Table-2: Distribution of number of biomass users & LPG users according to Exposure Index (hrs- years)

Exposure index(hrs-years)	Biomass users	LPG users	Total
20-49	23	25	48
50-79	8	16	24
80-109	19	9	28
Total	50	50	100

*p<0.05-significant, **p<0.01- highly significant, ***p<0.001-very highly significant

Table 3 Shows distribution of biomass users & LPG users according to the exposure index(exposure to cooking fuel). Out of 50 biomass users 23 were found to have 20-49 hrs- years exposure index, followed by 19 subjects in 80-109 hrs- year range. Only 8 women are exposed to 50-79 hrs-years.

Out of 50 LPG users 25 were found in exposure index of 20-49 hrs- years range followed by 16 in 50-79 hrs- years and only 9 subjects with exposure index of 80-109 hrs- years.

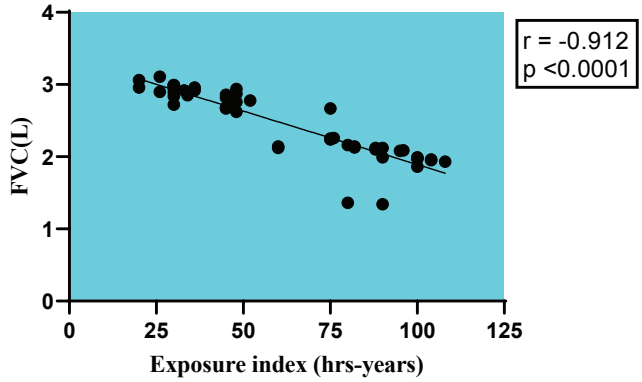
TABLE 3: Shows Spirometry parameters among Biomass users and LPG users

PARAMETER	BIOMASS USERS (n=50)	LPG USERS (n=50)	p VALUE
FVC (liters)	2.447±0.464	2.737±0.526	0.007**
FEV1(liters)	1.890±0.429	2.201±0.471	0.0024**
FEV1/IVC (%)	3.460±0.511	3.921±0.878	<0.0001****
PEFR (liters/sec.)	0.767±0.051	0.802±0.045	0.007**

*p<0.05-significant, **p<0.01- highly significant, ***p<0.001-very highly significant

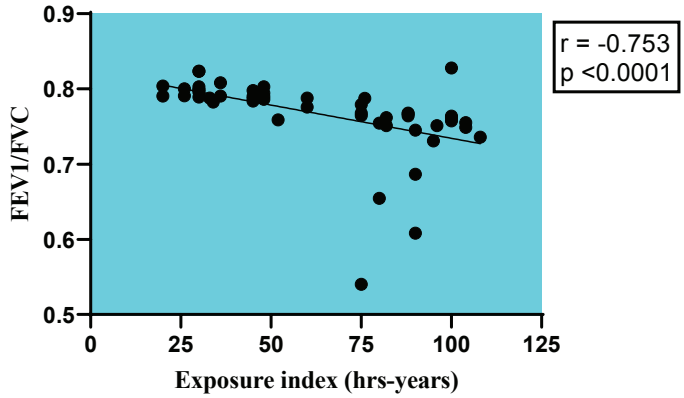
A significantly lower FVC, FEV1, FEV1/FVC and PEFR values were found in biomass users compared to LPG users (table 3).

Fig 1: Correlation between Exposure index and FVC among Biomass fuel users.



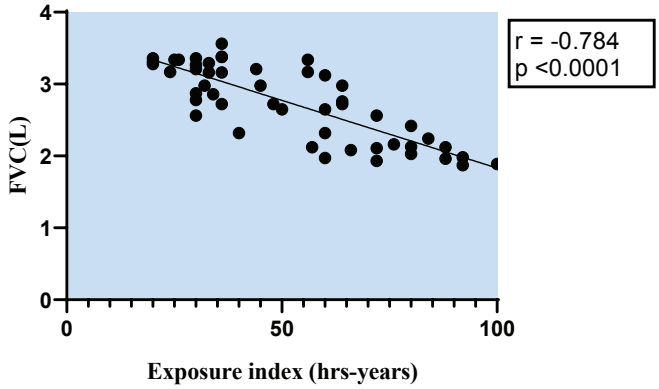
*p<0.05-significant, **p<0.01- highly significant, ***p<0.001-very highly significant

Fig 2: Correlation between Exposure index and FEV1/FVC among Biomass fuel users.



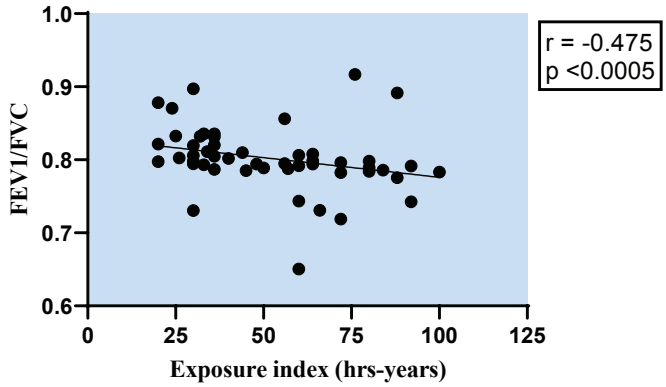
*p<0.05-significant, **p<0.01- highly significant, ***p<0.001-very highly significant

Fig 3: Correlation between Exposure index and FVC among LPG users.



*p<0.05-significant, **p<0.01- highly significant, ***p<0.001-very highly significant

Fig 4: Correlation between Exposure index and FEV1/FVC among LPG users.



*p<0.05-significant, **p<0.01- highly significant, ***p<0.001-very highly significant

The mean value of exposure index in biomass users was 62.52 ± 28.09 and among LPG users was 51.94 ± 22.75 and the difference was statistically significant (p=0.041). When correlation analysis was done between exposure index and spirometry values,we found a significant negative correlation both in the biomass group and LPG group. In both the groups we found that values of FVC, FEV1, FEV1/FVC and PEFR significantly decreased with an increase in the exposure index.

Discussion

The present study was conducted to observe the effect of biomass smoke on lung functions of healthy non-smoking females and to compare the lung function between women using biomass and LPG as cooking fuel.Weenrolled equal number of LPG and biomass fuel users and studied the lung function among them through spirometry. Since we have taken only non-smoker females and also avoided confounding variables like passive smoking, it helped us to evaluate the effects of biomass combustion exposure alone on pulmonary function.

The two groups did not have any significant difference in their demographic profile like age, sex, height, weight and BMI. But the two groups had significant difference in their incomes. This might be one of the main reasons for their preference of the cooking fuel used.

In our study we found a significant difference in FVC, FEV1, PEFR and FEV1/FVC values between the biomass and LPG users. The results showed that there is a greater deleterious effecton lung functionin biomass

fuel user than LPG. The duration of exposure was also significantly more in the biomass fuel users which might be an additional factor contributing to the harmful effects seen. When we further analyzed the correlation between exposure and spirometry parameters, we found significant decline in lung function with increase in exposure index in both the groups. This signifies that both the kind of fuels may have a deleterious effect on the lung function. Since the spirometry parameters were significantly lower in biomass users than LPG, we can say that biomass smoke has more hazardous effects on the lung function.

Previously also many studies have shown similar results. Da Silva LF et al. at in their study found that long term exposure to biomass smoke is associated with increased prevalence ofrespiratory symptoms and reduced lung function.They found that symptoms like cough, wheezing and dyspnea are more common in them along with decreased FEV1 and FEV1/FVC ratio.[11]In a study done by Stapleton EM et al. normal spirometry was found in 40% of LPG users and only10% in the biomass fuel user. 60% of both the groups had restrictive pattern (post bronchodilator FEV_1/FVC>90). The remaining biomass users (30%) had respiratory obstruction (post FEV_1/FVC<80).[12]Sukhsohale ND et al. concluded in their study that women who use biofuel suffer more from different health problems like eye irritation, cataract, headache, diminution of vision and respiratory illnesses like chronic bronchitis. Lower PEFR was found in them and the prevalence of symptoms was associated with increased exposure index.[13]

Studies have reported exposure to biomass to be a significant risk factor for lung diseases.[4,14,15]The biomass smoke is found to be an independent etiologic factor for COPD in non-smokers. [16]It is found that chronic exposure to biomass smoke leads to deposition of organic and inorganic substances like carbon particles, iron, lead, cadmium, silica, phenol, hydrocarbon complexes. This cause oxidative damage and inflammation in the airways and alveoli leading to lung pathologies.[5,17]Considering the harmful effect of biomass fuel use on lung function, interventions focusing towards finding a more cost-effective safer cooking method and increasing awareness regarding better cooking practices is required.

The limitation of our study is that we didn't perform the reversibility test in spirometry which could have given a clearer picture about the obstruction in the lung. The degree of exposurewas calculated according to the exposure index which is based on memory andhow the participant recalls the cooking duration, which could be a biasing factor.Details like exposure to industrial pollution should also had been included to rule out its effect on lung function.

In conclusion, we can say that use of biomass fuel is associated with greater reduction in lung function in comparison to LPG. This effect is dependent on both the magnitude and duration of exposure.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Ethical clearance taken from the ethical board of the institution.

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Association between Hypertension and ABO Blood Groups: A Prospective Study among Students

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Abstract

Background: High blood pressure (BP) is a major public health problem in India and its prevalence is rapidly increasing among both urban and rural populations. Age, gender, genetic factors and ethnicity are non-modifiable risk factors of hypertension. The ABO blood group is inherently heritable, genetically detected at time of conception and becomes permanent for whole life. This study intends to find out any effect of different blood groups on development of hypertension.

Method : A total of 172 subjects were studied between March 2017 to June 2018. Blood pressure of all the participants in the study was recorded using mercury sphygmomanometer. The formula, weight in kg was divided by height in meter square was used to calculate the BMI of patients and unit is kg/m2. The data collected was compiled and analysed using chi-square test. SPSS ver. 16 was used for this. P value of <0.005 was considered highly significant.

Conclusion: Blood group B has the highest tendency to be obese and developed both prehypertension and hypertension. Whereas blood group AB has least chance to develop hypertension and obesity.

***Key Words**: -ABO Blood Group, BMI, Hypertension, Obesity, Prehypertension*

Introduction

High blood pressure (BP) is a major public health problem in India and its prevalence is rapidly increasing among both urban and rural populations.[1, 2] In fact, hypertension is the most prevalent chronic disease in India. Worldwide, 7.6 million premature deaths (about 13.5% of the global total) were occurring due to higher blood pressure. Globally around 54% stroke and 47% IHD (ischemic heart disease) were occurring because of high blood pressure.[3]

In India, total prevalence for hypertension was 29.8% (95% CI: 26.7–33).[4] Age, gender, genetic factors and ethnicity are non-modifiable risk factors of hypertension.

ABO blood group is one of them that requires to be investigated in some detail. Since hypertension is multifactorial, the ABO antigens might indirectly have some effect on arterial pressure. This ABO blood groups pattern was classified by the detection of A and B antigens on membrane of human RBC (red blood cell).[5] The antibodies that detected against RBC antigens called agglutinins. These antibodies were present in the individuals' serum whose RBCs had absence of corresponding antigen. ABO group was distributed into four major blood groups A, B, AB and O depending upon detection of these antigens and agglutinins in individuals.[5,6] The ABO blood group is entirely and inherently heritable, genetically detected at time of conception and became permanent for whole life. Therefore,frequency distribution of ABO blood group following to known pattern was regulated by transmission of gene from one generation to next generation and it differs geographically and racially among human beings.[7]

According to JNC 8, systolic 90-119 mm of Hg and diastolic 60-79 mm of Hg is normal blood pressure. Hypertension is a condition where systolic pressure

is >120 mm of Hg and diastolic is >80 mm of Hg. Prehypertension (high normal), systolic blood pressure is 120-139 mm of Hg and diastolic is 80-89 mm of Hg. In stage 1 hypertension, systolic blood pressure is 140-159 mm of Hg and diastolic is 90-99 mm of Hg. In stage 2 hypertension, systolic blood pressure is 160-179 mm of Hg and diastolic is 100-109 mm of Hg. In stage 3 hypertension (hypertensive emergency), systolic pressure is ≥180 mm of Hg and diastolic is ≥110 mm of Hg. Isolated systolic hypertension ≥140 mm of Hg and diastolic <90 .[8]

Material and Method

The study was done in the Department of Physiology, Darbhanga Medical college& Hospital. A total of 172 subjects were studied between March 2017 to June 2018. Blood pressure of all the participants in the study was recorded using mercury sphygmomanometer. Blood pressure of individuals recorded in sitting position after the subject had been rested for at least 5 minutes. Two measurements of Blood pressure recording over the period of at least 3 minutes was obtain on left arm in sitting position by using mercury sphygmomanometer. The blood pressure at which the first Korotkoff sound heard would indicate systolic B.P and the pressure when the sound disappears would indicate diastolic B.P. The blood for blood grouping was obtain by finger prick in aseptic condition and ABO and Rhesus blood group was determine by using anti-sera by slide method. Height in meter and weight in kilogram (kg) of participants were measured to calculate BMI. The formula, weight in kg was divided by height in meter square was used to calculate the BMI of patients and unit is kg/m2. According to WHO (World Health Organization), "Asian Criteria" for BMI cut off point are less than 18.5 is underweight,18.5-22.9 is normal, 23-24.9 is overweight, 25-29.9 is pre-obese, ≥ 30 obese, 30-40 type 1 obese, 40.1-50 type 2 obese and more than 50 is type 3 or super obese.The data collected was compiled and analysed using chi-square test. SPSS ver. 16 was used for this. P value of <0.005 was considered highly significant.

Results

The data of 172participants were collected and analysed by chi-square test. The mean age of students is 21.43 years. In total, 87(50.6%) were male and 85(49.4%) were female. Maximum 60(34.9%) had blood group B. Minimum students, 17(9.9%) had AB blood group. Most common blood group in both sexes was B group. Out of 172 students,162 students have Rhpositive blood group and 10 have negative. Seven male and 3 female had negative blood group.

Table 1: Gender distribution according to blood group of students

Blood Group	Male	Female	Total
A	22 (12.8)	24 (13.9)	46 (26.74)
B	30(17.44)	30 (17.44)	60 (34.9)
AB	8 (4.65)	9 (5.23)	17 (9.9)
O	27 (15.7)	22 (12.8)	49 (28.5)
Total	87(50.6)	85(49.4)	172 (100)
Rh(+)	80	82	162
Rh(-)	7	3	10

Maximum 4 (2.33%) students had obesity (≥30) was found in students with blood group B. There were no obese students in blood group AB. Students with blood group O were maximum 10(5.81%) underweight. Maximum

overweight (23-24.9) was found in A blood group. And pre-obese were maximum (5.23%) in B blood group. So, tendency of obesity was maximum in B and minimum in AB blood group.

Table 2: BMI distribution according to blood group

Blood Group	Under weight	Normal	Overweight	Pre-Obese	Obese	Total
A	6	23	9	7	1	46
B	5	34	8	9	4	60
AB	1	11	3	2	0	17
O	10	27	7	5	0	49
Total	22	95	27	23	5	172

Table 3: Systolic and Diastolic blood pressure stages in relation to different blood groups

	Normal		Prehypertension		Stage 1 HTN		Total
	Systolic	Diastolic	Systolic	Diastolic	Systolic	Diastolic	
A	26	23	20	21	0	2	46
B	25	26	32	31	3	3	60
AB	12	10	5	6	0	1	17
O	30	25	19	22	0	2	49

Table 3 shows that blood group B has maximum prehypertension (systolic) n = 32(18%) and maximum prehypertension(diastolic) n=31(18.02%). It also shows that blood group B has maximum stage 1 hypertension(systolic) 3 (1.74%) as well as maximum stage I Hypertension for diastolic blood pressure n = 3(1.74%). Students with blood group AB has minimum prehypertension and no stage 1 hypertension for both systolic and diastolic blood pressures.

Table 4: Comparison of BMI with different stages of systolic blood pressure

Body Mass Index	Normal	Pre-Hypertension	Stage 1 Hypertension	Total	Chi-square test
Under weight	17	5	0	22	
Normal	58	37	0	95	
Overweight	8	19	0	27	0.00
Pre-Obese	8	12	3	23	
Obese	2	3	0	5	
Total	93	76	3	172	

Table 5: Comparison of BMI with different stages of diastolic blood pressure

Body Mass Index	Normal	Pre-Hypertension	Stage 1 Hypertension	Total	Chi-square test
Under weight	16	6	0	22	
Normal	54	39	2	95	
Overweight	7	18	2	27	0.00
Pre-Obese	6	15	2	23	
Obese	1	2	2	5	
Total	84	80	8	172	

Discussion

This current study showed that the B blood group has more tendency to develop hypertension and obesity followed by blood group O, A and AB. Whereas AB blood group has least chance of getting hypertension and obesity. Similar result were seen in study done in Iran by Abdollahi AA et.al.[9]

In this study, blood group O was the most common type, maximum 112(32.9%) and AB is least common 32(9.4%). A Saudi Arabian study also showed similar result.[10] A study done by Siva KGV had shown different result. That study showed blood group O was more susceptible for obesity. But in current study, blood group B had more prevalence of overweight, obesity and hypertension.[11]

A study done by Das PK et al in the southern region of India the commonest blood group be of the O type and the second commonest to be of the B type.[12]Another study done by Behera Swikruiti showed O blood group was most common type in male and A was common in female. Whereas blood group AB had maximum Body Fat Percentage (BFP) >21% and Waist Hip Ratio (WHR)>0.9.[13] In similar study, showed blood group B had high incidence of obesity and high leptin level.[14] A study was done in Saudi Arabia by AboelFetoh, which showed no statistically significant association among overweight, obesity and blood group.[15] Similar study showed the most common type of bloodgroup was A. which was associated with higher incidence of high serum cholesterol level, HTN and DM but no significant association.[16] A study done in Iran showed similar result blood group A was the most common type with high tendency of getting obese and overweight.[17]Intwo different studies done by Purushottam A, Yadav S, et al and Warghat NE, Sharma NR et al the results are on a similar trend to our study with the RH positive blood group being more common.[18,19]A study was carried out in medical students of Kasturba Medical Collegeshowed tendency of prehypertension was associated with increased BMI. And blood group O was more susceptible to develop hypertension.[20]

Conclusions

Blood group B has the highest tendency to be obese and developed both prehypertension and hypertension. Whereas blood group AB has least chance to develop hypertension and obesity.

Ethical Clearance: Present study was approved by Departmental ethical committee, DMC,Laheriasarai, Darbhanga, Bihar

Conflict of Interest: – Nil

Source of Funding: -Self

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A Study of Incidence of Pre-Eclampsia in Relation to Maternal Age

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Abstract

Background: - Pre-eclampsia is a serious complication of pregnancy and contributes significantly maternal as well as perinatal morbidity and mortality. So this study is done to find if there exists any relationship between maternal age and pre-eclampsia.

Aim:- To study what age group is more prone to development of pre-eclampsia in normal pregnancies.

Methodology:- 400 pre-eclamptic women in age group 18-42 years were included in the study. Cases are divided according to different age group.

Result:- Higher incidence of pre-eclampsia was observed in the age group 18-26 years followed by 35-42 years.

Discussion:- Age is found to be related to pre-eclampsia.

Conclusion:- From this study, this can be concluded that age less than 25 years and age greater than 35 years are more prone to development of pre-eclampsia.

Key Words :- *Maternal age, pre-eclampsia, proteinuria, blood pressure.*

Introduction

The glory of attaining motherhood is often associated with shadows of life threatening dangers to the mother and the unborn child, even though pregnancy and childbirth is purely a physiological process.

Pre-eclampsia is one of the complication of pregnancy and contributes significantly maternal as well as perinatal morbidity and mortality[1,2]. This disorder is characterised by involvement of cardiovascular, coagulation, renal and hepatic system[3,4]. This is a life threatening complication of pregnancy and is characterised by high blood pressure and proteinuria[5].

Extensive studies have been made to detect the aetiology and pathogenesis of the condition. But despite decade of research, the aetiology of PIH has remained elusive and no definite and universally accepted conclusion has been reached[6]. During normal pregnancy, renal blood flow and glomerular filtration increases appreciably. With the development of pre-eclampsia renal perfusion and glomerular filtration are reduced, resulting in impairment of renal function. The main characteristic feature of pre-eclampsia i.e. edema, proteinuria and hypertension are due to renal involvement. There occurs renal vasospasm which eventually produce endothelial damage, proteinuria and hypertension[7,8,9].

So considering the mater related to our country an attempt has been made to study the incidence of pre-eclampsia in relation to age of the mother. The purpose of the study is to show the relationship if exists between maternal age and chances of risk of pre-eclampsia to help early detection of pre-eclampsia.

Aim

To study what age group is more prone for the development of pre-eclampsia in normal pregnancies.

Methodology

The present study was a cross sectional study undertaken from 1st August 2017 to 1st August 2019. Cases were collected from the department of Obstetric and Gynaecology, Silchar Medical College and Hospital, Silchar.

400 pre-eclamptic women in the age group 18 – 42 years were included in the study. Cases are divided according to different age group 18-26 years, 27-34 years and 35-42 years.

Criteria for selection of cases – 400 pre-eclamptic women in the age group 18 – 42 years were taken as cases. The pre-eclamptic women were diagnosed in accordance with American College of Obstetric and Gynaecology guidelines.

MILD PRE-ECLAMPSIA – SBP>140mmHg and DBP>90mmHg on two separate readings four hours apart and proteinuria (1+/2+) on dipstick measurement.

SEVERE PRE-ECLAMPSIA – SBP>160mmHg and DBP>110mmHg on two separate readings four hours apart and proteinuria (≥3+) on dipstick measurement.

Exclusion Criteria – Pre-eclamptic patients with history of having hypertension, cardiovascular disease, renal disease, hepatic disease, endocrine or metabolic disorder before the onset of the present pregnancy are excluded from taking as cases.

Result –

Table 1 showing age wise distribution of pregnant women with pre-eclampsia.

Age group in years	Number of pregnant women with pre-eclampsia	% of pregnant women with pre-eclampsia
18-26	188	47
27-34	40	10
35-42	172	43
Total	400	100

The above table showed incidence of pre-eclampsia 47% in age group 18-26 years; 12% in age group 27-34 years; 43% in age group 35-42 years.

Table 2 showing comparison of percentage of cases of pre-eclampsia among age groups 18-26 yrs and 27-34 yrs.

parameter	Age (yrs) 18-26	Age (yrs) 27-34	significance
% of cases of preeclampsia	47%	10%	<0.05

Student's t-test had been applied to assess if there was any significance difference in percentage pre-eclampsia cases in age group 18-26 yrs and 27-34 yrs. It had been observed that significant difference in percentage pre-eclampsia cases in age group 18-26 yrs and 27-34 yrs.

Table 3 showing comparison of percentage of cases of pre-eclampsia among age groups 35-42 yrs and 27-34 yrs.

parameter	Age (yrs) 35-42	Age (yrs) 27-34	significance
% of cases of preeclampsia	43%	10%	<0.05

Student's t-test had been applied to assess if there was any significance difference in percentage pre-eclampsia cases in age group 35-42 yrs and 27-34 yrs. It had been observed that significant difference in percentage pre-eclampsia cases in age group 35-42 yrs and 27-34 yrs.

Table 4 showing comparison of percentage of cases of pre-eclampsia among age groups 12-26 yrs and 35-42 yrs.

parameter	Age (yrs) 18-26	Age (yrs) 35-42	significance
% of cases of preeclampsia	47%	43%	>0.05

Student's t-test had been applied to assess if there was any significance difference in percentage pre-eclampsia cases in age group 18-26 yrs and 35-42 yrs. It had been observed that insignificant difference in percentage pre-eclampsia cases in age group 18-26 yrs and 35-42 yrs.

Discussion

In the present study age is found related to pre-eclampsia. In this study highest incidence of pre-eclampsia is observed in the age group 18-26 years (47%) followed by 35-42 years (43%).

Samuel et al found the highest incidence in the age group 16-27 years [10]. Entman et. al found the highest incidence in the age group 16-25 years [11]. Sheraj et al found pre-eclampsia more frequent with age group less than 21 years and in older age group greater than 35 years [12]. Zibaeenazhad et al reported that young primigravida less than 20 years and all patients above 30 years have an increase chance of hypertension[13]. Kumar et al documented that pregnant women less than 20 years were 3.87 times at risk of developing pre-eclampsia compared to age more than 20 years [14]. Duckill et al also observed teenage pregnancy and pregnancy above 30 years to be one of the risk factor of pre-eclampsia[15]. Sajith et al also reported that highest incidence of pre-eclampsia in the age group 18-22 years (41.3%)[16]. Walker reported that factors influencing the development of pre-eclampsia before 20 years of age may be due to initial tropoblastic invasion and how mother reacts to it. He added that failure of normal invasion tropoblastic cells leads to mal adaptation of spiral arterioles which are related to causation of pre-eclampsia [17]. Duckitt et al reported that increases incidence of pre-eclampsia in women greater than 30 years seems to be due to increases villous reaction [15].

Conclusion

From this study, this can be concluded that maternal age less than 25 years and greater than 35 years are more prone for development of pre-eclampsia.

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Ethical Clearance is not required and funding within the manuscript.

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Cardiovascular Autonomic Functions and Its Association with Oxidative Stress Marker in Heavy Smoking and Smokeless Tobacco Users of Low Socioeconomic Status

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Abstract

Background: Tobacco usage is a major preventable cause for cardiovascular morbidity and mortality. Tobacco is used in both smoking and smokeless forms. Alteration in cardiac autonomic function is a major predisposing factor for cardiovascular risk. There are only limited studies available which assessed autonomic functional status in smokeless tobacco users. This study was aimed to assess and compare the cardiac autonomic activity and oxidative stress in smoking and smokeless tobacco users with controls.

Methods: Sixty seven apparently healthy volunteers from the construction workers of low socioeconomic status were recruited. Those who are having habit of using tobacco in any form (n=42) were categorized into smoking tobacco group (n = 22) based on the smoking index and fagerstrom score for smokeless tobacco group (n = 20). Those who never used tobacco in any form were included as control group (n= 25). Cardiovascular autonomic function tests were performed and serum malondialdehyde was measured from venous blood sample.

Conclusion: In this study we found that there is definite alteration in cardiac autonomic function which is in correlation with the level of oxidative stress in heavy tobacco users. This alteration is seen more in heavy smokeless tobacco users in compare with smoking tobacco users.

Key words: *Cardiovascular autonomic functions, smokeless tobacco, malondialdehyde*

Introduction

Tobacco usage is a major preventable cause for morbidity and mortality. The Health Ministry has estimated that 40% of India's health problems are because of tobacco use and 0.9 million people die per year from the tobacco related diseases in India[1]. Heavy smoking is the commonest cause for ischemic heart diseases which leads to death in the early age of 30-40 years those who are usually to be free from other myocardial risk factors.

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World Health Organization report on global status (2010) says that smoking causes an estimated 71% of all lung cancer deaths, 42% of chronic respiratory diseases and nearly 10% of cardiovascular diseases[2]. Smokeless tobacco causes oral cancer, hypertension, heart diseases and other conditions. Expected deaths due to tobacco use in the year 2030 are around 8 million[3]. Smoking tobacco includes Cigarettes, Beedi, and Cigar etc. Tobacco can be used in the other forms such as smokeless tobacco which includes Khaini, Gutkha, Pan masala, Moist snuff etc. Prevalence of the smokeless tobacco use is 26% when compared with smoking tobacco is 14% among adults in India as reported by the Global adult tobacco survey report India[4]. The intensity of tobacco using is associated with the degree of alteration in cardiac autonomic function[5]. However in literature, data on the comparison of autonomic functional status between the

heavy tobacco smoking and smokeless tobacco users and its association with oxidative stress is lacking. Therefore, this study was designed to assess the impact of heavy tobacco smoking and smokeless tobacco on cardiac autonomic function and its association with oxidative stress among heavy tobacco smoking and smokeless tobacco users.

Materials and Methods

This was a cross-sectional study conducted in the department of Physiology of tertiary care teaching hospital in India. After obtaining approval of the Post-graduation Research Monitoring Committee and Institute Human Ethics Committee, Sixty seven apparently healthy volunteers from the construction workers between 20-40years were recruited. The sample size was estimated with expected difference of 6 at 5% level of significance of autonomic function tests and 90% power using Open Epi software (Version 2.3.1), in which sample size was calculated to be 67. An informed written consent was obtained from all the participants prior to the commencement of the study. The subjects were chosen with the help of smoking index for the smoking tobacco users and Fagerstrom scoring for smokeless tobacco users. The smoking index was calculated by multiplying the average number of cigarettes which was smoked per day and the duration of the smoking in years[6]. The number of cigarettes meant the average number of cigarettes which was smoked per day in the past seven days. Score >201 were included as study group 1. The Fagerström Test for Nicotine Dependence-Smokeless Tobacco (FTND-ST) score was obtained with the questionnaire[7] of FTND-ST, score > 6 were included as study group 2. Modified Kuppuswamy socioeconomic status scale 2012 was used to assess the socioeconomic status of all the participants in the study[8]. In this study, we included construction workers of low socioeconomic status. So subjects were divided into three groups;

Control group: Males with age of 20-40 years, who never used tobacco in any form.

Study group1: Males with the age of 20-40 years who are heavy tobacco smokers

(Smoking Index >201)

Study group 2: Males with the age of 20-40 years who are heavy smokeless tobacco users

(Fagerström Test for Nicotine Dependence-Smokeless Tobacco (FTND-ST) score > 6)

The subjects were asked to report to the autonomic function testing laboratory of physiology department and were advised to have little breakfast and wear loose fitting clothes. The subjects were told to refrain from medications known to influence cardiovascular system viz anticholinergics, anti-histaminics, over the counter cough and cold medications, diuretics, sympathomimetics and parasympathomimetic agents for 48 hours prior to the study. Subjects were advised to discontinue short acting α and β antagonists 24 hours before and long-acting antagonists 48 hours before the test. In case of any adversity in the health of the subjects resulting in poor overnight sleep quality, or any prodromal symptoms of fever and body pain, the test was postponed. The subjects were advised to come after evacuation of bowels and emptying of bladder.

We have recorded height in standing posture with barefoot, using a wall-mounted stadiometer (Easy Care, V.M. Electronics Hardware Ltd.). Weight was measured with a spring balance to the nearest half a kilogram avoiding zero and parallax errors.Body mass index (BMI)was computed by using formula Quetelet's index = Weight (Kg) / $(\text{Height})^2$ (m).

After 10 min of supine rest, blood pressure (BP) was recorded by oscillometric method using automated BP monitor Omron MX3 (Omron Healthcare Co. Ltd, Kyoto, Japan). This method uses an electronic pressure sensor that reads and evaluates oscillation of the arteries based on the blood flow. Cuff size of Omron automated sphygmomanometer was 121 mm (width) × 446 mm (length). The cuff was tied about 2 cm above the cubital fossa and fitted snugly with the arm, approximately at the level of the heart. For each subject, systolic BP (SBP), diastolic BP (DBP) and basal heart rate (BHR) were recorded in the left arm twice with an interval of five minutes between the recordings. For each of these parameters, the average of the two data was considered as the final recording.

Cardiac autonomic function tests - Procedure:

HR response to standing

After ten minutes of supine rest (from the basal recording measurements), second recording of lead II Electrocardogram (ECG) was started, and the subjects were asked to stand after 30 seconds with a due marking on the graph. The postural change was obtained within 3 seconds. HR were serially measured for next 5 minutes of stand i.e, immediate, first, second, third, fourth and fifth minute and allowed to rest for 3 min to achieve baseline HR values. RR tachogram from the ECG recording was retrieved and copied to a Microsoft Excel worksheet. A graphical representation (line diagram) of the RR tachogram was used to identify the minimum and maximum RR interval after standing. Shortest R-R interval at or around the 15th beat and the longest R-R interval at or around the 30th beat was calculated and thereby 30:15 ratio was computed.

HR response to deep breathing

Deep breathing was performed at the rate of 6 breaths per minute with inspiratory and expiratory cycles for 5 seconds each. During the 3 minutes of rest period after standing, deep breathing synchronized to a voice metronome and if necessary guided by hand movement was demonstrated to the subjects. The subjects performed deep breathing for the next one minute with continuous lead II ECG recording. Subjects were encouraged to perform deep and maximal respiration. A period of 3 min rest was given after the maneuver for the HR and BP to return to basal state. RR tachogram from the corresponding ECG recording was retrieved and transformed graphically into a line diagram on a Microsoft excel worksheet. The maximum and minimum RR interval averaged over 6 cycles of expiration and inspiration was calculated and the ratio was computed as E: I ratio.

BP response to sustained isometric handgrip

Initially the maximal voluntary contraction (MVC) during sustained isometric handgrip by the subjects was measured using handgrip dynamometer (Inco, Ambala). Then the subjects were instructed regarding sustaining the handgrip at one third of their MVC. The ECG recordings were started and at the fifteenth second subjects were instructed to perform one third of their MVC for 3 minutes. The maximum diastolic blood pressure (DBP) attained during the maneuver was noted. The difference between this highest DBP recorded during sustained handgrip and baseline supine DBP was noted as the pressor response to the test. After the procedure BP and HR were measured after 2 min to confirm if they have returned to basal levels. The magnitude of DBP rise during the maneuver (ΔDBP) was calculated as the difference between the maximum DBP attained during the handgrip and the supine basal values.

Statistical Analysis

The data was analyzed by using IBM-SPSS version 20 software. The data is expressed in mean ± SD. After normality testing, one-way analysis of variance (ANOVA) was performed to compare the parameters between the groups Post doc test was performed by using Bonferroni. The p value < 0.05 was considered as significant.

Results

There was no significant difference in age ($p=0.560$), body weight ($p=0.138$), and BMI ($p=0.569$) between the study groups (Table 1). The basal heart rate was significantly increaed in the smokeless tobacco group (73.48 ± 11.87/min) as compared to controls (66.72 ± 9.21/min) (Table 1). Among the cardiovascular autonomic function tests, E: I ratio was reduced in both smokeless and smoking tobacco users when compared to controls ($p=0.039$). Diastolic blood pressure difference (D DBP) in isometric handgrip test was increased in both smokeless and smoking tobacco users when compared to controls ($p=0.003$). Also, 30:15 ratio in heart rate response to standing was increased in both smokeless ($p=0.498$) and smoking tobacco users when compared to controls (Table 2).

Table 1: Comparison of age, anthropometric parameters, heart rate, blood pressure parameters and Socioeconomic status (SES) between controls, smoking tobacco and smokeless tobacco groups.

Parameter	Control Group (n=25)	Smoking Tobacco Group (n=22)	Smokeless Tobacco Group (n=20)	p value
Age	26.1 ± 6.11	28.10 ± 7.13	27.10 ± 8.15	0.560
Body weight (kg)	69.25 ± 10.65	65 ± 12.09	63.45 ± 11.93	0.138
BMI (Kg/m2)	24.13 ± 3.47	23.21 ± 3.37	22.98 ± 3.92	0.569
HR (bpm)	66.72 ± 9.21	66.83 ± 11.53	73.48 ± 11.87*#	0.042
SBP (mmHg)	118.15 ± 10.02	124.61 ± 16.04	126.32 ± 13.08	0.131
DBP (mmHg)	72.3 ± 8.81	74.79 ± 10.31	78.5 ± 11.65	0.170
SES				
Upper (I)	-	-	-	-
Upper Middle (II)	-	-	-	-
Middle/Lower Middle (III)	-	-	-	-
Lower/Upper Lower (IV)	35	45	40	0.339
Lower (V)	65	55	60	0.458

Values expressed as mean ± SD and percentages (%); Analysis was done by one-way ANOVA. BMI-Body Mass Index, HR: Heart rate, SBP: Systolic blood pressure, DBP: Diastolic blood pressure; MAP: Mean arterial pressure, RPP: Rate pressure product, SES-Socioeconomic status. The P values less than 0.05 were considered statistically significant.

#Comparison between controls and smokeless tobacco group, * $P < 0.05$, ** $P < 0.01$

+ Comparison between controls and smoking tobacco group * $P < 0.05$, ** $P < 0.01$

Table 2: Comparison of cardiovascular autonomic function testing parameters, MDA between controls, smoking tobacco and smokeless tobacco groups

Parameter	Control Group (n=25)	Smoking Tobacco Group (n=22)	Smokeless Tobacco Group (n=20)	p value
30:15 ratio	1.38 ± 0.23	1.45 ± 0.23	1.55 ± 0.71	0.498
E:I ratio	1.74 ± 0.88	1.39 ± 0.35	1.22 ± 0.61*#	0.039
D DBP (IHG)	14.70 ± 6.47	17.60 ± 6.26	19.60 ± 8.76**#	0.003
Serum MDA	2.51 ± 1.10	2.69 ± 1.09	3.68 ± 1.93*#	0.026

Values expressed as mean ± SD; Analysis done by One Way ANOVA. The P values less than 0.05 were considered statistically significant. 30:15 ratio: Ratio between maximum RR interval at 30th beat and minimum RR interval at 15th beat

E:I ratio: ratio of longest RR interval during expiration to the shortest RR interval during inspiration averaged over 6 cycles of respiration, Δ DBP: difference in diastolic blood pressure between supine and Isometric hand grip.

+ Comparison between controls and smoking tobacco group, ** P < 0.01. # Comparison between controls and smokeless tobacco group, * P < 0.05, ** P < 0.01

Discussion

Since there are no studies till date comparison of cardiovascular autonomic function in smokeless tobacco and smoking tobacco in young adults, our study has been the first in this untrodden path. Tobacco usage in any forms which resulting in cardiovascular diseases like increase in blood pressure, stroke, and myocardial infarctions. In this present study we had used smokeless tobacco tobacco with score more than 6 in the Fagerstrom Nicotine Dependence Score and heavy smoking tobacco users based on the Smoking Index more than 200. The study participants in this study were in the productive life and young at age. There was no significant change in BMI but we noticed a trend in decreasing in BMI in smokeless tobacco group with controls (Table 1). Literatures suggested that nicotine suppresses the hunger feeling which resulting in decrease of the food intake and therefore decrease in body weight[9]. Study participants belong to the construction workers who need a lot of energy to do their work and should have regular intake of food. Irregularities of food intake may affect the quality of life as decreasing in the productivity at work. This present study showed that significant changes were found in the parasympathetic and sympathetic autonomic function tests in the smokeless tobacco and smoking tobacco respectively when compared to control.

In the present study, the basal heart rate found highly significant in the smokeless tobacco group (73.48 ± 11.87/min) as compared to controls (66.72 ± 9.21/ min) (Table 1). The resting heart rate is considered to be a good indicator for overall cardiac health as heart rate is governed by the parasympathetic activity. Literature suggested that increased HR was a marker of the cardiovascular risk and placed a high burden of disability and mortality[10].

This study reveals that decrease in E:I ratio was observed in the smoking group (1.39 ± 0.35) and smokeless tobacco group (1.22 ± 0.61) when compared with controls (1.74 ± 0.88) as shows decreased vagal reactivity, as E:I ratio represents parasympathetic reactivity.

In Isometric sustained handgrip test, we measured the rise in the DBP, just before the release of the hand grip dynamometer. In the present study, it was noted that the rise in the DBP was significant rise in smoking group (19.60 ± 6.26 mm Hg) and significant reduction in smokeless tobacco group (11.60 ± 8.76 mm of Hg) in comparison with the controls (14.70 ± 6.47 mm of Hg). This suggesting increase in sympathetic activity in smoking tobacco group and decrease in sympathetic activity in smokeless tobacco group respectively, reveals that decrease sympathetic reactivity.

It is essential that risk factors associated with heavy and prolong usage of tobacco in any form smoking or smokeless causes the cardiovascular autonomic alterations and sympathovagal imbalance to be detected. To educate and create awareness to public not to use tobacco in any form and inform them the adverse effects and complications of post usage of tobacco, at an early stage to reduce morbidity and mortality. These individuals can be advised to follow to improve quality of life.

In this study, the baseline activities of the para-sympathetic and the sympathetic systems were studied, excluding the acute effects of smoking. Study can be extended with large number of samples to establish best results and we did not measure the plasma nicotine, or epinephrine levels and we also did not correlate them with the autonomic changes.

Conclusion

Our study findings are suggested that there is definite alteration in cardiac autonomic function which is in correlation with the level of oxidative stress in

heavy tobacco users. In this study we observed that the autonomic changes such as increased sympathetic activation and more vagal withdrawal in both the tobacco users group compared to their apparently healthy counterparts. Also, we might conclude that there is degree of autonomic imbalance and cardiovascular risk is comparatively higher in smokeless tobacco compared to tobacco smokers. Considering public health, tobacco control program should make more vigorous efforts to generate awareness and prevent the incidence of cardiovascular morbidity and mortality in tobacco users.

Conflicts of Interest: The authors declare that there is no conflict of interest and no competing financial interests exist.

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Effect of Caffeine on Multi-domain Neurocognitive Abilities in Occasional Coffee Consumers

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Abstract

Background: Multi-domain neurocognitive abilities underpin timely perception & appropriate action to unexpected threats in the dynamic environment. Hence enhancement of the same may be life-saving in some situations. Caffeine is the most widely consumed CNS stimulant which not only enhances neurocognitive abilities but also temporarily counteracts neurocognitive deficits. Therefore this study has been undertaken to quantify the effect of Caffeine on Multi-domain neurocognitive skills.

Aim: To find out the effect of Caffeine on neurocognitive abilities in occasional coffee consumers

Materials & Methods: This study was conducted on 23 participants. In all the subjects under basal conditions, a battery of multi-domain neurocognitive tests, which included ART, VRT, CFFF, Digits forward tests were conducted. Then a standard dose of 2.2grams of instant coffee powder (Nestle – 69.6mg of Caffeine) dissolved in 100 ml of milk was given. After 30 minutes of intake, the same battery of tests was repeated, and the test results were analyzed.

Results: In our study, we have found that Caffeine significantly increases CFFF ($p<0.001$), Digits forward test score ($p<0.001$) and decreases VRT ($p=0.03$). It also reduces ART, but it is not statistically significant. ($p=0.06$).

Conclusion: Caffeine significantly improves Critical flicker fusion frequency, attention span, performance and reduces reaction time.

Keywords: *Caffeine, Auditory Reaction Time, Visual Reaction Time, Critical Flicker Fusion Frequency, Digits forward test.*

Introduction

The mission of National safety council is to eliminate preventable deaths at work, in homes, communities and on roads through Leadership, Research, Education and Advocacy. Drowsiness, inattention & impaired neurocognitive abilities are among the public safety hazards which risks a person's as well as public life. Impaired neurocognitive skills are not only dangerous at home, but also the workplace and on-road. At the workplace, safety performance decreases as employees become tired; 62 % of night-shift workers complain about sleep loss.Fatigued worker productivity costs employers $1,200 to $3,100 per employee annually. Employees on rotating shifts are particularly vulnerable because they cannot adapt their "body clocks" to an alternative sleep pattern[1]. Coming to road safety, National Highway Traffic Safety Administration estimates, drowsy driving was responsible for 72000 crashes 44,000 injuries, and 800 deaths in 2013[2]. However, these numbers are underestimated, and up to 6000 fatal crashes, each year may be caused by drowsy drivers. Cognition reflects the processes by which sensory input is transformed, reduced, elaborated, stored, recovered & used. The domains of cognition include attention, executive function, memory, visuospatial function and language[3]. These multi-domain neurocognitive abilities underpin timely perception & appropriate reaction to unexpected threats in the dynamic environment. Hence

enhancement of the same may be life-saving in some situations. Caffeine because of itspsychostimulant properties, easy availability, legal and social acceptance, low toxicity and abuse potential may be considered for enhancement of multi-domain neurocognitive abilities[4]. Hence this project has been undertaken to study the effect of caffeine on Multifield neurocognitive abilities in Occasional Coffee consumers.

Materials & Methods

Study population: It is a quasi-experimental [Interventional] study, conducted on 23 subjects, out of which eight subjects were females, and 15 were males. The subjects who have acquaintance to the investigators were recruited using a non-randomized sampling technique. The subjects were inquired about the history of medical illness,their lifestyle andbehaviour. Following anthropometric measurements, they were subjected to a battery of Neurocognitive function tests, which includes:

Auditory Reaction time & Visual Reaction time:

Auditory Reaction time & Visual Reaction time were recorded using an in house built device called PC1000. It is described as 1000Hzsquare wave generator & Module A & B with which we start and stop the oscillator. Module A has Start button & Module B has a stop button.Auditory Reaction Time, Subject is instructed to press the stop button in module B when he hears a tone of 1000 Hz in headphones. The number of oscillations produced in this period recorded and reported as the Auditory Reaction Time with an accuracy of 1 msec. For determining Visual Reaction Time, the same device had been used, and the only difference is the subject is provided with a visual stimulus, a red colour light which is 5 mm in size (LED– Light Emitting Diode).In module A when the start button is pressed, the red light glow in module B, for which the subject is instructed to press the Stop button in module B. The numberOf Oscillations produced by the oscillator in this period is recorded as the Visual Reaction Time with an accuracy of 1 msec[5,6].

Critical Flicker Fusion Frequency:

CFFF was measured using an in house built device which can produce a Red light-emitting diode of 5mm size at frequencies in the range of 10 Hz to 60 Hz (Square wave) with the help of a software called as “Sweepgen”. The participants sit in front of the module at a distance of 25 – 30 cm in a less illuminatedroom. The Red light is made to flicker at a low frequency of 10 Hz. The subject is instructed to prompt when the flickering stops. In the next step, frequency is increased gradually at a rate of 1 Hz at a time. The frequency at which the subject is no longer able to discriminate individual flickers and perceives it as asingle stimulus is reported as CFFF[7,8].

Digits forward test:

In psychology and neuroscience, memory span is the most extended list of items that a person can repeat back in correct order immediately after presentation,i.e., it is a measure of working memory. In Digits span test, a series of random numbers in the ascending order from 1 to 10 are told to the subject and each time he is asked to repeat the set of numbers in the correct order. Digit Span tests your ability to remember a sequence of numbers that are told, one at a time, in the same order. If you correctly recall all of the numbers, then the next serieswas one number longer. If you make a mistake, then the following sequence was one number shorter. the test ends after three mistakes,. In this test accuracy does matter; after three errors, the trial ends. However, wrong answers do not subtract from thescore of the subject, which is the maximum number of digits that are correctly repeated.

Intervention:

Standardization of coffee: According to USDA (United States Department of Agriculture) 1.8 grams of Nestle Instant coffee powder comprises of 57 mg of caffeine. Therefore the regular 2.2 grams of Nestle coffee powder sachets consists of 69.66mg of caffeine. So in our study, we have used 2.2 grams of Nestle coffee powder of same batch comprising of 69.66mg of caffeine dissolved in 100 ml of milk to study effects of caffeine on multi-domain neurocognitive abilities[9].

After conducting the above mentioned multi-domain neurocognitive teststo each subject, a standard dose of 2.2grams of instant coffee powder of same batch (Nestle – 69.6mg of caffeine) dissolved in 100 ml of milk was given. After 30 minutes of intake, the same battery of tests was repeated, and the test results were analyzed& the effect of caffeine on temporalcognition was studied and quantified.

Statistical Analysis

The data was analyzed by using Graph pad prism (Trail version). The information was expressed as the Mean ± standard deviation. The data were subjected to find outnormal Gaussian distribution using the Kolmogorov – Smirnov test. As the data sets were skewed, Non-parametric test (Man Whitney - U test) was performed to find out the differences between before and after the intervention. The correlation coefficient (r) was analyzed using the Spearman correlation to determine associations. A p-value < 0.05 was considered as statistical significant.

Results

The demographic features of the subjects were shown in table – 1. The mean age of the participantswas29.19 ±7.62 years with Confidence Interval (26.11 – 32.27 years). The mean height and weights were 157.8 ±12.77cm and 62.23 ±11.56 kg, respectively. The BMI was calculated using the conventional formula, and the mean BMI was 25 ±4.1 kg/m^2. The effect of caffeine was analyzed with an interval of 30 min. The different neurocognitive parameters were measured using simple reaction times and Critical flicker Fusion Frequency,which were shown in Table no – 2. We have observed a statisticallysignificant difference before and after intervention with caffeine in CFFF (p-0.001), VRT(p-0.05) and DigitS forward test (p-0.001). There was no statistical significance associated withART(p-value - 0.06). However, there was a trend showing a decline in ART on intervention with caffeine.

Table1: Shows Demographic features

Demographic features	Mean± SD	Median	95% CI
Age (yrs)	29.19 ±7.62	23.75	26.11 – 32.27
Weight (kg)	62.23 ±11.56	60	57.56 – 66.9
Height (cm)	157.8 ±12.77	159	152.7 - 163
BMI (kg/m2)	25 ±4.1	24.05	23.35 – 26.67

Table 2 Shows Multi domain neuro cognitive parameters before and after intervention with caffeine

Neurocognitive tests	Before	After	P value
ART	148.4 ±25.05	139.5± 25.53	0.06
VRT	197.7 ±30.4	180.2± 25.05	<0.05
CFFF	41.58 ±3.7	43.27± 3	<0.001***
DFT	7.11 ±2	7.82± 2.1	<0.001***

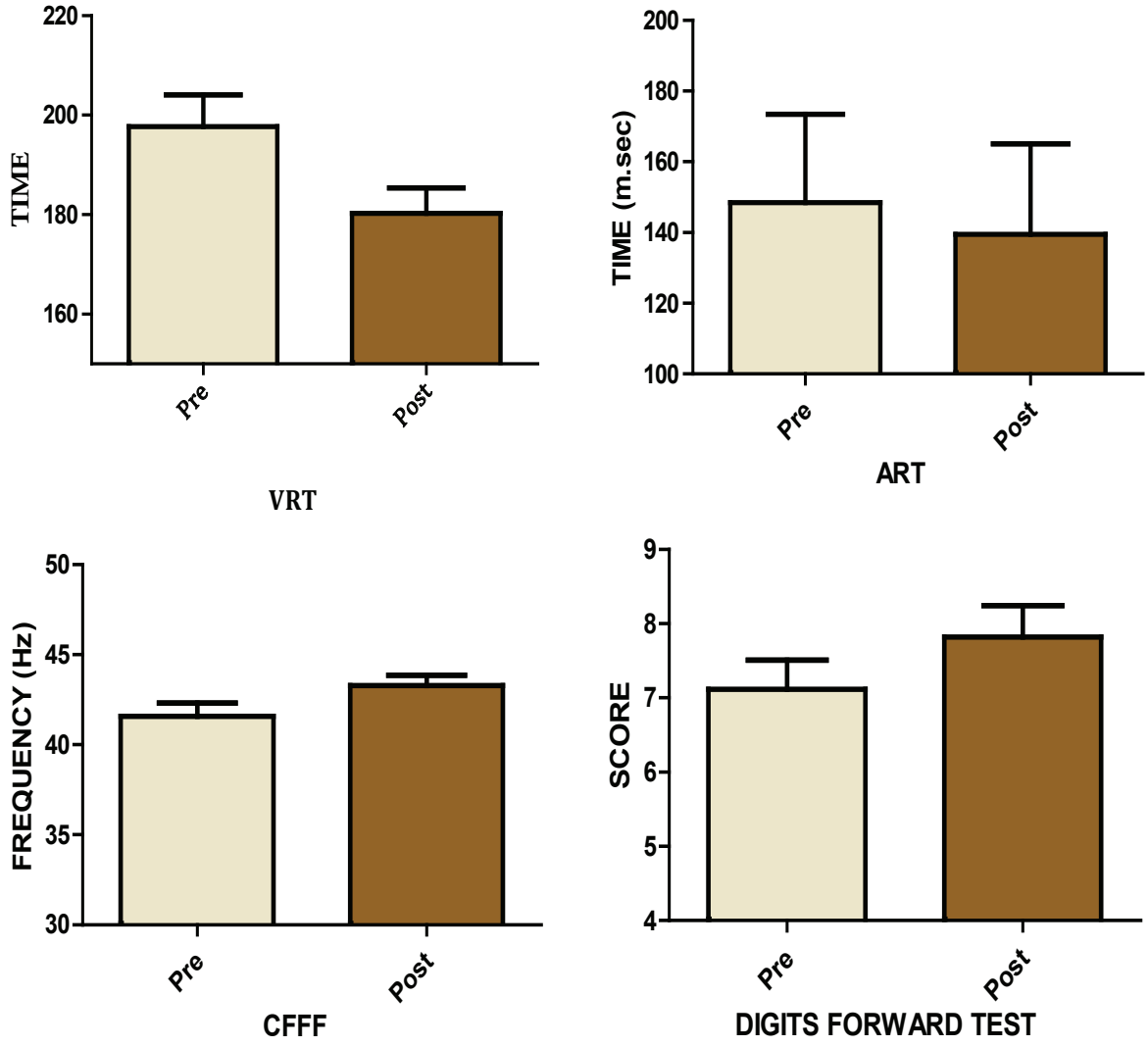

Figure1 shows the differences of multi domain neuro cognitive parameters before and after caffeine intervention

Discussion

Natural and humanmade disasters can strike anywhere and at any time.So it is essential to have a planned response at home, at work and on-road. Inattentiveness &inability to predict the hazards sometimes costs life at home. At the workplace, the National Safety Council says that Safety performance decreases as employees become tired.62% of night-shift workers complain about sleep loss.Fatigued worker productivity costs employers $1,200 to $3,100 per employee annually.Employees on rotating shifts are particularly vulnerable because they cannot adapt their "body clocks" to an alternative sleep pattern[1]. Similarly, on-road, a drowsy driver is three times more likely to be in a car crash. Driver's Reaction times, awareness of hazards and ability to sustain attention all worsen when the driver is drowsy. Inattentiveness & inability to predict the risks sometimes costs life even at home. Toprevent these mishaps, National Safety Council has suggested some interventions to avoid drowsy driving, i.e., Crash avoidance technologies, University interventions, promoting 7hours of sleep each night, Medication labels for drugs causing drowsiness, Health programmers for employees regarding the importance of sufficient sleep.Our study adds a readily available, economically

affordable, socially acceptable intervention to the list to drive away drowsiness and fatigue[17]. Alertness & arousal are maintained by Ascending Reticular Activating System.These projections fire in a characteristic pattern to promote arousal. However, every 24 hours, during a sleep arousal system is inhibited by sleep-active γ-aminobutyric acid (GABA)-ergic and galaninergic neurons of the ventrolateralpreoptic nucleus (VLPO). The interaction between the VLPO and the branches of the ascending arousal pathway is mutually inhibiting, functioning much like an electrical «on-off» switch, enabling the body to maintain a stable state of wakefulness and sleep. When the brain does not get enough sleep ATP is co-released with neurotransmitters. Adenosine is the secondary bye product ofATP. During prolonged alertness, physical and mental fatigue, the extracellular concentration of Adenosine increasesin the Cortex and Basal forebrain. Adenosine exerts it» s somnergic effects by binding to it» s receptors—i.e., A1, A2A. The underlying mechanisms for the sleep-inducing effects of Adenosine are 1. Slowing down the neuronal activity 2. Dilatation of blood vessels supplying the brain to let more Oxygen into that organ during sleep. Caffeine, the world's most widely consumed psychoactive drug & central nervous system (CNS) stimulant of the methylxanthine class[16]. Caffeine binds to Adenosine receptors, i.e., A_1, $A_{2A\ in}$ the central nervous system (CNS) and inhibits Adenosine from binding. Thus hindering the Adenosine mediateddownregulation of CNS activity and by promoting central dopamine &noradrenaline transmission[11].

In a study conducted by, Usha G. Shenoy et al., "The Influence of Caffeine on the Visual and Auditory Reaction Time in Medical Students "the authors concluded that Visual reaction time & Auditory reaction time were significantly reduced after the consumption of caffeine ($p<0.05$). Therefore caffeine is a potent stimulant of the Central nervous system. In our study, we have found that though caffeine reduces both Auditory as well as Visual reaction time the reduction in the visual reaction time is found to be statistically significant ($p= 0.03$) The three main mechanisms involved in the decrease in reaction time by Caffeine are:1[10]. It improves physical performance and mental alertness due to the neurohormonal influence of caffeine which helps in mobilization of the intracellular calcium, and it inhibits an enzyme called phosphodiesterase, which breaks cAMP and increases cellular activity resulting in generalized stimulation. The only likely mechanism of action of methylxanthine is antagonism at the level of adenosine receptors. Caffeine increases metabolism throughout the brain but at the same time decreases the blood flow, including relative brain hypoperfusion. In a study conducted by GromeJJ et al. it has been concluded that caffeine increases local cerebral glucose utilization and decreases regional cerebral blood flow.Therefore it resets the ratio of cerebral blood flow Glucose utilization at a lower level. Besides,It activates noradrenaline neurons and seems to increase the local release of dopamine[14,15].

CFFF is one of the best means to measure cortical arousal. It is defined as the frequency at which an intermittent light stimulus appears to be entirely steady for the average human observer. Owen GN et al. stated that caffeine improvises the Cognitive performance demanding tasks associated with rapid visual information processing, critical flicker fusion threshold, attention switching and mood. Quantitatively caffeine improved subjective alertness at 60 min and accuracy on the attention-switching task at 90 min period of post Coffee consumption[12].

Digits forward test is a measure of working memory, i.e., short term auditory memory. In a study conducted by Stephanie M. Sherman, Timothy P. Buckley, ElsaBaena et al. stated "Caffeine Enhances Memory Performance in Young Adults during their Non-optimal Time of Day[13]. Theauthors of the same study have concluded thatcaffeine has a specific benefit for memory during student's non-optimal time of day – early morning. The current research also shows a statistically significant increase in the score was noted on Digits forward test. Koppelsletter et al.studied about a dozen healthy adults and reported that caffeine boosts activity in the brain regions related to attention and short-term memory. There are recent advanced techniques to quantify the temporal cognition which are user friendly and cost effective[18,19,20].

Limitations: The current study has a few limitations. The results of the present study cannot be generalized to the population because of the lesser sample size and recruitment of subjects by convenient sampling technique. The long term effects of caffeine were not

studied.The cognition is a large domain which cannot be attributed by assessing choice and exact reaction times alone.We are planning to extend our study design with more sample size and subjects will be followed up to find out thelong term effects of caffeine on multi-domain neurocognitive abilities.

Conclusion

From the study entitled "Effect of Caffeine on Multi-domain neurocognitive abilities" it has been concluded that intervention with caffeine significantly improves Critical flicker fusion frequency, attention span, performance and reduces Simple reaction times like Visual & Auditory reaction times.

Implications: The current study provides newer insights for reliable, practicable, safer andinstantaneous intervention to drive away drowsiness. It also reduces reaction time and improves the ability to sustain attention, to eliminate preventable deaths in homes, on roads and at workplaces.

Ethical Considerations: The study was reviewed and approved by the Institutional Ethics Committee of Host institution.

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Conflict of Interest: On behalf of all the authors, corresponding authors states that there is no potential conflict of interest to publish this article.

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Perinatal Psychiatry in Context to Women 'S Health

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Abstract

Introduction: Women's Mental Health Traditionally focuses on women's reproductive health,like Puberty, Pregnancy, Menopause now it is expanding to include disorders and conditions more prevalent in females than in males, or different in clinical features and risk factors. Perinatal Psychiatry refers to mental health issues in antenatal and postpartum period like Antenatal depression, Postnatal blues, Postpartum depression, Postpartum psychosis.

Methods: The global burden of psychiatric disorders in women is increasing, especially in the perinatal period. We have focused on discussing the impact of culture on the perinatal psychiatric disorders and management principles of different perinatal psychiatric disorders. Health-care delivery in the perinatal group of population has been improving over the years, but still there is lot to improve.

Conclusion: A scientific and evidence-based approach is a definite need toward attaining this goal.

***Key Words**: Perinatal Psychiatry; post partum blue; postpartum psychosis; post partum depression; Mental health.*

Introduction

Perinatal Mental Health

Women's Mental Health Traditionally focuses on women's reproductive health, eg: Puberty, Pregnancy, Menopause now it is Expanding to include disorders and conditions more prevalent in females than in males, or different in clinical features and risk factors. Perinatal mental health has become a significant focus of interest in recent years.

Psychiatric disorders in India contribute to about 11.6% of the global burden of disease (GBD) (WHO, 2008) and have the highest number of suicides in the world. The lifetime prevalence of any form of mental illness in Indian population is 13.7%.[1] The GBD of mental disorders among women aged between 15 and 44 years is 7%.[2] In Indian women and teenage girls aged 15–19 years, suicide has surpassed maternal mortality as the leading cause of death.[3]Despite an increase in the age of marriage, 61% of all women (69% in rural regions and 31% in urban areas) are married before the age of 16 and the median age at first pregnancy is 19.2 years.[4,5] As evident from the statistics, this particular age group as such is vulnerable to mental morbidity which becomes more problematic when combined with the phenomenon of pregnancy. Hence, mental health of perinatal women is the need of the hour.

Culture, and Perinatal Mental Health

Gender is a critical determinant of mental health and mental illness. In the Indian culture, several factors determine the mental health of women like joint family system, patriarchy, marriage a must, preference for the male child, practice of dowry, , strict code of conduct for females, lower educational status of women and primary

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roles of women being childbearing and child-rearing.[6,7] In India, events related to pregnancy are perceived as "normal phenomena" and usually medical help is sought at times of emergencies or crisis,[8] thus leaving minimal role for preventive measures. Sometimes, adversities are believed to be a part of pregnancy, wherein a fatalistic attitude of any sort of medical help would yield no beneficial changes, is common.[9]Any ill health is less explained on the lines of modern medicine and more in terms of religious faiths and curses or fate.[8]

Cultural attitudes and stigma significantly affect the mental health of the mother. Rituals are usually a routine phenomenon wherein special diets, massage, warm environment, and traditional healing foods are offered to the mother and many times the extended family members are given the responsibility of taking care of the infant. Modern medicine practices appear to be out of the norm and considered to be non-Indian, which cause conflicts between the mother and her extended family and may hinder the social support. However, gradually, modern medicine has been adopted by educated people.[10] According to Hema et al., 2008, in India, incorporation of postpartum depression (PPD) into maternal child health services has been a new initiative overcoming the various cultural issues and stigma associated with the treatment.[11]

Post partum psychiatric disorder

Postpartum period is demanding period characterized by over whelming biological, physical, social, and emotional changes. It requires significant personal and interpersonal adaptation, especially in case of primigravida. Many females experience a wide range of overwhelming emotions such as anticipation, excitement, happiness, fulfilment, as well as anxiety, frustration, confusion, or sadness/guilt during pregnancy and postpartum period. The postpartum period makes them highly vulnerable to various psychiatric disorders. Traditionally postpartum psychiatric disorders are classified as maternity blues, puerperal psychosis, and postnatal depression. Postpartum psychiatric disorders can adversely affect mother-infant interaction and attachment. Hence, early diagnosis and management of the postpartum psychiatric disorder is extremely crucial.[12]

Postpartum blues(PB)

PBs, also known as "baby blues" or "maternity blues," is a phase of emotional lability following childbirth. Most of these women report symptoms consistent with "baby blues," a transient mood disturbance characterized by mood !ability, sadness, dysphoria, subjective confusion, and tearfulness. The symptoms arise within the first 10 days and peak around 3–5 days. Generally symptoms of PB do not interfere with the social and occupational functioning of women. PBs persisting for more than 2 weeks may make women vulnerable to a more severe form of mood disorders[12].

Postpartum depression

As per Rai et al.,[13] about 10%–15% of postpartum women have PPD, making it the most common disorder in postpartum women. PPD can occur during pregnancy or within the first 12 months following delivery.PPD is generally difficult to distinguish from depression occurring at any other time in a women's life. In PPD the negative thoughts are mainly related to the newborn. It is seen in 10–15% of postpartum women and, in addition to postpartum time specifier, the diagnostic criteria is difficult to differentiate from that of major depressive episode characterized by pervasive depressed mood, disturbances of sleep and appetite, low energy, anxiety, and suicidal ideation. Additionally feelings of guilt or inadequacy about the new mother's ability to care for the infant, and a preoccupation with the infant's well-being or safety severe enough to be considered obsessional.

Postpartum psychosis(PP)

Postpartum psychosis (sometimes called puerperal psychosis) is an example of a psychotic disorder that occurs in women who have recently delivered a baby. Acute and abrupt onset, usually observed within the first 2 weeks following delivery or, at most, within 3 months postpartum, and should be regarded as a psychiatric and obstetrical emergency The syndrome is often characterized by the mother's depression, delusions, and thoughts of harming either herself or her infant. Such ideation of suicide or infanticide must be carefully monitor. At times, delusions revolves around the infant, especially that the infant is possessed, has special powers, is divine, or is dead. Infanticide and suicide are observed in 4% and 5% of the women suffering

from PP respectively. Enquiring about suicidal and infanticidal thoughts is crucial during the assessment of women suffering from PP. Past history of psychosis with previous pregnancies, history of bipolar disorder, family history of psychotic illness (e.g., schizophrenia or bipolar disorder) are some of the major risk factors for the development of PP. although rare, some mothers have acted on these ideas. The symptoms of postpartum psychosis can often begin within days of the delivery, although the mean time to onset is within 2 to 3 weeks and almost always within 8 weeks of delivery[12].

Bipolar disorder

Bipolar disorder is a major risk factor for PP. The women are at a high risk for relapse during and after pregnancy, being about 3 times more compared to non pregnant women who are not on mood stabilizers and being euthymic at the time of conception. The majority of episodes were depressive or dysphoric and seen during the first trimester. Perinatal bipolar disorder diagnosis takes a back step when any patient presents with depression, which is further complicated by insomnia, poor mother–infant interaction, and obsessions regarding the baby, delusions, suicide, etc.[12]

Postpartum posttraumatic stress disorder

Many studies have shown the incidence of postpartum PTSD to be around 5.6%. It is generally characterized by tension, nightmares, flashbacks and autonomic hyper arousal that can continue for some weeks or months, and may recur toward the end of the next pregnancy. This can also result in secondary tocophobia.[12]

Anxiety disorders specific to the puerperium

The most common feature is nocturnal vigilance characterized by the mother lying awake listening to the infant's breathing, and frequent checking resulting in sleep deprivation. Many mothers are excessively worried and preoccupied about the health and safety of their children which is known as "maternity neurosis."[12]

Obsessions of child harm

Women diagnosed with postpartum onset of major depression may have repetitive, intrusive thoughts related to some occurring to the baby associated with compulsive checking behaviour. Postpartum onset of OCD can occur during gestation or within 6 weeks following delivery. The theme of the obsessions is frequently related to thoughts/gruesome images of harming the baby.[12]

General principles of management

Detailed documentation regarding the women's menstrual history, informed consent decision regarding the conception and medications, treatment recommendations, consistent monitoring of patients for adequate therapeutic control and preventing toxicity, addressing psychosocial factors, and encouraging to normalize daily activities such as sleep hygiene and healthy lifestyle modifications.

Nonpharmacological treatment

Educating the patient and family members about the nature of treatment definitely helps in handling the responsibilities of motherhood better. Individual, interpersonal, group psychotherapy, reassurance, psychoeducation, and emotional support have shown to improve social adjustment in mothers.[14-]

Pharmacological treatment

Medication management during pregnancy and lactation gets complicated by concerns about teratogenicity (congenital malformations), neonatal complications, and by pharmacodynamic or pharmacokinetic interactions of the drugs. Electroconvulsive therapy is another therapeutic option for severely ill patients but does not replace pharmacotherapy. In premature infants, breastfeeding can be avoided if the mother is on psychotropic medication. Breastfeeding can be done at times when the breast milk drug concentration is lowest, like just before or after taking medication.[14]

Breastfeeding

Women may be suggested to avoid breastfeeding as this may cause sleep deprivation, which may precipitate disturbances in mood, also that all psychotropic drugs are excreted in breast milk at various concentrations. However, in view of the infant's health demand, breastfeeding can be followed.

Management of individual disorders

Postpartum blues

They usually do not cause dysfunction and are self-limiting with no requirement for active intervention except social support from the family members[13].

Postpartum depression

PPD responds to similar treatment interventions as depression at other times, with few exceptions in the guidelines for this special population. Selective serotonin reuptake inhibitors (SSRIs) are recommended as the first-line therapy in PPD, for postpartum dysthymia, panic disorder, and obsessive-compulsive disorder[14].

In women with bipolar disorder

During pregnancy

Antidepressants should generally be avoided. In women already taking antidepressants, decision regarding continuation of the drugs should be judged on clinical, pharmacological, and social support profile of the patient. Abrupt withdrawal of the antidepressants may precipitate emergence of (hypo) manic or psychotic symptoms, wherein the use of psychotropic medications such as olanzapine, quetiapine or mood stabilizers may be indicated .

Post delivery

Antidepressants need to be used with caution and best be avoided[14].

Perinatal health-care system

Some of the initiatives taken by the government are:

1. As per the Health Care For All initiative under the Ministry of Health and Family Welfare, there is a 27.7% increase in the budget allocation for health care sector from Rs. 37,061.55 crores in 2016–2017 to Rs. 47,352.51 crores in 2017–2018

2. In the National Health Mission, for 7498 renovations of health facilities, 43,726 ASHA workers were selected

3. Mission Parivar Vikas was launched for effective family planning, aiming to provide services and contraceptives to nearly 146 districts of 7 high-focus states in North India; in which nearly 30 lakh postpartum intrauterine device insertions were done from 2014 to February 2017

4. Janani Suraksha Yojana and Janani Shishu Suraksha Karyakram aimed at minimizing maternal and neonatal mortality ratios

5. In Mental Health Care Act 2017, a special clause for women and children regarding admission and treatment has been emphasised

6. The Constitution included a special provision in Article 15, permitting the state to positively discriminate in favour of women by enacting laws/provisions so as to ameliorate their social, economic, and political condition and to accord them parity

7. In the premiere institutions such as AIIMS (New Delhi), NIMHANS (Bengaluru), and others, provisions have been made for postdoctoral fellowship courses.

Conclusion

Provision of standardized and operationalized criteria for identification, diagnosis, referral, management, and follow-up of perinatal psychiatry disorders is needed. Improvement has been done at. Various levels political and policy level, medical and nonmedical level, and social and family. Better integration of perinatal health care at all these levels would be warranted for a holistic care of women in India.

Ethical Clearance- Taken from Institute ethical committee of IMS , BHU

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The Effect of Short Term Alcohol Abstinence on Neutrophil Phagocytic Properties

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Abstract

Background : Alcohol dysregulates the innate immunity in numerous ways, making alcohol dependants more susceptible to varied forms of infections and immunological assaults.

Objective : The current study on alcoholics throws light on the consequence of short term alcohol abstinence on neutrophil phagocytic power.

Method : 21 subjects meeting the inclusion and exclusion criteria were enrolled for the study.Their blood samples were collected before and after a period of abstinence and studied for neutrophil phagocytic index using *Candida* phagocytic assay test.

Result : An increase in the Mean Particle Number(MPN) of phagocytosis was observed in all the individuals after the alcohol-free period.

Conclusion : The improvement in phagocytic ability of neutrophils post-abstinence provides us an insight into the ways alcohol manipulates the defense mechanism of the human body .Understanding this might help us in exploring novel ideas to circumvent the mortality and morbidity in alcoholics.

Keywords : *Alcohol abstinence , Neutrophil phagocytosis, Candida albicans phagocytosis assay, Mean Particle Number*

Introduction

Alcoholism, or alcohol dependence is a chronic disease that interferes with physical and mental health, and with the family and social responsibilities. Alcoholism is incriminated as the leading risk factor in developing countries with high mortality rates, and ranks third in developed countries.[1]

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In India, alcohol abuse has emerged as a major public health problem, with 21% of the adult men indulging in the same. About 14 million people of this group are dependent drinkers requiring "help" .[2]

Several studies have asserted that alcohol suppresses several leukocyte functions like adhesion, chemotaxis, phagocytosis, superoxide anion production and oxygen metabolism .[3]

The pro inflammatory immune responses and the impaired anti-inflammatory cytokines caused by chronic alcohol, have a major role in the pathogenesis of alcoholic liver disease, pancreatitis, and numerous other organ and tissues injury. [4]

Factors that contribute to the high incidence of infections among alcoholics include breakdown of

local protective barriers, aspiration, exposure, and malnutrition .[5]

Animal experiments by Preheim LC et al [6] showed that the alcohol neutrophils phagocytosed bacteria efficiently, but did not effectively kill all strains of *Pneumococcus.*

In the present experimental study, an attempt is made to evaluate the effect of alcohol abstinence on neutrophil phagocytosis using the phagocytosis assay. [7,8]

We aim at contributing to the knowledge of the immune-modulatory role of chronic alcohol exposure on neutrophil related functions which may exert the pathophysiological assault, thereby allowing a better insight into the effect of alcohol on our body's defence mechanism.

Aims and Objectives

To assess the phagocytic activity of neutrophils, in alcohol dependents before and after abstinence

Materials and Methods

Study design: Before and After Comparison study.

Type of study: Non-randomized Interventional study

Study site: The study was conducted in the Department of Physiology, after recruiting alcoholic individuals from a Rehabilitation Centre , in Bengaluru.

Duration of study: May 2018 – June 2018.

Number of subjects: 21 alcohol dependent males

Ethical clearance and informed consent : Taken

Inclusion criteria:

1. Men in the age group between 25 and 50 years.

2. Men with a history of alcohol dependence.

Exclusion criteria:

1. History of diabetes and hypertension.

2. History of cardiac pathology.

3. History of neurological, psychiatric and endocrine disorder.

4. Subjects with hepatic cirrhosis.

5. Cases of any autoimmune disorder.

6. History of any acute or chronic infections.

7. Smokers.

8. History of any carcinoma

9. Hematological disorders.

Choice of subjects and control: 25 alcoholic males were enrolled for the study. Excluding four subjects as per the exclusion criteria, the study group contains 21 subjects.

Study Protocol:

Following the collection of baseline data and clinical examination, under strict aseptic precautions, 3 ml of venous blood samples was collected in a heparinized vial, twice from each subject, one at the time of enrollment and the other after 40 days of total alcohol abstinence..

Phagocytosis Assay:

A test tube with 1ml of the blood, 1 ml of gelatin and 1ml of Phosphate Buffered Saline (PBS) was allowed to stand for 45 min. The RBCs sediment at the bottom. The supernatant was centrifuged at 3000 rpm for 2 minutes. The upper layer was discarded. 2ml of PBS was added to the remaining cell pellet, mixed well and the solution was centrifuged at 3000 rpm for 2 min. The resulting supernatant was discarded.1ml of PBS was added to the residual cell pellet and mixed well to get a solution rich in neutrophils.

A suspension of *Candida albicans* prepared in 0.9 % saline was used as the indicator to determine the phagocytic function of neutrophils. [9]

For every subject, two test tubes labeled **'Control'(C)-** pre-abstinence and **'Test'(T)-** post abstinence- were taken. To both (C) and (T), 250 µL of the neutrophil enriched solution,250 µL of the *Candida* suspension, 250µL of Hank's balanced salt solution and 250 µL of serum were pipetted. The test tubes were incubated at 37°C for 30 minutes. Two thin smears (C and T) were prepared from the bottom part of the

mixture, dried, fixed with methanol and stained with Giemsa. After 10-15 minutes, the slides were washed under running water, air dried and then observed under 100x. The mean number of *Candida* cells phagocytosed per neutrophil was calculated and expressed as mean particle number (MPN) for both (C) and (T).

The characteristics of the study subjects were tabulated for description using frequencies. The Phagocytic MPN pre- and post-abstinence were compared.

Statistical Methods

The data was compiled in Microsoft Excel sheet. Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. Student t test (two tailed, dependent) has been used to find the significance of study parameters on continuous scale within each group.

Paired Proportion test has been used to find the significance of proportion in paired data. The statistically significant figures considered were:

+ Suggestive of significance (P value: $0.05<P<0.10$)

* Moderately significant (P value:$0.01<P \leq 0.05$)

** Strongly significant (P value: $P \leq 0.01$)

Results

Assessment of Phagocytic MPN -

The ability of the neutrophils to phagocytize *Candida* was assessed by MPN. The number of dead *Candida* cells was expressed as Mean Particle Number (MPN).

Table 1: Comparison of Study variables before and after rehabilitation

Variables	Before Rehab	After Rehab	Difference	t value	P value
Phagocytic MPN	1.63±0.47	2.39±0.69	-0.752	-4.863	<0.001**

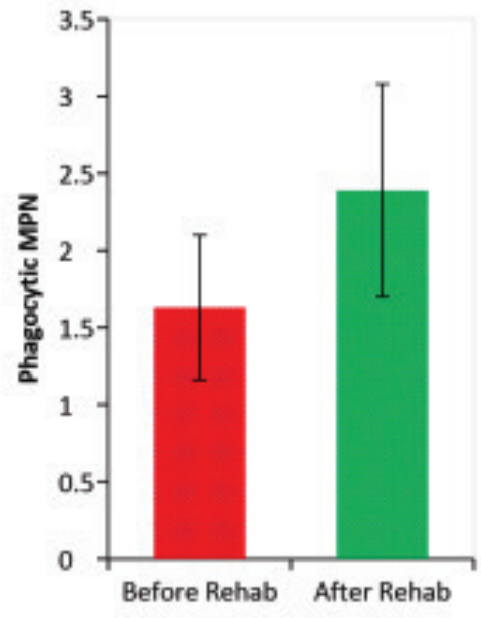

Figure-1

Statistically significant difference was observed in Mean Particle Number (MPN) of ingested *Candida,* by the phagocytizing neutrophils in alcohol dependent subjects, before and after rehabilitation (2.39±0.69 vs 1.63±0.47, t=-4.863, p= <0.001**). (Table- 1, Fig-1)

Discussion

The results of the present study indicate that there was a significant increase in Phagocytic MPN post abstinence, as compared to control samples. This perpetual increase in neutrophil activity may be due to the release of large amounts of various mediators, such as leukotriene B4, IL-8, and TNF, that occurs in the presence of chronic driving inflammatory process in the alcoholic subjects.[3]

Thus, the results hint at a possible pathogenic and immunomodulatory mechanism of alcohol on the neutrophil metabolic activity and their phagocytic functions. This is in consensus with a vivo human and animal study by Szabo et al [10] that alcohol itself is a potent modulator of the immune system at various levels.

Whether this neutrophil "transformation" is the result of alcohol dependence or an indicator of pathogenesis of alcohol induced stress in stimulating the immune reactions towards both tissue injury and mortality is yet to be ascertained. A large number of studies on a wider spectrum of chronic alcoholics need to be performed to further elucidate this property.

Our results may have implications in the selection of patients for anti-inflammatory strategies and Immunosuppressive therapy. Targeting neutrophil related dysfunctions with molecular or biochemical techniques may reduce mortality due to alcohol induced assault at various levels.

Conclusion

Our study demonstrates that the *Candida* –cidal arsenals could be impaired in alcohol dependents with altered immune functions, which is evidenced by a significant functional improvement after a short period of abstinence.This may form the basis for a strategy to improve the selection of alcohol dependents for current therapies and suggest new therapeutic approaches for rehabilitative management, aiming to identify persons in different levels of alcohol dependence, even before serious harm has been incurred.

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Conflict of Interest : Nil

Source of Funding : Self

Ethical Clearance : Taken

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The Effect of Trataka Yoga Kriya on Visual Evoked Potential in Myopes

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Abstract

Aim of Study: To evaluate the effects of Trataka yoga on Visual Evoked Potential (VEP) in myopic subjects

Methodology: Out of 36 myopes recruited for the study, 25 subjects were considered for statistical analysis. Visual Evoked Potential was recorded before and after an intervention of Trataka yoga kriya for 3 weeks.

Results: The study showed that there was no significant statistical change in P100 latency pre and post intervention with mean readings of 95.25 and 95.79ms pre and post intervention respectively for the left eye and 95.15 and 96.4ms pre and post intervention respectively for right eye.

Conclusion: Our study concluded that Trataka yoga has no significant effect on VEP but better designed studies need to be done on a larger sample to confirm these findings and study the above association accurately.

Keywords*: Visual Evoked Potential, Myopes, Trataka Yoga Kriya*

Introduction

The prevalence of Myopia among the highest among pathology of the eye and is associated with comorbidities with an estimated 22.9% of the world population, being affected.[1]An additional 2.7% of people are estimated to have high myopia.[2] The economic impact of uncorrected refractive error is estimated to be a loss of $202 billion of global gross domestic product. In 2010, just over 28% of the world's population were affected by Myopia. This is predicted to rise to 34% by 2020 and nearly 50% by 2050.[3]

Visual evoked potential (VEP) is the graphic illustration of the cerebral electrical potentials generated by the electrical activity of the occipital cortex evoked by a defined visual stimulus, during the visual processing.[4] It is reported that the refractive errors distort the stimulus and cause defocus, which significantly changes the VEP (P100 latency and amplitude). There have been studies asserting that P100 wave latency of VEP is one of the major discriminators between normality and abnormality of visual Pathway and it is more sensitive to small refractive changes.[5]

Trataka Yoga Kriya is a form of Yoga said to improve eyesight and strengthen ocular muscles.

We hypothesized that impaired visual evoked response is associated with refractive error among myopic subjects. Furthermore, to date there is insufficient information available in connection with the above association in myopes after Trataka yoga kriya intervention. Similarly, no study has reported the impact of short term Trataka intervention on the VEP in different levels of refractive errors till date.

Hence, in the present study, an attempt is made to evaluate the possible association relating the visual

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evoked response in myopics aged 18 - 25 years following a non-pharmacological intervention of Trataka yoga kriya, which is easy to learn, implement, and adhere.

The present study may have significant potential for contributing to knowledge of the role of myopia on visual evoked response which may exert the pathophysiological assault, before and after an intervention program. Our data may provide an insight into the conflicting results of other studies and may suggest a rationale to select an appropriate evidence based non-pharmacological therapy tailored to the patient.

Aims and Objectives

To assess the influence of Trataka yoga kriya on Visual Evoked potential in myopes. Although several studies have reported the modulatory effects of refractive error on VEP among myopes, the possible role of a short period of Trataka practice was not well documented.

Material and Methods

Study design:

Pre and Post intervention study.

Study period:

August 2019 and October 2019

Place of study:

Dept of Physiology, BMCRI.

Study group:

The study was conducted on 36 subjects prediagnosed with myopia.

Sample size:

36 subjects prediagnosed with myopia

Inclusion Criteria:

1. Subjects in the age group of 18 and 25 years.
2. Subjects pre-diagnosed with Myopia.

Exclusion Criteria:

1. History of any ocular surgery
2. History of any ocular pathology
3. Subjects with colour blindness.
4. Subjects with history of seizures
5. History of neurological /psychiatric and other systemic diseases
6. Subjects who had received yoga training in the previous 3 months.

Methodology

Written informed consent was obtained from the recruited subjects after explaining the procedure in detail. The subjects were selected based on inclusion and exclusion criteria and their base line data was recorded.

Recording of Visual Evoked Potential (VEP)

Visual evoked potentials were recorded using the using Nemus by EB Neuro according to the protocol proposed by the International Society for Clinical Electrophysiology of Vision (ISCEV).[6] VEP s were elicited by stimulation with a checkerboard pattern and were recorded from the occipital region in the midline and on either side of the scalp. The electric potentials that lead to an upward deflection were termed negative while those with a downward slope were termed Positive.[7] The two primary features to each deflection that can be described are-

a. The time elapsed since the stimulus (latency)

b. The magnitude of deflection from the base line (amplitude)

The component of major clinical importance is the P100 response, a positive peak having a latency of approximately 100ms.[8] The latency of P100 response is being considered in the present study. The recordings were evaluated using the "Queen Square" montage, which includes a midoccipital electrode placed 5cm above the inion, referenced to a mid-frontal electrode placed 12cm above the nasion (MO-MF). To complete the montage, leads were usually placed 5cm to the left (LO) and right (RO) of the MO lead. The results were then statistically evaluated.

Trataka Yoga Kriya And Related Eye Exercises

After measuring the baseline data, an intervention of Trataka yoga kriya[9] along with a set of eye exercises

was be given for a period of 3 weeks. It included gazing at the candle flame with focused attention for a period of 30 seconds followed by defocusing, breathing and chanting. Each session was repeated for 30 min duration and was conducted on everyday basis.

The preparatory Eye Exercises include

- Left and Right movements
- Up and Down movements
- Clockwise and anticlockwise Circular movements
- Simple Palming
- Simple and Intermittent Pressure application
- Palming with Brahmari

The form of Trataka which was practised is the Jyothi Trataka. The subjects were asked to sit 3 feet from a candle flame in a dimly lit room. They were asked to gaze and focus effortlessly and later intensively on the outer part and later the inner parts of the flame with intermittent chanting. In between the exercises simple palming was done to relax the eyes.

Statistical Analysis

Data was entered in Microsoft Excel and spss version 24.0 was used for statistical analysis. Data was analysed by descriptive statistics such as mean, median, standard deviation and interquartile range, percentage, tables and graphs wherever necessary. Student 't' test was used to determine significant difference in Visual Evoked Potential between pre and post intervention.

Observation and Results

Of the total 36 subjects, 25 subjects (with a mean power of left and right eyes being 2.29±1.92 and 2.52±1.97 respectively both male and female in the ratio of 17:8 with a mean age of 20 years) completed the intervention and were considered for the study. All 25 subjects had successfully completed 3 weeks of yoga intervention and were asked to continue the practice till the readings required for the study were completed.

Pre intervention tests showed a P100 latency of 95.15±4.08 and 95.25±5.97 in right and left eyes respectively. (Table-1)

Post intervention tests showed a P100 latency of 96.40±5.13 and 95.79±5.29 in right and left eyes respectively. (Table-1)

Paired sample tests show a mean increase of 0.055 and 0.497 post intervention in the P100 latency in right and left eyes respectively which is not significant. (Table-1)

Table-1: Pre and Post intervention Comparison

Parameters	Pre intervention	Post intervention	Sig (2 tailed)
P100 latency(L)(ms)	95.25±5.97	95.79±5.29	0.497
P100 latency(R)(ms)	95.15±4.08	96.40±5.13	0.055

Discussion

In the present study VEP was recorded in subjects prediagnosed with myopia before and after a yogic intervention and it was found that there is no statistically significant difference in the latency of P100 at the end of yoga training. A study by Anand et al has shown a strong negative correlation with P100 amplitude and strong positive correlation with P100 latency among myopes.[10] B J Winn has observed the positive correlative changes in latency and amplitude of P100 by artificially simulating refractive error.[11] A study has concluded that nonpharmacological approaches such as eye exercises and Trataka Yoga Kriya are not significant on myopia and VEP.[12]

Recording the refractive error using Autorefractometers could have been proved to show

valid and repeatable measures, which we could not precisely measure due to technical restraints. The use of standardized protocols for obtaining cognitive evaluations were followed by single researcher, to increase the test reliability. Though the Trataka intervention period was only for 3 weeks, still we could show significant improvement in cognitive functioning post intervention. This claim however needs to be tested in larger samples with long term intervention, which could have depicted significant changes. Further studies can be conducted to test the effect of Trataka on different neurological test batteries.

By observing the obtained results, the limitations would be lack of a larger sample size, short interventional protocol duration, the Trataka being tiresome for some of the participants to perform, as they were asked to perform the eye exercises in proper repetition.

Conclusion

The present study concludes that P100 latency in myopes did not show significant changes, postintervention of Trataka yoga kriya. For researchers, this study could provide a substantial base for conducting future trials to test the effect of Trataka in myopes. Also, more rigorously designed studies with a larger sample size are recommended to study the causal relationship between the VEP response at different levels of visual neuronal pathway, in combination with neuroimaging to assess the quality of Trataka yoga kriya, when applied over the myopic population.

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Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Taken

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