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Lung Function Abnormalities among Tannery Workers in Vellore District

Adikesavan B.[1], Sangeetha P.[1]

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Abstract

Vellore and its allied areas have a high concentration of tanneries. There is a very large population engaged in the different sections of the tanneries. They are constantly exposed to leather tanning chemicals like chromium, HCL, H_2SO_4, alum etc. The constant exposure to these chemicals makes the workers susceptible to many lung function abnormalities. More over the contact with these chemicals can cause skin diseases, nasal cancer, ocular abnormalities and respiratory diseases. Duration of exposure is a major criterion for the reduction in lung function. It is a cross sectional study involving 39 male subjects aged between 18-60 years working in different sections of the tanneries in Vellore district as study group and 25 male subjects of the same age group and socio economic status and who do not have any previous exposure to leather tanning chemicals as control group . Lung function testing was done using Eagles's global spirometer. Our study shows moderate restriction and mild obstruction in study group when compared to normal subjects and also shows progressive decrement in FVC and FEFmax with their age and duration of occupation.

Keywords: *Tannery workers, PFT, FVC, FEF max.*

Introduction

In Tamil Nadu, Vellore district was found to have more number of tannery factories. Vellore district is the topmost suppliers about 37% of finished leather around the country.(1) Vellore and its allied areas have a high concentration of tanneries. There is a very large population engaged in the different sections of the tanneries. They are constantly exposed to leather tanning chemicals like chromium, Hydrochloric acid (HCl), Hydrogen sulphate (H_2SO_4), alum etc. Constant exposure to environmental chromium this can affect lung airways and parenchyma. A study among chrome tannery workers showed that there was significant prevalence of cancer not only of the lungs but also pancreas, bladder, kidney, testes, nasal cavity, lymphoma etc.(2) Another risk is exposure to chromium as it enters the body through inhalation, ingestion leading to the risk of nasal septal perforations (3) and even direct cutaneous contact with chromium can cause severe eczema.(4) The exposure to these chemicals makes the workers susceptible to many lung function abnormalities. More over the contact with these chemicals can cause skin diseases, nasal cancer, ocular abnormalities and respiratory diseases. Duration of exposure is a major criterion for the reduction in lung function. Benzene based dyes and formaldehyde are the chemicals used in tanning process are considered to be carcinogenic.(5) According to the International Agency for Research on Cancer (IARC), showed that there is evidence of carcinogenicity in humans who work in leather tanning and processing whereas the production process involves more exposure to numerous chemicals.(6) Leather tanners can be also exposed to pesticide which can cause prostate cancer.(7)

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Table 1: Shows here the chemicals used in the process of tanning and its purpose (8) Kanpur-occupational

S.No	Processes	Chemical Used	Purpose
1	Preparation for hide tanning	DDT, Zincchloride, phenols, formaldehyde, arsenic	Defestationand disinfection
2	Tanning process	Calcium hydroxide, sulphide, benzene, ethanol, H2SO4	Removal of epidermis and subcutaneous layer.
3	Finishing-Casein finishing & Nitrocellulose finishing	Formaldehyde as fixer, anilines and resins	Coloring, softness, brightness, elasticity

Hence we choose to do pulmonary function tests in tannery workers who come to the chest clinic with respiratory symptoms to our hospital.

Materials and Methodology

This study was done in the Vellore district involving the tannery workers and lung function tests were done in the department of Physiology, Government Vellore medical college (GVMC). This cross sectional study involved 39 male subjects aged between 18-60 years working in different sections of the tanneries in Vellore district as study group were the patients attending the chest clinic outpatient department (OPD) in our hospital. The control group 25 male subjects of the same age group and socio economic status and also who do not have any previous exposure to leather tanning chemicals were the patients attending the medicine OPD in our hospital. More importance was given while taking history where mainly focussed on personal and occupational history. The Personal history includes the name, age, height, weight, BMI, smoking history, alcohol consumption, history of previous respiratory illnesses, surgeries etc. The Occupational history included occupational duration, type of work, toxicants they work with and the mode of contact with the chemicals. The medicine and chest clinic were intimated earlier about the study and contact number of the principal investigator (PI) were also given.So before sending the patient to the physiology department for doing PFT, the PI was also intimated. The study was proceeded after getting consent from the both the groups.

Lung function testing was done using “EAGLES’S GLOBAL SPIROMETER” in the department of Physiology and the following parameters were studied - FVC, FEV_1, FEV1/FVC, FEF 25-75%, FEF max and MVV.

Forced vital capacity/Timed vital capacity- Maximum volume of air that can be breathed out forcefully and rapidly after a maximum inspiration.

FEV_1 (Forced vital capacity in 1 second)- Volume of FVC expired in one second of exhalation.

FEF 25-75% -The maximum flow during the middle third of the total expired volume which is expressed as forced expiratory flow at 25% to 75% of lung volumes.

MVV-(Maximum voluntary ventilation)-also called maximum breathing capacity where the maximum volume of gas can be breathed per minute by maximal voluntary effort.

Results

The comparison of the mean values of the anthropometric measure between the study and the control group was done. But there was not much significant because both the groups were of the same age and socio-economic status. The table 2 below shows the mean values of FVC, FEV1/FVC, FEF25-7%, FEF max and MVV when compared between the study and the control group showed significant reduction in all the parameters among the study group especially in FVC and MVV. So there is 22% reduction in FVC with p value of 0.019, 23% reduction in FEF 25-75% with p value of 0.001, 13% reductionin FEF max with p value of 0.00021 and 85% reduction in MVV.

Table 2: Shows the comparison between the control and study group of the lung parameters assessed

Parameters	Control (Mean)	Study (Mean)	P- value
FVC	3.51133	2.7128	>0.019581
FEV1	3.25933	2.616	
FEV1/FVC	92.45867	95.4872	
FEF25-75%	4.55267	3.4964	>0.009930
FEFmax	8.606	7.4772	>0.000029
MVV	127.81867	109.3488	

The reduction in FEF 25%, FEF 75%, FEF 50% among the study group when compared to the control group and also the study group showed 13% reduction in FEF max is shown in Fig 1 as bar graph representation below.

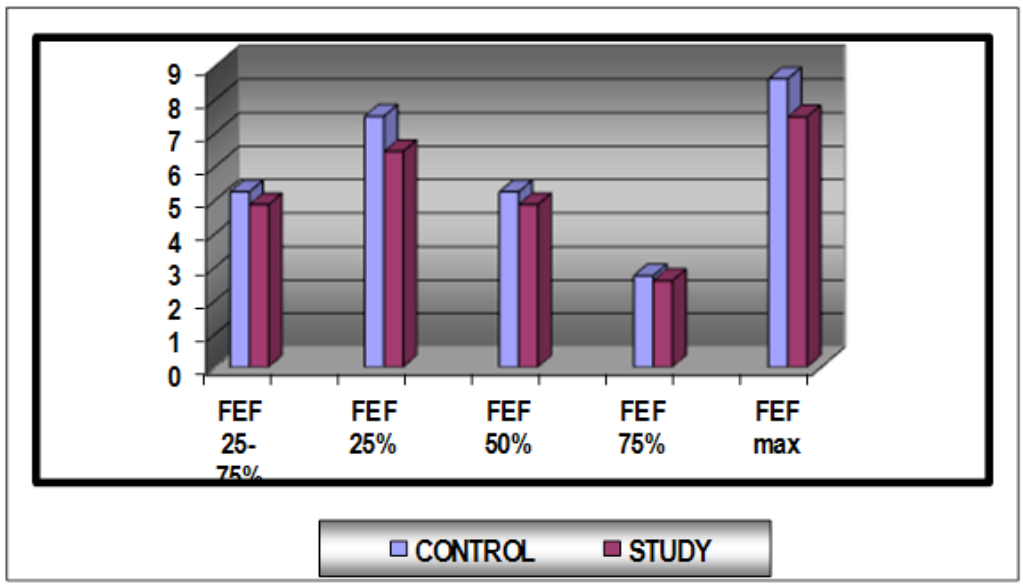

Fig 1: Shows the bar graph comparison of Various FEF values between the study and control groups

The Co-relation of FVC with duration of occupational years of exposure showed an inverse relationship between them, that is the more was the occupational duration, the less was the value of FVC has been shown below in fig 2.

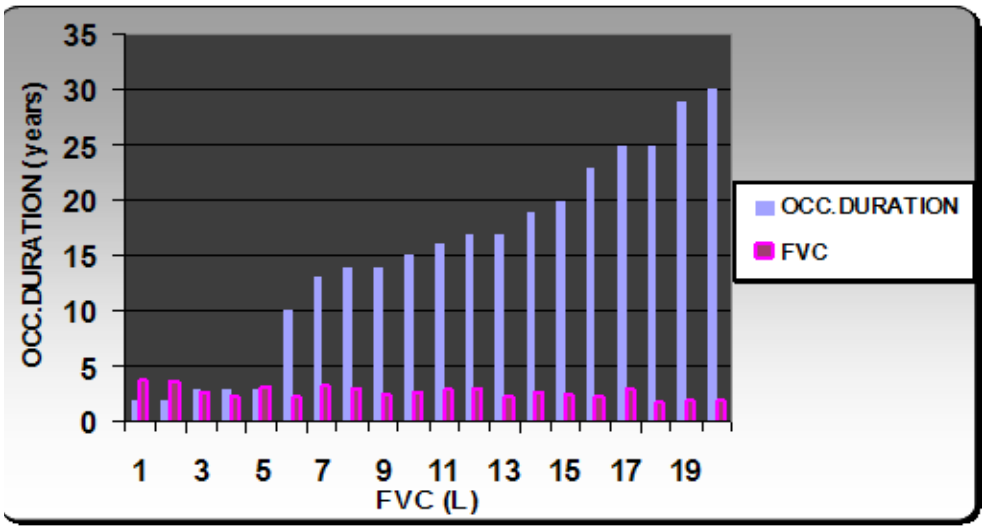

Fig 2: Shows the bar graph comparison of FVC values with the occupational years

Fig 3 below shows that the correlation between MVV and occupational duration also showed an inverse relationship between them. The MVV decreases as the occupational duration increases.

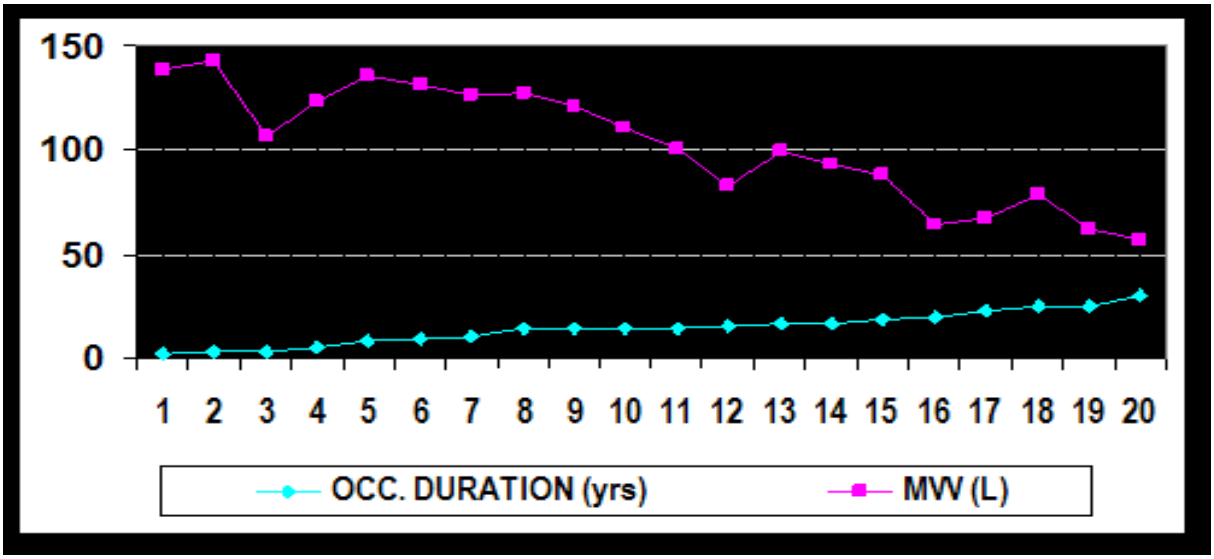

Fig 3: Shows the line graph comparison of MVV values with the occupational years

Discussion

Vellore and its surroundings has got many tannery workers where they are involved in various processes before the final production and exposing themselves to harmful chemicals. Chromium is one among the chemicals which can cause cancer of not only the lungs but also the bladder,kidney, nasal cavity.[9]Many studies have been done to assess the effect of such harmful chemicals in lung functions. Long term exposure to these biological hazards like endotoxins mycotoxins could be another cause of reduction in lung function because during the tanning process, the hide contains numerous microorganisms which serve as a medium for exposure. In another study showed that chronic and long term exposure to tanning chemicals can cause asthma related symptoms that is features of obstructive lung disease. This study was done among tannery workers working in Tuzla Organized Industry Region, Istanbul was doneto know whether long term exposure to chemical affects lung function parameters showed a significant deficit in the lung parameters of FVC%, FEV $_1$%, FEV$_1$/FVC%, PEF%, FEF$_{25-75\%}$.[10] All the lung parameters were also reduced in another study done in Kanpur leather where the study group showed the features of bronchial obstruction.[8]

Our study too showed moderate restriction and mild obstruction when compared to normal subjects. This study correlates with previous study of tannery workers and chrome plate workers. It also shows progressive decrement in FVC, FEFmax and MVV with their age and duration of occupation. Decrement in MVV which was found may be due to aging process. Respiratory illness was found in 60% of our study group when compared to <40% in control group.

Long-term exposure to biological hazards, especially to microbial agents; endotoxins, proteases and mycotoxins, about which there is a large literature, may be another reason for continuing complaints. During the tanning process, risk of exposure to biological agents is ever-present, since the hide serves as a medium for numerous microorganisms

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Conclusion

There is moderate restriction and mild obstruction in the study group when compared to the normal subjects and also shows progressive decrement in FVC as well as FEFmax with their age and duration of occupation in the tannery factories. The study recommends breathing exercises to improve the detoriated lung functions. The study can further be extended in near future by the monitoring in addition the diffusion capacities.

Acknowledgements: We sincerely thank our Dean, Government Vellore Medical College, Vellore for support and help to do this work. We thank the faculties of the department of Physiology and Tannery workers and volunteers for the control group for their full cooperation for our study.

Ethical Committee Clearance: Institutional Ethical committee clearance obtained.

Conflict of Interest: No conflict of interest applicable for this study.

Source of Funding: Self

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Evaluation of Efficacy of Pulsed Electromagnetic Field Therapy as an Adjuvant Therapy in Healing of Diabetic Foot Ulcers

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Abstract

Background and Aim: Foot ulcer is a common complication of diabetes mellitus. The life time risk of developing foot ulcer is 25 % with an annual incidence of 2-3% and may result in limb amputation if left untreated. Diabetic foot ulcers are conventionally treated with wound debridement and off loading. Proper wound healing is uncertain in conservative management of these ulcers. Pulsed Electromagnetic Field therapy is a new modality that interacts at various steps in wound healing. This study aims at evaluating the efficacy of pulsed electromagnetic field therapy as an adjunct therapy in diabetic foot ulcers. Method and materials: Thirty patients with mean duration of Diabetes 7.8 ±1.47 yrs, mean duration of foot ulcer 4.9±1.2 months with Wagner's grade 1 and 2 were subjected to Pulsed electromagnetic field for 45 min/day for 30 days Statistical Analysis: Data was analysed using student paired t -test Results: The patients showed overall 66% ±15% reduction in the wound surface area. Less than 50 % reduction is reported in 2 of the patients. About 50-59% reduction is noted in 6 patients, 11 patients showed 60-69% reduction, 7 patients showed 70-79% reduction, 2 patients more than 90% reduction and 2 patients showed 80-89% reduction in the wound area. None of them reported any side effects. P value of <0.05 was taken to be significant. Discussion and conclusion: Significant reduction in wound surface area observed could be due to Pulsed Electromagnetic Field therapy that helped in healing of tissues, improved circulation and reduced inflammation. Thus PEMF can be an effective and safe adjuvant therapy for treating diabetic foot ulcers.

Keywords: *Diabetic foot ulcers, limb amputation, wound debridement, wound healing, Pulsed electromagnetic field therapy.*

Introduction

The life time risk of developing foot ulcer is 25%[1] with annual incidence 2-3%[2] in diabetic population. Foot ulcer changes the quality of life in patients leading to devastating consequences like limb amputation. A million lower leg amputations are performed each year worldwide due to diabetes and every 30 second at least one lower limb is lost[3].Around 100,000 leg amputations are carried out per year in India[4].

Peripheral neuropathy and Ischemia from peripheral vascular disease are the major predisposing factors for the development of foot ulcers[5] along with biomechanical changes in the foot. Diabetic peripheral neuropathy involves all three divisions of nervous system[5]. Due to loss of sensation any trivial injury is unnoticed by the patient. They are prone for repetitive trauma due excessive pressure points during weight bearing and ambulation. The autonomic neuropathy increases

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susceptibility to skin cracks and infection as the overlying skin becomes dry and fissured[6]. Hyperglycemia leads to endothelial cell dysfunction in peripheral arteries[7]. Atrophy of intrinsic muscles of foot leads to anatomical foot changes and deformities with development of high pressure points[8]. Abnormal non enzymatic glycosylation end products decrease synthesis of nitric oxide a vasodilator leading to endothelial dysfunction with alteration in extra cellular matrix integrity[9]. Disordered immune response prolongs the inflammation. Release of Inflammatory cytokines interferes with cell proliferation, wound closure and healing[10]. keratinocytes fail to reepithelialize the wound[11]. Failure of reepithelialization increase susceptibility to infections and damages the tissues leading to gangrene and limb amputation[12].These amputations are potentially preventable. Prevention, multidisciplinary treatment and appropriate organization can lead to significant reductions in amputation rates up to 85%[13]. Diabetic foot ulcers are conventionally treated by off loading and debridement[14]. But these do not act at cellular levels. Hyperbaric oxygen therapy[15] though popular in improving local perfusion but has uncertain efficacy. Surgical therapies found to be costly. All these modalities increase the burden on the patient in terms of time consumption and cost. Pulsed electromagnetic therapyhas been used for tissue healing over last decade[16]. On exposure to electromagnetic fields in pulsed, non invasive manner on and off with a specific intensity and frequency local currents are induced. These induced currents then interacts with the wound currents or with cellular transduction signaling pathways in soft tissues[17]. It has beneficial effects on various functional aspects of wound repair such as proliferation of fibroblast and granulation tissue, epidermal cell migration, increased blood flow and edema reduction[17]. It also enhances microcirculation and microvasculature which has been linked with the enhanced healing of wounds[18] .As a result it is evident that the pulsed electromagnetic fields act as a potential, safe and an effective conservative management in promoting diabetic ulcer healing in clinical practice.

Materials and Method

Study design: Prospective observational study.

This study was conducted from Sep 2014- Aug 2015 at Rajiv Gandhi Government General Hospital after obtaining Institutional Ethics Committee clearance. **Inclusion criteria:** Thirty diabetic patients both men and women of age 40-60 years, foot ulcers of duration more than 4-6 weeks, Wagner's grading 1 (superficial ulcers) and Wagner's grading 2(Ulcer extension involving ligament, tendon, joint capsule, or fascia with no abscess or osteomyelitis) are participated .**Exclusion criteria:** Patients with uncontrolled DM, Wagner's grade 3, 4 and 5, Neuroischemic ulcers, traumatic or venous ulcers, Peripheral vascular disease and those with Pacemakers are excluded from the study. Informed consent was obtained from all the patients. They were explained about the daily treatment protocol and follow up schedule and instructed to continue anti diabetic treatment, throughout the study period. Complete general, systemic and local examination carried out. The equipment consists of a controlled magnetic field system-portable type along with its accessories-a signal generator [Make systronics, model 1012 and sr. No 4588] and a monitoring meter assembly [oxford 50-0-50mA range] . The coil assemblies designed and fabricated at Madras institute of magneto biology The device provides an ultra low intensity (1500nTesla) about 1/40th of normal earth's magnetic field at extremely low frequencies (ranging between 1 to 10 Hz) for therapy. This ensures safety to the patient's .No radiation is involved and it is totally non-invasive. All patients included in the study group were subjected to Pulsed electromagnetic field therapy as per the protocol designed by Madras Institute of Magneto biology. The patient comfortably lies in the couch for 45 minutes keeping their foot with ulcers inside the magnetic field of the coil system every day for 6 days with a break of one day for 30 days, The equipment set at low current strength of 30 m A, frequency of 10Hz, sine wave form and intensity of 1500nT. Wound size and dimensions, tissue type, amount of exudation before and after treatment was compared. The longest and widest aspect of the wound surface is measured with ruler in cms. Depth measured by sterile metal probe placed perpendicular into the lowest section of the wound marked with marker pen read with a ruler in cms. The **type of tissue** present in the ulcer bed scored as: (4) Necrotic Tissue: (Eschar) black/brown tan tissue that adheres firmly to the wound bed (3) Slough: yellow or white tissue that adheres to the ulcer bed and ismucinous.(2) Granulation Tissue: pink or beefy red tissue with a shiny, moist, granular appearance. (1) Epithelial Tissue: New pink or shiny tissue (skin) that grows in from the edges or as islands on the ulcer surface. (0): Closed/Resurfaced: the wound completely covered with epithelium (new skin)". **Amount of exudation** is calculated by placing a butter (or) tracer paper spread on to the wound area and amount of soaking is seen

and scored as None: 0, Light :1, Moderate: 2, Heavy: 3, Grading of tissue type and exudates amount is followed from **Pressure Ulcers: Scale for Healing (PUSH)**

Statistical Analysis: Data was analysed using student paired t -test p value <0.05 was considered statistically significant. Statistical software SPSS version 21 used for analysis.

Results

Table I: Demographic data and base line data (n)=30

Mean Age (years)	55.1±5.01	
Age range (years)	43-60	
Number of men	23	
Number of women	7	
Mean duration of Diabetes (yrs)	7.8±1.47	
Mean ulcer duration (months)	4.9±1.2	
Wagner's classification	Grade 1	Grade 2
	16	14

The patients demographic data given in the table 1 shows that the study group included thirty patients (M: F, 23:7) with mean age of 55.06±5.01 yrs. The mean duration of Diabetes is 7.8 ±1.47 yrs and the mean duration of ulcer is 4.9±1.2 months. Sixteen were grouped under Wagner's 1 and fourteen are grouped under Wagner'2 grading. None of the patients were complained of adverse effects and their compliance was good throughout course of the treatment. Percentage reduction in surface area as calculated as

$$\frac{\text{(Initial surface area – final surface area X100)}}{\text{Initial surface area}}$$

The patients showed overall 66% ±15% reduction in the wound surface area. Less than 50 % reduction is reported in 2 of the patients. About 50-59% reduction is noted in 6 patients, 11 patients showed 60-69% reduction, 7 patients showed 70-79% reduction, 2 patients more than 90% reduction and 2 patients showed 80-89% reduction in the wound area. None reported any worsening of the symptoms. Tissue type changed from slough to granulation tissue in all patients and exudates amount reduced significantly.

Table 2: Comparison of healing Before and after treatment

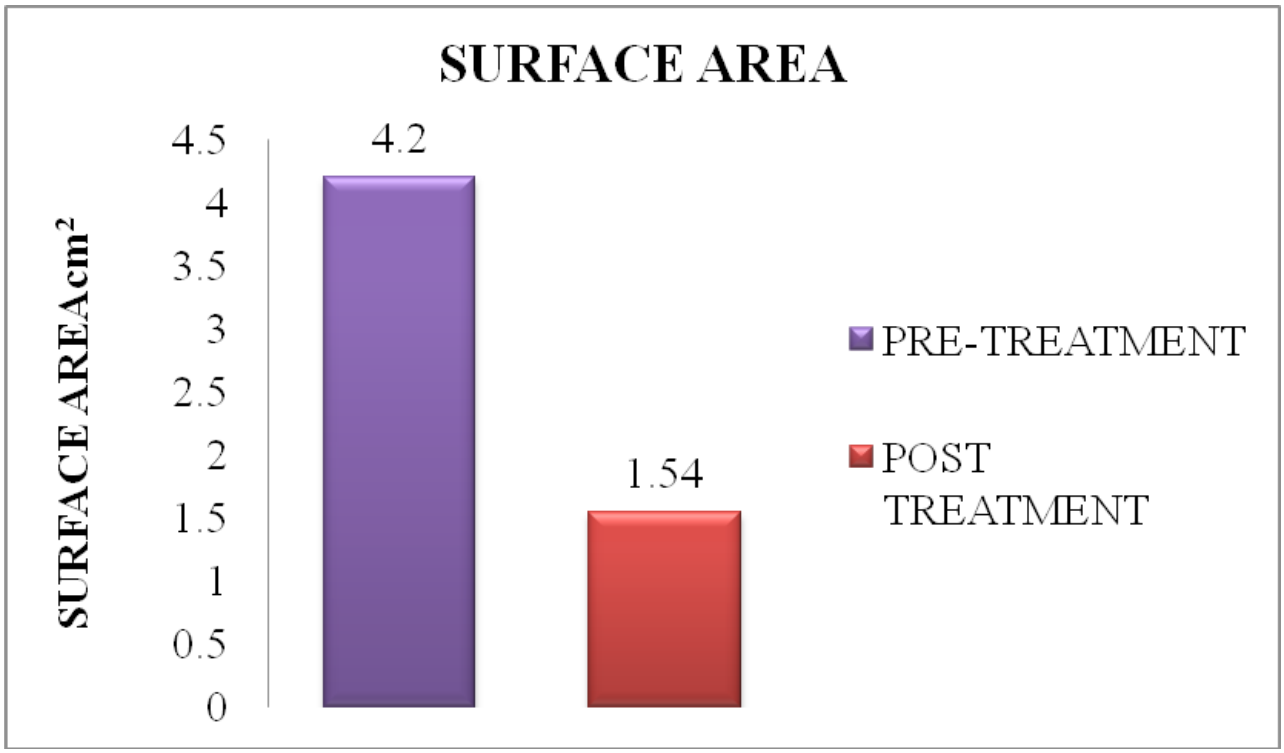
Variable	Group	N	Mean	SD	P-Value
Surface Area	Pre	30	4.2	2.8	0.0001**
	Post		1.54	1.0	
Depth	Pre	30	0.66	0.19	0.0001**
	Post		0.33	0.2.	
** P – Value < 0.0001 Highly Significant					

Table 2 shows statistically significant reduction in the wound surface area and wound depth at the end of the therapy from the base line value (** P – Value < 0.0001)

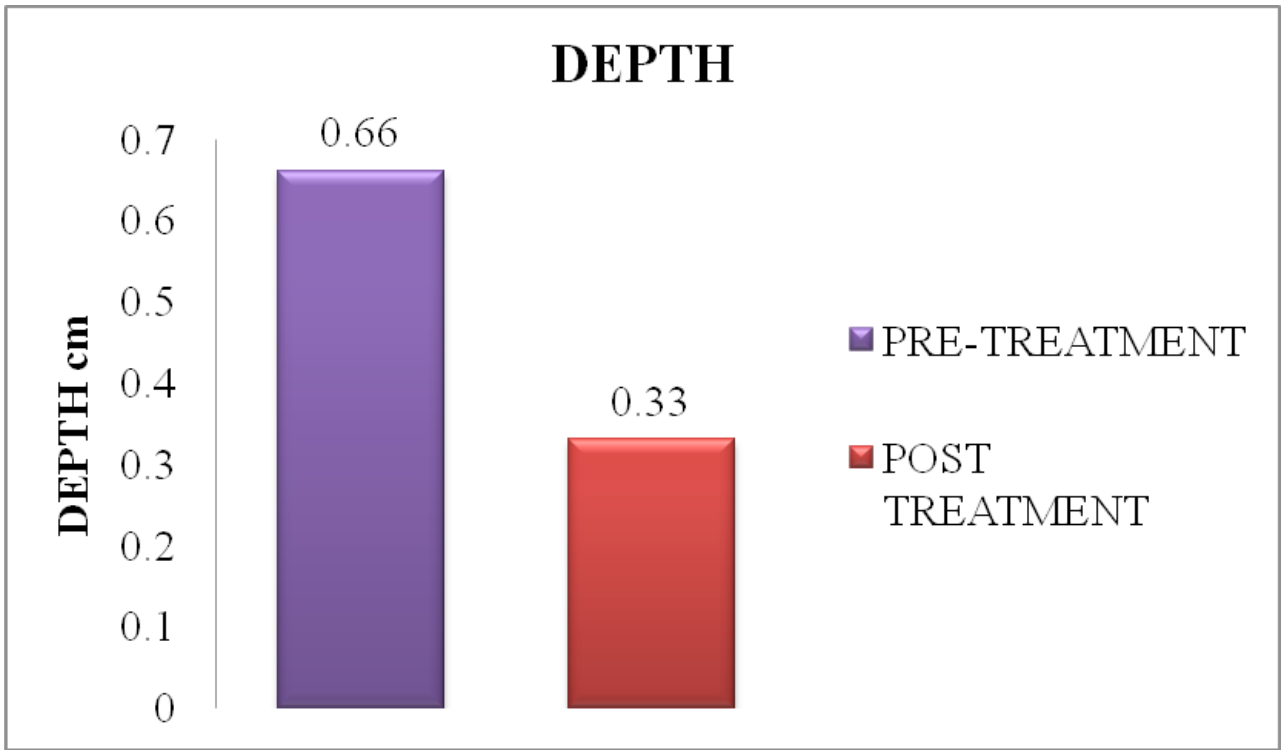
Table 3: Comparison of healing Before and after treatment

Variable	Group	N	Mean	SD	P-Value
Tissue Type	Pre	30	3	0	0.0001**
	Post		1.76	0.61	
Exudate Amount	Pre	30	1.4	0.48	0.0001**
	Post		0.16	0.37	
** P – Value < 0.0001 Highly Significant					

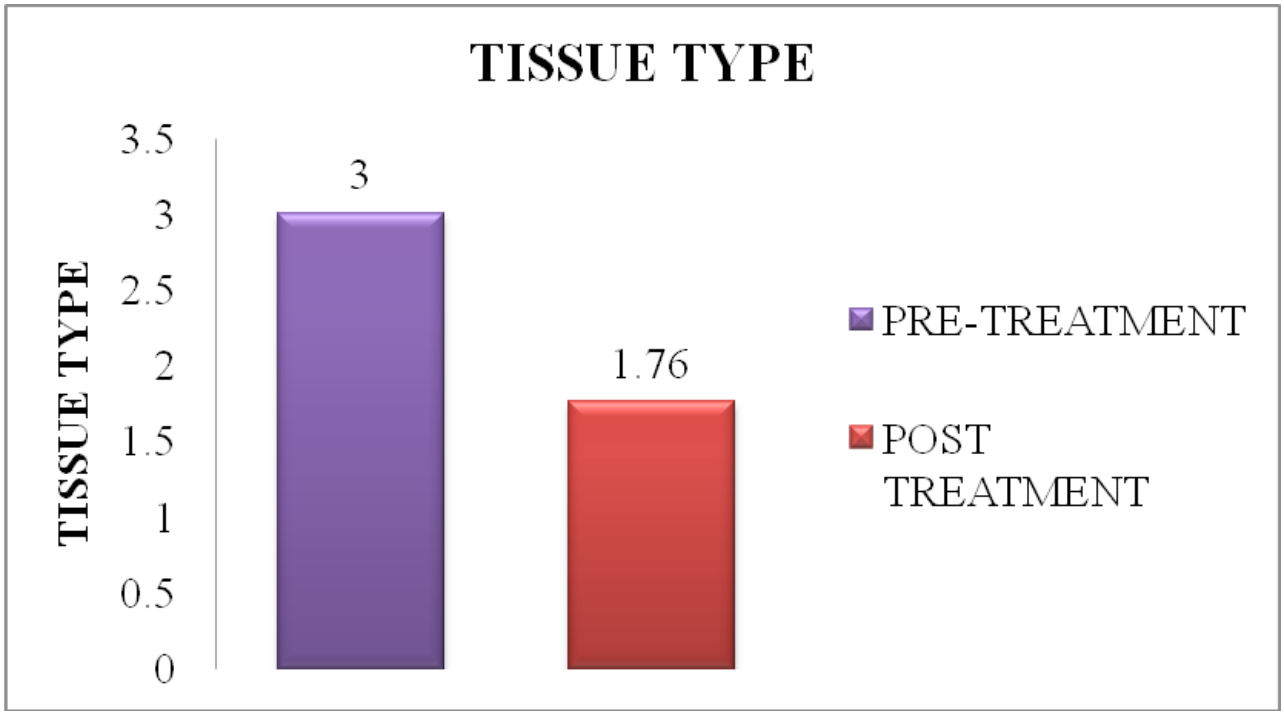
Table 3 shows statistically significant change in the tissue type and significant decrease in exudates amount at the end of the therapy from the base line value (** P – Value < 0.0001)



Graph 1. Comparison of means of ulcer surface area before and after PEMF



Graph 2. Comparison of means of ulcer depth before and after PEMF



Graph 3. Comparison of means of ulcer tissue type before and after PEMF

Discussion

Though diabetic foot ulcers conventionally treated by debridement and off loading their efficacy remain uncertain. In this study portable non invasive equipment which delivers pulsed electromagnetic fields is used. This study showed significant reduction in wound surface area and dimensions which is consistent with the study by stiller et al[19] where 47.7% reduction in ulcer surface area and significant reduction in wound depth. A randomized trial of case control study by Kenkre JE et al[20] in primary care venous leg ulcers showed exposure to electromagnetic fields for 30 days has resulted in reduction in mean ulcer area and some ulcers completely healed. Pulsed electromagnetic field therapy for a duration of 90 days reported significant healing in venous ulcers (Ieran et al[16]). There was a change in tissue type from slough to granulation tissue in almost all the patients showing improvement in healing in this study which is consistent with the study by stiller et al[19]. Ian M Rawe et al[21] observed a steady decrease in wound size as well as decrease in visible peri wound edema. In both the studies of Stiller et al[19] and Ian M Rawe et al[21] all the patients were well tolerated therapy without any adverse effects.. PEMF accelerated wound healing in chronic ulcers (Canaday and Lee et al[22]). PEMF therapy increase cellular metabolism, increase mitosis of various cells such as fibroblasts and endothelial cells by applying certain frequencies and intensity. This could be the reason for the improved healing of soft tissue in this study (Brette wade et al[23]). There are many in vitro studies showing diverse cellular responses to PEMF which are relevant to wound healing. Fibroblasts and epithelial cell cultures, on exposure to electric fields migrated perpendicular to the applied field. This could be the reason for healing in this study which involves the migration of fibroblasts and epithelial cells to the wound site. When locally exposed to magnetic fields, there was blood vessel relaxation (Smith et al[24]). A study by Ottani et al[25], induced surgical wounds in rats on exposure to magnetic field therapy for 42 days resulted in greater and faster rate of wound healing. From these studies it is evident that PEMF was able to treat inflammation in diabetic ulcers and act as a non-invasive, low-cost, easy-to-use complement or alternative to currently prescribed treatments thus this study showed that PEMF therapy is safe and effective in healing of diabetic foot ulcers.

Conclusion

The result of this study concludes that PEMF can be used effectively as a safe adjuvant treatment in diabetic

foot ulcers. From various clinical and case studies it is evident that PEMF therapy linked positively with wound healing processes, improved circulation and reduced inflammation. Also it is noninvasive, portable and convenient to the patient without any side effects. There are certain limitations of our study such as the small sample size, inclusion of only grade 1 and 2 Wagner's ulcers, Non feasibility of prolonged treatment protocol. There is need for further case control studies to determine timing, duration and efficacy of electromagnetic therapy.

Conflict of Interest: No

Source of Funding: Self

Ethical Clearance: Taken from Institutional Ethics Committee, Madras Medical College.

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The Comparative Study on Stress of Medical and Engineering Students by Using Kessler's k-10 Questionnaire

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Abstract

Context: Many studies in medical students show that they experience a high level of stress in Undergraduate course[1,2,3,4,5]. This high level of stress has detrimental effect on learning and cognitive functioning of students[6].

Aim: To determine the level of stress in medical and engineering students using K 10 questionnaire.

Results: The response rate of students for questionnaire was 85.6%. High prevalence of stress was noted (experienced both by male and female) in medical compared with engineering students. Stress levels were higher in first year and final year among medical students. Stress level subsided as the year of study in professional course progressed.

Conclusion: Stress was found in both medical and engineering students with higher stress levels in females as compared to males. There is a pressing need to teach students to handle stress.

Keywords: *Medical, Engineering, Students, Stress.*

Introduction

The medical and engineering courses are very demanding and create a high level of stress in the students. This stress may lead to depressive symptoms or depression in around one third of medical students[7,8,9]. Increased level of stress has been linked to reduced empathy[10], suicidal thoughts[11,12] and reduced academic performance.[13,14,15]

The level of stress in medical students exceeds the age matched general population[16,17,18]. There is a pressing need to assess the stress levels among young learning professionals so that measures at the institutional and family levels may be arranged to take care at the earliest.

Aims and Objectives: This study was conceived to know the level of stress among medical and engineering undergraduate students.

Material and Method

Study Universe: Students of Veer Chandra Singh Garhwali Government Institute of Medical Sciences and Research and Engineering students of National Institute of Technology, Srinagar (Garhwal), Uttarakhand of all academic years.

Study Participants: All the male and female medical and engineering students.

Study Design: Cross-sectional study

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Study Instrument: Kessler developed the K-10 Psychological distress scale which has been used in many epidemiological studies. There are five responses to each question which varies from "none of the time" to "all of the time" and are scored from 1 to 5. To obtain the total score all the questions were collected. Interpretation was - a score below 20 was representing no level of stress while a score of 20-24 representing mild stress, 25-29 showed moderate stress and 30- 50 represented severe stress.

Study Procedure: All the male and female medical students of Veer Chandra Singh Garhwali Government Institute of Medical science and Research and Engineering students of National Institute of Technology, Srinagar (Garhwal), Uttarakhand in the all academic years, were invited to complete the English version of the K10 self-administered, anonymous questionnaire during the academic year 2015-2016. This study was carried for comparing 372 medical students and 346 engineering student's year wise. The whole test was explained in detail to each subject and consent was taken from every subject before the test. The students were allowed to respond in their own free time and privacy. The participation was totally voluntary. Data was collected from the willing participant. Kessler Psychological Distress Scale (K-10) was provided to the students of both Medical and Engineering backgrounds. The questionnaire was collected after it was completed. The K-10 Score was then calculated by adding up (Likert type Scale).

Ethical Consideration: Institutional ethical permission was obtained before commencement of the study. Those students who were found to be stressed were referred to the psychiatric counsellor for further management.

Statistical Analysis: The data was entered in Microsoft excel spreadsheet and analysis of data was done using SPSS software version 16 for Windows. To detect difference in the means of continuous variables, T-test and ANOVA test were used for 2 and more than 2 variables respectively. Post hoc analysis was done using Tukey test with a significance level of < 0.001.

Results

Out of the 400 medical students who received questionnaires 372 completed and returned them (response rate = 93%) of all respondent and out of 400 engineering students 346 completed and returned it (response rate = 86.5%).

Table 1: Comparison of scores among engineering and medical students in different years of professional course.

Year of Course	Engineering students (Mean±S.D.)	Medical students (Mean±S.D.)	P-value
1	22.03±6.156	27.62±6.009	<0.001
2	22.09±6.627	23.60±5.207	0.0877
3	23.45±5.726	26.45±2.382	<0.001
4	23.90±4.468	26.97±2.558	<0.001
Total	**22.85±5.862**	**26.16±4.591**	**<0.001**

Table 2: Intergroup comparison of stress level between different years of medical students.

Year	Compared Year	Mean Difference	P value	95% C.I
1st Year	2nd Year	-4.022	<0.001	(-5.67 to -2.38)
	3rd Year	-2.848	<0.001	(-4.50 to -1.20)
	4th Year	-3.366	<0.001	(-5.00 to -1.73)
2nd Year	3rd Year	1.173	0.48	(-0.48 to 2.83)
	4th Year	0.655	0.98	(-0.98 to 2.29)
3rd Year	4th Year	-0.518	0.848	(-2.16 to 1.13)

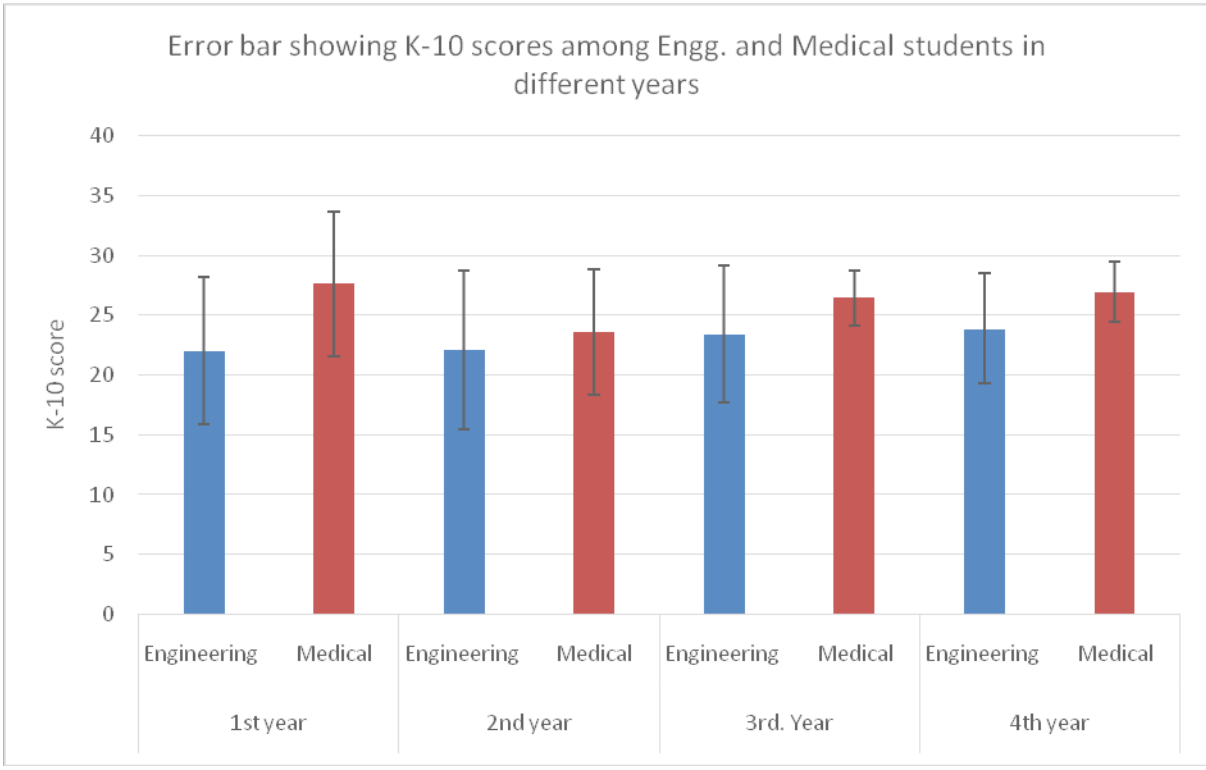

Figure 1: Graph shows year wise mean score in medical and engineering students.

Above error bar shows the scores of stress levels among engineering and medical graduate level students in various years of course. It is seen that first year and final year students show more stress in medical stream.

Table 3: Intergroup comparison of stress level between different years of engineering students.

Year	Compared Year	Mean Difference	P value	95% C.I
1st	2nd	0.61	1	(-2.22 to 2.34)
	3rd	-1.353	0.409	(-3.61 to 0.90)
	4th	-1.802	0.204	(-4.17 to 0.57)
2nd Year	3rd	-1.413	0.356	(-3.63 to 0.81)
	4th	-1.863	0.169	(-4.20 to 0.47)
3rd Year	4th	-0.449	0.959	(-2.76 to 1.86)

The multiple comparisons of stress level between different years of engineering students, the P value difference of stress score in engineering students is statistically not significant (P > 0.001).

Table 4: Mean score of male and female students in engineering and medical streams

Stream	Male Students	Female Students	p-value
Engineering (M/F=321/25)	22.42±5.80	28.28±3.506	<0.001
Medical (M/F=172/200)	25.83±5.315	26.45±3.852	<0.001
Overall (M/F=493/225)	23.51±5.86	26.65±3.852	<0.001

Mean score is high in females compared to males. There is significant difference in stress level of males and females.

Discussion

This study showed a relatively high prevalence of stress experienced by both male and female medical students compared to engineering students. There was difference in prevalence or in mean scores of stress between male and female students contrary to that reported from medical students in United Kingdom[20]. A considerable proportion of stressed students had stress levels that were likely to result in developing symptom and psychiatric problem which is similar to findings of other study [21]. Initial adaptations to the program were more stressful than other stages of training. But in the study stress was found to be significantly more in first year compared to other year levels. Living away from home and coping with a new program of study can be thought as roots of stress in the first year of program. Later in the program work related stress are more pronounced in hospital such as interaction with patient and staff.

In the present study the level of stress reduced as the year of study progressed in line with the study conducted in a medical school in Saudi Arabia [1] and is contradictory to the result of another study where it reached 40 percent higher by the end of clinical training [22]. Results of other studies in North America also suggest that mental health worsens after students join a medical school and remains poor throughout the course, especially in the transition from basic science teaching to clinical training. Only one study falls in line with the finding of this study that the students found medical course stressful during the first year of study but less so in subsequent years. This finding could be explained due to interplay of varied factors. First, this is not a cohort study but a cross-sectional. This may be because of stress in different groups and not the same batch of student. One more reason could be that the students may have devised coping mechanisms. Lastly low failure rate**s** in later years of courses make students more confident and less stressed [1].

The prevalence of stress in the study was higher among the female students compared to their male counterparts but other studies have shown that the gender differences in specific stress symptoms and overall prevalence or mean scores of stress were scarce and did not turn out to be a significant factor in reporting of stress.

As the study findings showed a high level of stress among the first-year students, we suggest supporting them and taking care of this group by the student support system. This will also help them cope well with stress in the later years. It is very important to target stress-prevention strategies at students who have any level of psychological stress to prevent the development of more serious conditions relating to stress. Wellness and mental health programs are also needed to help students make smooth transition between different learning environments with changing learning demands and a growing burden on their mental and physical capacity.

There are undoubtedly numerous difficulties, unchangeable facets of medical training but efforts should be made to sort out as many factors as possible. Method suggested for reducing student stress are the use of small groups of teaching.Staff student committees that can examine for stressors. Our findings suggest that many stressors are present in the path to become a doctor. A more detailed investigation of these factor throughout universities of medicine and based on that introducing procedures centrally and university based will undoubtedly help tackle many of these problems.

A little amount of stress is necessary to add variety to one's life and for developing optimal performance at examinations. Stress in moderation is involved with growth and is necessary for sound personal functioning [1].

Our study shows that the stress level of medical students in 1st and 4th year is higher compared to rest of the years. The possible reason may be home sickness, the college is located in remote and hilly area, extreme weather, risky route and no source of entertainment as the place is devoid of parks, movie theatres, malls etc. The stress level in the female students is higher compared to males due to psychosocial factors.

Conclusion

From the present study we can conclude that there is an urgent need to train the students in effective stress management. Stress is a part of life which cannot be eliminated but has to be managed. The only solution which would not only help us but aide in combating stress is managing it, to our best.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: Was taken prior to this study even though it had no animal or human iintervention

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Impact of Duration of Smoking on Lung Function Parameters in Young Adult Males

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Abstract

Background: The tobacco epidemic is one of the biggest public health threats the world has ever faced, killing more than 8 million people a year. In 2002, about 20% of young teens smoked worldwide, half of those who begin smoking in adolescent years are projected to go on to smoke for 15 to 20 years. Smoking increases the risk of developing coronary artery disease, stroke, chronic obstructive pulmonary disease (COPD) and various malignancies. Smoking is being recognized as the most important causative factor for COPD. While studies have shown an overall 'dose response curve" for smoking and lung function, some individuals develop severe disease within few years of smoking, whereas some individuals show minimal to no clinical symptoms even after many years of smoking. Hence the following cross sectional study was undertaken to assess the extent of decline in lung function parameters with duration of smoking in young adults with no apparent clinical features of COPD.

Objectives: To assess the impact of duration of smoking on various lung function parameters in young adult males.

Materials and Method: Fifty apparently healthy, young smokers were selected for the study. Pulmonary function test was evaluated by computerized spirometer (UNI-EM SPIROMIN). Correlation between duration of smoking and various lung function parameters was analyzed by ANNOVA.

Results: All parameters were found to decline with duration of smoking, however the decline in FVC and FEV1 were statistically significant.

Conclusion: Duration of smoking is correlated strongly with decline in FVC and FEV1 values.

Keywords: *Duration of Smoking, FVC, FEV1 FEV1/FVC, FEF $_{25-75\%}$, PEFR.*

Introduction

Tobacco smoking is one of the greatest public health threats of the industrial era, accounting to more than 8 million deaths per year. There has been a sharp increase in the number of smokers globally, from 721 million smokers in 1980 to 967 million smokers in 2012. In 2002, about 20% of young teens smoked worldwide, half of these teenagers continue to smoke well into their adulthood.[1]

Smoking increases the risk of developing a wide range of diseases, many of which being fatal. The leading cause of death in chronic smokers is malignancy of the lung, followed by respiratory disorder (mainly COPD) and lastly cardiovascular diseases. Smoking is also an important risk factor for stroke, blindness, deafness, back pain, osteoporosis and peripheral artery disease. After the age of 40, smokers on an average have higher risk for pain and disability than non-smokers.[2]

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Chronic obstructive pulmonary disease (COPD) is being recognized as the major cause for morbidity and mortality among smokers.[3]

Cigarette smoking is the most commonly encountered tobacco-related risk factor for COPD, the other factors like smoking tobacco in different forms like bidi, cigar, chillum, which is popular in some countries is also equally harmful. Air contamination resulting from the burning of firewood and fuels has also been identified as a predisposing factor for development of COPD. Passive exposure to cigarette smoke may also contribute to the development of COPD.[4]

Cigarette smoke contains 5,000 different chemicals that are highly reactive and form a complex mixture which is not only carcinogenic but also leads to development of various chemically mediated diseases in humans.[5]

Chronic exposure and inhalation of toxic gases and particulate matter in tobacco smoke, triggers chronic innate and adaptive inflammatory immune response, leading to emphysematous lesions. This leads to obstruction in the small conducting airways, disruption of the epithelial barrier, interference with muco-ciliary clearance apparatus that result in accumulation of inflammatory mucous exudates in the small respiratory tract lumen. Inflammation then triggers infiltration of immune cells into the airway walls. All these immune reactions lead to depositionin connective tissue leading to narrowing of the airway wall. This leads into remodeling and repairing which causes the thickening of the airway walls, reduces lumen capacity and restricts the normal increase in caliber produced by lung inflation. This ultimately leads to airflow limitation that is the hall mark feature of COPD.[6]

Since prevalence of smoking is on the rise, especially among youngsters, who usually present to the clinic only after obvious clinical manifestations of COPD, screening for COPD using PFT can be helpful for early detection and primary prevention of COPD. With this in view, the current study was conducted to assess the extent of lung dysfunction in correlation with duration of smoking in young adults with no clinical features of COPD.

Materials and Method

This cross-sectional study was conducted in Department of Physiology, KVG Medical College, Sullia. The study and its conduct were cleared by ethical committee of the institute. Fifty smokers were randomly selected from population of Sullia taluk. They were smokers for a minimum of two year duration, who smoked a minimum of five cigarettes per day. The study and its aim were explained to the subjects and written informed consent was taken.

Inclusion Criteria:

1. Male subjects in age group of 18 to 30 years.
2. A minimum history of smoking tobacco for more than two year duration.

Exclusion Criteria:

1. History of cardiovascular diseases.
2. History of chronic obstructive pulmonary diseases and chronic restrictive lung diseases.

Method of collection of Data:

- Health status and duration of smoking was obtained by comprehensive Questionnaires.
- Weight was recorded with portable weighing machine
- Height was recorded using wall stadiometer.
- Computerized data logging Spiro meter for recording the pulmonary function tests (UNI-EM Spiromin 6.24.9 Ink).

Based on the duration of smoking the subjects were divided into three groups:

- Group 1 (2-4 yrs)
- Group 2 (5-7 yrs)
- Group 3 (8-10 yrs).
- The lung parameters: FVC, FEV1, FEV1/FVC, $FEF_{25-75\%}$, PEFR, were recorded in all three groups. The differences among the three groups were analyzed using ANNOVA by SPSS 20 software.

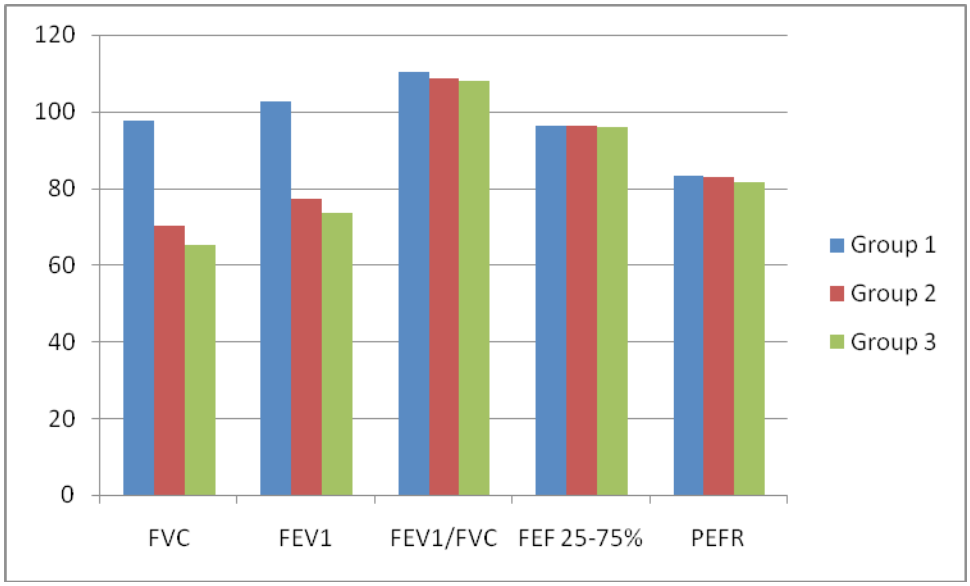
Results

Table 1: Mean lung function parameters in the three Groups

Duration (Yrs)	FVC (% P)	FEV_1 (% P)	FEV_1/FVC (% P)	$FEF_{25-75\%}$ (% P)	PEFR (% P)
Group 1	97.45±13.7	102.75±13.9	110.30±5.6	96.40±18.8	83.37±20.5
Group 2	70.12±8.1	77.24±8.3	108.77±6.2	96.20±12.6	82.95±16.3
Group 3	65.19±6.6	73.69±7.9	107.96±5.4	95.87±27.3	81.70±11.9

Table 2: ANNOVA

	FVC	FEV1	FEV/FVC	$FEF_{25-75\%}$	PEFR
F value	49.24	37.82	0.732	1.585	0.042
P value	<0.001	<0.001	>0.05	>0.05	>0.05
Significance	HS	HS	NS	NS	NS



Graph 1: Mean lung function parameters in the three Groups

In the present study, analysis between the three groups for the various lung function parameters using ANNOVA, showed statistical significance for FVC (P value<0.001) and FEV1(P value<0.001), however FEV1/FVC, $FEF_{25-75\%}$ and PEFR were not statistically significant (P value > 0.05).

Discussion

In the present study, smokers were classified into three groups based on the duration of smoking: Group 1 (Smokers since 2-4 years), Group 2 (Smokers since 5-7 years) and Group 3 (Smokers since 8-10 years).

The mean FVC and FEV1 in group-1 was 97.45 ± 13.7 and 102.75 ± 13.9 (Mean ± SD) respectively, the mean FVC and FEV1 in group-2 was 70.12 ± 8.1 and 77.24 ± 8.3 (Mean ± SD) and the mean FVC and FEV1 in group-3 was 65.19 ±6.6 and 73.69 ± 7.9 (Mean ± SD).

The striking finding of the present study was the decline in FVC and FEV1 with duration of smoking which was statistically significant.

The results of the present study are similar to a study done by Azian Hariri et al., on university students in Malaysia, which also showed a decrease in FVC and FEV1 in smokers.[7]

A similar study done by Yang SC showed an irreversible decrease in FEV1 and FVC.[8]

However a similar study done in Pakistani adults by Shireen Jawed et al., showed decline in FVC, FEV1 and the FEV1/FVC ratio and also a dose response relation between history of smoking and duration of smoking.[9]

The significant change in FEV1 and FVC seen in the present study could be due to a host of inflammatory changes triggered by tobacco smoke in the alveoli and small airways.

To protect the lungs from injury, the respiratory tract has an elegant set of mechanisms for handling the particles and gases in inhaled air. These defenses include physical barriers, reflexes and the cough responses, the absorptive capacity of the epithelial lining, the muco-ciliary apparatus, alveolar macrophages and immune responses of the lung. Further high-level exposures, particularly when continued, may destroy the lung's defenses and some agents have the potential to reduce the efficacy of these defenses. Cigarette smoke contains components that impair muco-ciliary clearance and triggers inflammatory response in alveolar spaces and terminal bronchioles.

The inflammatory immune cells that infiltrate the epithelium, sub epithelium and glandular tissue include the polymorphonuclear neutrophils (PMNs), macrophages, CD8-positive (CD8+) and CD4-positive (CD4+) T lymphocytes and B cells that are part of the adaptive inflammatory immune process . This chronic inflammation, consisting of enlargement of the mucous glands and remodeling of the walls of both large and small bronchi reflects a deregulated healing process in tissue persistently damaged by the inhalation of tobacco smoke. The consequences of this process include both the development of a chronic cough and the accumulation of excess mucus in the airway's lumen. However, this inflammatory process has little influence on airflow limitation unless it extends to the small conducting airways that account for much of the increase in airway resistance.[10, 11, 12]

The relationship between cigarette smoking and the respiratory function test of adolescents has been studied previously. Gold et al., found that FEV1/FVC decreased among adolescent smokers. Smoking habits and the number of cigarettes smoked per day were associated with the reduction in FEF25–75%.[13]

However there are few studies on young people showing no apparent respiratory pathology and no advanced impairment of lung function. Indeed, the vast majority of youths demonstrated respiratory function values within the normal range.[14]

One of the reasons for the decrease in PFT parameters among smokers could be a decrease in functioning of respiratory muscles. Cigarette smoking affects the respiratory muscles through the influence of free radicals on the vascular system, leading to a reduction in respiratory muscle blood supply which adversely impacts respiratory function.[15]

Some studies showed the effect of smoking on lung function during a 12-year follow-up of new-onset asthma in adult patients. In adult-onset bronchial asthma patients cigarette smoking is widely associated with the speeding up of decline in lung function parameters.[16]

In contrast, some negative studies have been published, showing no relationship between smoking and lung function decline.[17, 18]

Similar studies done showed values of different parameters of pulmonary function tests in smokers were compared with non-smokers i.e. the control group. The results showed statistically significant decrease in FVC, FEV1, FEV1/FVC ratio, PEFR, FEF25-75% among smokers compare to non-smokers.[19]

Wihelmensen and Tibblin[20] have reported that the lung function tests show uniform tendency of deterioration with increasing tobacco consumption. M.S. Islam et al[21] studied changes of ventilator functions among smokers and nonsmokers and observed fall in FVC amongst the smokers. Also the MEF25-75% was markedly diminished amongst smokers.

Similarly, Burrows et al., reported that there is quantitative significant relationship between impaired ventilatory function and duration and frequency of smoking[22].

However, several researchers like Angelo[23], Malo[24] and Indian workers Gupta et al[25] and Mahajan et al[26] observed that there was no change in FVC in smokers and nonsmokers.

In a recent study, a significant correlation was found between duration of smoking, participant age and lung function parameters (FVC, FEV1 and MVV values). These results indicate that a decrease in lung function parameters (FVC, FEV1 and MVV values) is correlated conversely with smoking duration and participant age. On the other hand, non-significant correlation was found

between number of cigarettes smoked per day and lung function parameters (FVC, FEV1 and MVV values).[27]

Strength and limitation of the study: The strength of the present study was it included smokers with varying history of smoking duration, from 2 years to 10 years.

However the study was limited in the sample size. Future studies can include large sample size and provide validation to the present study.

Conclusion

In conclusion, our study showed correlation between duration of smoking and declining of all pulmonary function parameters. But the decline in FVC and FEV1 was statistically significant.

Conflict of Interest: None

Ethical Clearance: The study and its conduct were cleared by the ethical committee of the institute.

Source of Funding: Self

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Impact of Video-games on Social Intuition among Teenagers

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Abstract

Background: Playing games is not only a favorite past time but it is also an inherent behavior in human beings that promotes cognitive and social development. With changing lifestyle, outdoor games have been replaced by electronic games like video-games, which are fast gaining popularity among teenagers, with the prevalence rate being as high as 75% in some of the industrialized countries. The popularity of video-games has raised concern over their possible impact on the social and emotional development of teenagers who regularly indulge in video-gaming

Aims and Objectives: The aim of the present study was to assess the impact of regular competitive video-gaming on social intuition among teenagers.

Materials and Method: The present study was conducted in GIMS, Gadag, after being cleared by the Ethical committee. Fifty healthy teens in the age group of 17-19 years who regularly played competitive video-games acted as subjects and fifty age and gender matched students were controls. Information related to type and duration of video-gaming was assessed using comprehensive questionnaire. Social intuition was evaluated using emotional styles questionnaire. Comparison between the groups was done using students t-test. Effect size was calculated.

Results: Social intuition was found to be decreased in teenagers who regularly played competitive video-games, when compared to their peers who didn't play video-games. The difference was statistically significant ($P < 0.05$).

Conclusion: Competitive video-gaming has a negative effect on social intuition among teenagers.

Keywords: *Video-games, Teenagers, Social intuition.*

Introduction

A play can be defined as a voluntary activity that is intrinsically motivated, involves active physical and mental engagement and results in a reward. Play often has no extrinsic goals; it is fun, often spontaneous and performed for self-amusement and recreation. Play during early childhood is not just a past-time but a valuable tool for learning social-emotional, cognitive, language and self-regulation skills that help in the development of a pro-social brain. Play helps the child to acquire valuable skills like problem solving, collaboration and creativity that are later critical for adult success.[1]

Social play behavior also referred to as play fighting, is a form of social behavior extremely common in many mammals particularly during early childhood. This form of play helps in the development of various social skills that are valuable during adulthood. One important function of social play behavior is to facilitate the development of a rich and flexible social repertoire that is the trigger for social development.[2]

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The drive to play and engage in games is not just limited to childhood and early developmental years; it also tends to continue into adolescence and adulthood as well. However with the changing life-style the nature of the games has changed dramatically. Teenagers nowadays have started taking a liking towards electronic games like video-games, as is very much evident from the fact that the prevalence rate of video-gaming among teenagers is as high as 75% in some of the industrialized countries.[3]

The easy accessibility and availability of smart-phones and computers has exposed the majority of the population to the world of video-games and has fuelled their popularity among people of all age groups. However with teenagers being highly exposed to video-games, there is a need to assess the impact of video-games on the social behavior of teenagers who regularly indulge in video-gaming.

The crucial element that separates video-games from regular games is a total lack of direct social interaction. A video-gamer interacts with an electronic interface and rarely sees his opponent even in multi player games. With the advent of Role-playing games (RPG), a gamer controls a fictional character and interacts with other fictional characters online. Most video-games are totally devoid of direct face to face communication.

Face to face communication plays a vital role in the development of social skills as it engages complex neuronal networks-the mirror neuron system being one of them- that help in the development of empathy. Empathy enables us to perceive the emotion of others and allows us to tune ourselves to their emotional state. It helps us to understand the perspective of others and plays a critical role in development of interpersonal relations. These interpersonal interactions form the foundation of healthy social development. Empathy is the bridge that connects people and promotes prosocial behavior.[4]

Recent research has shed light on the strong link between video-game exposure and isolated behavioral traits like empathy, morality and aggression.[5] Exposure to violent video-games is shown to decrease not only empathy but related empathy-related concepts like sympathy and is believed to be implicated in delay of moral development.[6]

Teenagers who regularly play video-games seem to exhibit not only immature moral reasoning but also moral disengagement.[7]

However there are studies which have shown that action video-games may reduce rumination and may prove beneficial in depressed patients.[8]

Taking into consideration the available research on the influence of video-games on social behavior, the present study was under taken with the objective of assessing the social intuition of teenagers who regularly engaged in competitive video-gaming.

Materials and Method

The present study was conducted in Department of Physiology, GIMS, Gadag, after being cleared by the Ethical Committee of the Institute.

This was a cross sectional study done on teenagers whose age ranged from 17-19 years. Fifty teenagers who regularly played competitive video-games were enlisted in the study group and fifty age and gender matched teenagers who didn't play video-games were taken as controls.

Routine health check-up was done in all the volunteers who took part in the study. The aim and design of the study was explained in detail to all the volunteers and written informed consent was taken.

Inclusion Criteria: Healthy volunteers in the age range of 17-19 years.

Exclusion Criteria:

1. Students suffering from depression, anxiety or any other mental disorders.
2. Students who indulged in smoking, alcohol or usage of recreational drugs.

Method of collection of data: Duration and type of video-gaming among the video-gamers was found out using a detailed questionnaire. Only those teenagers playing competitive video-games were enlisted for the study.

Social intuition of the teenagers was assessed using "Emotional style questionnaire" designed by Richard Davidson et al., The Emotional Style Questionnaire is a measure of overall emotional health, it provides information about the six different dimensions underlying emotional health: The six dimensions being Outlook, Resilience, Social Intuition, Self-Awareness, Sensitivity to Context and Attention.

The questionnaire for social intuition was chosen for the study. The subjects were asked to answer ten true/false questions and scoring was done based on the response. The maximum score being 10 and minimum being zero, the higher the score the more is the social intuition of the person. Social Intuition refers to one's degree of attunement to nonverbal social cues. People high on the Social Intuition dimension are adept at reading nonverbal cues such as facial expressions, body language or vocal intonation and infer social information from others' emotional states. People low on this dimension, on the other hand, has difficulty picking up and decoding subtle emotional signals.

The comparison between the two groups was done by students' t- test. Effect size was calculated to know the magnitude of influence of videogame on social intuition scores. All analysis was done in SPSS 16.

Results

The present study had a total of hundred participants who were divided into two groups:

Video-gamers: Those who played video-games on a regular basis (n=50) and Controls: those who didn't play video-games (n=50).

In the present study the social intuition score in the control group was 6.54 ± 1.83(Mean ± SD) and the social intuition score among the video-gamers was 5.8 ± 1.79 (Mean ± SD) **(Table 1, Graph 1)**.

The difference between both the groups was statistically significant ('t' value = 2.039 and P value = 0.044)

The average duration of video-gaming in the subject group was 1.24 ± 0.91 (Mean ± SD).

Correlation between social intuition scores and duration of video-gaming using Pearson's correlation co-efficient yielded a 'r' value of -0.207, though there was a negative correlation, it was not statistically significant (P value = 0.1492).

Effect size calculation showed moderate effect of video-games on social intuition score (Cohen's d = 0.408).

Table 1: Social intuition score in controls and Video-gamers

Controls Mean ± SD	Video-gamers Mean ± SD	t value	P value	Cohen's d (effect size)
6.54±1.83	5.8±1.79	2.039	0.044	0.408

Discussion

For the sake of the study, Video-games were classified into two types- competitive video-games (where the participants compete with each other) and co-operative video-games (where participants co-operate with each other towards a common goal). The study involved subjects playing competitive games only.

Teenagers playing competitive video-gamer on a regular basis were found to have lesser scores in social intuition and hence were inept in dealing with social situations when compared to their peers. The striking outcome of the present study was the negative impact of competitive video-gaming on social intuition scores.

The questionnaire used to assess social intuition in the present study is based on Richard Davidson's theory of Emotional styles. In this theory he highlights the fact that different individuals respond to the same emotionally challenging situation in different ways and this constitutes the emotional style of an individual. This emotional style has six dimensions; Outlook, Resilience, Social Intuition, Self-Awareness, Sensitivity to Context and Attention, each one having its own unique 'neural signature'.

The dimension of social intuition is a measure of the ease with which a person can decipher non-verbal cues; it indicates how adept an individual is when dealing with a social situation. Being socially adept involves the ability to detect subtle facial expressions, body language or vocal intonation and infer social information from others' emotional states; it is the ability to tune with the emotional state of others.[9]

The findings of the present study are similar a study done by Weigman O et al., which showed a direct negative relationship between video-games and prosocial behavior.[10]

There are numerous studies claiming that violent competitive video-games have a negative impact on prosocial behavior and empathy and also negatively affect the behavior and attitude of teenagers.[11, 12, 13]

Moreover violent video-games have been shown to reduce sympathy, promote aggressive behavior and negatively impact moral judgment.[14]

However there are studies which have shown that co-operative video-games may in fact increase prosocial behavior and co-operation among the players,[15]some video-games may even promote quick decision making and improve cognitive flexibility.[16, 17]

When compared to outdoor games, video-games involve zero face to face interaction; this crucial factor may hamper the development of neuronal circuitry and the proper attitude essential for social intuition and prosocial behavior. We hypothesize that competitive video-games stimulate the inherent drive to win at all costs and thus trigger aggressive behavior among teenagers, making them less willing to co-operate and compromise in real life social situations.

We conclude that the effect of video-games mainly depends on the nature and type of video-games, with competitive/violent video-games negatively affecting social intuition and decreasing prosocial behavior in teenagers.

Conclusion

Competitive video-games seem to have a negative impact on social intuition scores as measured by emotional style questionnaire. Teenagers who regularly engage in competitive video-games seem to be less adept at deciphering non verbal communications and social cues.

With the increasing popularity of video-games and their rampant use among teenagers, video-games can no longer be dismissed as a harmless past-time. Parents, guardians and teachers must take into consideration the negative impact of video-games on social development and encourage teenagers to engage in outdoor games with their friends.

Limitations: The present study was done with a limited sample size; future cross-sectional studies with a larger sample size may shed new light on the findings of the present study.

Conflict of Interest: The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Ethical Clearance: the study and its conduct were cleared by the ethical committee of the institute.

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Effect of Yogic Controlled Breathing Exercises on Cardiovascular Parameters

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Abstract

The study was conducted to evaluate the effect of pranayam (yogic controlled breathing exercises) & meditation on cardiovascular parameters in 1st year male medical students of GSVM Medical College, Kanpur. All the 60 students selected for the study were randomized into 3 groups of 20 students each: Group I–Anulom Vilom Pranayam, Group II–Kapalbhati Pranayam, Group III–Bhastrika Pranayam. Blood pressure (systolic & diastolic) & pulse rate of all the students in each group were recorded at baseline & after 3 months of training. Training programme included 10 min. meditation in padmasana followed by 5 min. practice of pranayam twice a day for 3 months. A significant ($p < .001$) decrease in pulse rate, systolic BP and diastolic BP were observed after 3 months of training.. The relaxation & flexibility induced by meditation & pranayam help to stabilize the autonomic nervous system with a tendency towards parasympathetic dominance. So the meditation & pranayam should be encouraged to improve the performance of cardiovascular system. Controlled pranayam breathing is also effective in improving the strength & tone of muscles involved in respiration.

Keywords: *Pranayam, Blood Pressure, Pulse Rate, Meditation*

Introduction

Modern man is the victim of stress and stress related disorders which threaten to disrupt his life totally. Being holistic in its approach, yoga offers the best way out of this 'whirlpool of stress'

Pranayama is a scientific method, being a part of "yoga" as preached and propounded by accomplished yogis of yore and systematized by Maharashi Patanjali

The state of the mind and that of the body are intimately related. If the mind is relaxed, the muscles in the body will also be relaxed. Stress produces a state of physical and mental tension. Yoga developed thousands of years ago, is recognized as a form of mind body medicine. In yoga physical postures and breathing exercises improve muscle strength, flexibility, blood circulation and oxygen uptake as well as hormone functions. In addition relaxation induced by meditation helps to stabilize the autonomic nervous system with a tendency towards parasympathetic dominance. Physiologic benefits which follow help yoga practitioners become more resilient to stressful conditions and reduce a variety of important risk factors for various diseases, especially cardiorespiratory diseases. (Parshad O, 2004).[1]

According to Bharshankar R (2003)[2] environmental conditions and variety of behavioral factors such as stress, anxiety, affective and attitudinal disposition of the individuals influence the cardiovascular responses. Yogic exercises involve physical, mental and spiritual task in a comprehensive manner. It brings about the behavioral changes. Yoga in long duration affects hypothalamus and brings about decrease in the Systolic BP and Diastolic BP through its influence on vasomotor

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centre, which leads to reduction in sympathetic tone and peripheral resistance.

The present study was undertaken to investigate the effects of training (for 3 months) in meditation and different types of pranayams viz. Anulomvilom, Kapalbhati and Bhastrika on cardiovascular parameters

Materials and Method

The present study was conducted on 60 1st year male MBBS students of GSVM Medical College, Kanpur. Students with a history of active sports training, previous experience of yoga training, major medical illness in the past such as tuberculosis, hypertension, diabetes mellitus, bronchial asthma etc., were excluded from the study. Written consent was obtained and formalities of ethical committee were completed.

Student were randomized into the following 3 groups of 20 students each.

Group I: Meditation in Padmasana then Anulom-vilom Pranayam.

Group II: Meditation in Padmasana then Kapalbhati Pranayam.

Group III: Meditation in Padmasana then Bhastrika Pranayam.

The following parameters were recorded:

Anthropometric Measurements: Height, Weight, Body Mass Index.

Cardiovascular Parameters:

Pulse rate (per minute)

Systolic Blood pressure (mmHg)

Diastolic Blood pressure (mmHg)

BP was recorded using conventional mercury type of sphygmomanometer.

Trainging Programme:

The subjects of group I were trained in Anulom Vilom Pranayam: Deep inhalation through left nostril, then deep exhalation through right nostril, then again inhalation through right nostril and exhalation through left. Subjects were instructed to repeat mentally the mantra 'AUM' while practicing this pranayam.

The subject of group II were taught Kapalbhati: Normal tidal inspiration through both the nostril and then forceful expiration through both the nostril. While doing this pranayam subjects were instructed to think that while exhaling they are throwing out of their body all the negative and injurious elements with mental aberrations like anger, greed, self ego attachment etc. along with the air exhaled. Likewise while breathing in they were asked to think that they are taking into their body positive thoughts like compassion, love, detachment etc. and filling body and mind with them.

The subjects of group III were trained in Bhastrika Pranayam: Forceful inspiration with both the nostrils and then forceful expiration with both the nostrils. Subjects were asked to think at the time of breathing in, that the cosmic energy which enlivens the entire universe and which is the cause of happiness of mankind, enters their body with every inhalation and they experienced that they have become an integral part of that energy.

Subjects were instructed to practice meditation in Padmasana for 10 min. and then Pranayam for 5 min. twice daily for 3 months.

Statistical Analysis: Observations were tabulated and analysed using Students't' test.' p value of 0.05 was taken as cut off for the measure of significance.

Observations and Results

All subjects were male between 17-27 yrs of age with an average of 21.50+ 2.82 yrs in group I, 21.30+1.71 yrs in group II and 21.25+1.71 yrs in group III.

Table 1: Group I: Pre and Post Yogic Exercise Values (Anulom Vilom Pranayam)

Sl.No.	Parameters	Pre	Post	'p' value
1	Weight	57.7±7.39	57.7±7.39	-
2	BMI	20.32±2.46	20.32±2.46	-
3	Pulse rate	79.3±4.26	73.3±3.96	<0.001
4	Systolic BP	128.4±3.01	124.6±3.61	<0.001
5	Diastolic BP	76±5.91	72.1±5.40	<0.001

Table 2: Group II: Pre and Post Yogic Exercise Values (Kapal Bhati Pranayam)

Sl.No.	Parameters	Pre	Post	'p' value
1	Weight	61.55±7.85	61.55±7.85	-
2	BMI	22.01±1.98	22.01±1.98	-
3	Pulse rate	76.6±4.81	70.3±3.26	<0.001
4	Systolic BP	128.4±4.03	124.6±3.89	<0.001
5	Diastolic BP	75.6±4.66	71.5±3.99	<0.001

Table 3: Group III: Pre and Post Yogic Exercise Values (Bhastrika Pranayam)

Sl. No.	Parameters	Pre	Post	'p' value
1.	Weight	57.10±8.91	57.10±8.91	-
2.	BMI	20.47±3.00	20.47±3.00	-
3.	Pulse rate	77.2±3.91	71.3±3.79	<0.001
4.	Systolic BP	129.7±3.79	125.1±4.37	<0.001
5.	Diastolic BP	75.5±4.89	70.6±3.73	<0.001

A Comparison was made between Pre and Post values.

Physical Assessment – There was no effect of Yoga on weight and BMI.

Cardiovascular Assessment:

Pulse Rate: A highly significant decrease [P<0.001] in PR was observed in all three groups after 3 months of training in pranayam.

BP: A highly significant decrease [P<0.001] in Systolic BP and Diastolic BP was observed in all three groups after 3 months of training in pranayam.

Discussion

Our results are similar to most of the earlier studies done on yoga.

Srivastava RD et al (2005)[3] studied the effect of alternate nostril breathing on cardiorespiratory and autonomic functions in healthy young volunteers and observed decrease in RR, HR, SP, DP and increase in PEFR. They explained decrease in HR in the following way –

The individuals differ in relation to their parasympathetic (Vagal) tone and sympathetic activity levels as evident from great variation in resting HR from 60 -90/min. (Ganong WF 2001)[4]. The HR responses will therefore depend on the algebraic summation of sympathetic and parasympathetic activation further modulated by hypocapnoea and lung stretch receptor responses (Kontos HAet al, 1965)[5]. Both tachycardia (Hayashi KD, 1969)[6] and bradycardia (Glick G et al, 1969)[7] have been recorded following pulmoflation.

According to Bhargava R et al (1988)[8] pranayam breathing exercise increases vagal tone and decreases sympathetic discharges and our findings are also showing the same effects.

SP is determined by venous return and sympathetic and parasympathetic drive. Lung inflation has been known to decrease systemic vascular resistance. (Hainsworth R, 1974)[9] This response is initiated by pulmonary stretch receptor which bring about withdrawal of sympathetic tone in blood vessels leading to wide spread vasodilatation thus decreasing peripheral resistance.

Noradrenergic fibres end on vessels in all part of the body. The noradrenergic fibres are vasoconstrictor in function. In addition to their vasoconstrictor innervation, the resistance vessels of the skeletal muscles are innervated by vasodilator fibres which although they travel with the sympathetic nerves are cholinergic (the sympathetic vasodilator system). There is no tonic discharge in the vasodilator fibres but the vasoconstrictor fibres to most vascular beds have some tonic activity.

So on sympathectomy the blood vessels dilate. In most tissues vasodilatation is produced by decreasing the rate of tonic discharge in the vasoconstrictor nerve, although in skeletal muscles it can also be produced by activating the sympathetic vasodilator system (Ganong WF, 2005)[10].

Wide spread vasodilatation leads to less venous return and SP falls. Vasodilatation also decreases total peripheral resistance resulting in decrease in DP.

In the present study subjects were instructed to think that while exhaling they are throwing out of their body the entire negative and injurious element. Likewise while breathing in they were instructed to think that they are taking into their body positive thoughts and filling their body and mind with them. So, peace and stability of mind is secured. Such a practice affects hypothalamus and brings about decrease in the systolic and diastolic BP through its influence on the vasomotor centre, which leads to reduction in sympathetic tone and peripheral resistance as was observed by Khanam AA et al (1996)[11].

Vijayalakshmi P et al (2004)[12] studied on hypertensive patients and reported decrease in BP and HR after yoga training (technique was not specified).

Jain N et al (2005)[13] reported decrease in PR, SP and DP after training in right nostril breathing and left nostril breathing in healthy student volunteers and suggested that there occurs a general parasympathetic dominance by both these breathing pattern.

Mc Caffrey R et al (2005) [14] reported decrease in BP and HR in hypertensive patients following yoga program (type of yoga not specified).

Conclusion

All the three pranayams (Anulomvilom, bhastrika & kapalbhati) seem to be equally effective in improving the efficiency of cardiovascular system in healthy individuals.

The students also gave the feedback of becoming more energetic both physically and mentally. They became more calm, peaceful and stable in handling stressful situations.

Environmental conditions and variety of behavioral factors such as stress, anxiety and affective disposition of the individuals influence the cardiovascular response. Regular practice of meditation and pranayam with positive thoughts has calming effects on mind. This decreases the sympathetic tone. In case of physical exercise or during the competitive sports events the mere thought of exercise causes increase in sympathetic tone, so that changes in PR & BP can be demonstrated before starting physical exercise.

Hence, practice of meditation and pranayam should be introduced in the daily activities of the students who face stress during their study periods especially during exams. It is also recommended to be introduced as a part of regular training program of professional sports player. It would be extremely helpful in easing out their stress before and during the .event and improve their overall performance.

So the results & their explanations justify that the regular practice of meditation & pranayam is beneficial for cardiovascular system in healthy individuals and retards age related cardiovascular pathological process.

The real meaning of Pranayama as expounded in the Yoga Shastras is control of the life force, prana that governs the heart, sensory motor nerves, breathing and all other functions of body. All body processes can be brought under our conscious direction if we learn the art of controlling the life force

Further studies are required to explore the potency of ancient Indian science and art of meditation and yoga for the overall welfare of human beings.

Conflict of Interest: Nil

Source of funding: Self

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Effect of Left and Right Nostril Breathing on Heart Rate Variability among Healthy Adult Males: A Cross-sectional Study

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Abstract

The effects of various breathing manoeuvres on autonomic functions, especially those of alternate nostril breathing and single nostril breathing have been well documented.[1,2,3,4] However, most of the studies have investigated these effects after practiced breathing manoeuvres,[5,6,7] and few have looked into the immediate effects of such types of breathing. The purpose of this study was to determine the immediate effects of a single session of single nostril breathing, first right nostril and then left nostril, on the various time and frequency domain parameters of heart rate variability (HRV) and to compare these effects with that of HRV during normal breathing.

Sixty male volunteers (age range, 20 to 40 years) were assessed. Electrocardiography was conducted, using standard procedure, under controlled laboratory conditions, for three five-minute periods: during breathing normally through both nostrils, during the last five minutes of a twenty-minute session of breathing through the right nostril only and similarly while breathing through the left nostril only. The R-R intervals obtained were analyzed for HRV parameters and further analyzed using different statistical method.

When compared to right nostril breathing, a statistically significant increase in mean R-R intervals was noted with left nostril breathing ($p = 0.009$). Sympathetic activation with right nostril breathing was also evident, although statistically not found to be significant. A statistically significant higher SDNN with left nostril breathing as compared to both nostril breathing ($p = 0.004$) was also observed. Similarly, NN50 and pNN50 were found to be significantly higher with left nostril breathing as compared to both nostril breathing ($p = 0.003$ & 0.007, respectively). However, RMSSD, LF power, HF power, LF norm, HF norm and LF/HF ratio were not found to be statistically different for the three breathing manoeuvres.

Thus our study showed an overall parasympathetic predominance, with an increase in total power of HRV with left nostril breathing, but the minute variations of HRV were not found to be significantly different among the three breathing manoeuvres.

Keywords: *Left nostril breathing Heart rate variability Parasympathetic.*

Introduction

Aim: To compare the effect of right and left nostril breathing among the healthy adult male volunteers on heart rate variability.

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Material and Method

This cross-sectional descriptive study was conducted in the Department of Physiology, P.I.M.S., between January and December 2012. Ethical clearance was obtained. The study participants were clinically healthy adult male volunteers in the age group of 20-40 years. The exclusion criteria were as follows:

- Smokers and alcoholics
- Practitioners of yoga
- Participants with any mechanical or infective nasal blockage
- Participants with oro-pharyngeal infections
- Participants on any ANS modifying drugs
- Participants with any major systemic disorders, especially respiratory and cardiovascular disorders

Methodology

Sixty adult males in the age group of 20-40 years attended the study voluntarily. Prior to being recruited for the study, the participants were briefed about the procedure and written informed consent was obtained from each of them.

In the lab, after preliminary briefing, the participant was asked to lie down in the supine position and breathe in a relaxed manner, without going off to sleep. After a 10 min rest, a 5 min ECG was recorded. This was the first recording for each participant, henceforth designated as BN (to indicate breathing through both nostrils).

Subsequently, the subject was instructed to occlude his left nostril (with his left index finger) and breathe only through his right nostril for the next 20 minutes. Instruction was also given to the participant not to breathe through the mouth. The investigator monitored and ensured that the participants performed this manoeuvre correctly. During the last 5 minutes of this right nostril breathing manoeuvre ECG was recorded as with the BN recording. This was the second recording for each participant, henceforth designated as RN (to indicate right nostril breathing).

The participant was then asked to breathe in a relaxed manner through both nostrils, while resting in the supine position for a period of 10 minutes. Following this period of rest, the participant was asked to occlude his right nostril (with his right index finger) and breathe only through his left nostril for the next 20 minutes. As with the RN manoeuvre, ECG was recorded during the last 5 minutes of this left nostril breathing manoeuvre. This was the third recording for each participant, henceforth designated as LN (to indicate left nostril breathing).

Equipment and Data Acquisition: For the purpose of ECG recording, the three standard limb leads were used, with 3M monitoring electrodes placed over the anterior chest wall. The electrodes were connected to a computerized ambulatory ECG system (Niviquire, Pune). The ECG signal was continuously amplified, digitized and stored in the computer for offline analysis. The RR peak detector was adjusted appropriately. A high quality ECG recording was thus acquired under standardized conditions to minimise artefacts. R-R intervals acquired from this ECG monitoring system were then further subjected to HRV analysis.

For the purpose of HRV analysis, Kubios HRV version 2.0, 2008 (Biosignal Analysis and Medical Imaging Group, University of Kuopio, Finland) was used. The R-R interval data obtained with the ECG monitoring system was subjected to Fast Fourier Transformation and analyzed for parameters in the time and frequency domains.

Statistical Analysis: The data was entered in Microsoft Excel and analyzed using SPSS 17.0 for Windows statistical software. Repeated measures ANOVA and students paired t-test were used.

Result

Table 1: Mean Standard Deviation of NN Intervals (SDNN) with the Three Breathing Manoeuvres (n=60)

	Median (ms)	Interquartile Range		p value*
		25^{th} Percentile	75^{th} Percentile	
Both nostril breathing (BN)	46.05	33.63	88.05	0.001
Right nostril breathing (RN)	46.50	37.70	87.28	
Left nostril breathing (LN)	62.60	46.13	92.45	

*Friedman test used; statistically significant at p=0.05 level

Table 2: Root Mean Square of Successive Deviations (RMSSD) with the Three Breathing Manoeuvres (n=60)

	Median (ms)	Interquartile Range		p value*
		25th Percentile	75th Percentile	
Both nostril breathing (BN)	36.50	25.88	85.78	0.059
Right nostril breathing (RN)	34.90	27.85	74.03	
Left nostril breathing (LN)	46.30	31.33	81.68	

*Friedman test used; statistically significant at p=0.05 level

Table 3: Median NN50 Values with the Three Breathing Manoeuvres (n=60)

	Median	Interquartile Range		p value*
		25th Percentile	75th Percentile	
Both nostril breathing (BN)	24.50	12.25	63.75	0.009
Right nostril breathing (RN)	30.50	13.25	84.50	
Left nostril breathing (LN)	52.00	18.25	94.50	

*Friedman test used; statistically significant at p=0.05 level

Table 4: Median pNN50 Values with the Three Breathing Manoeuvres (n=60)

	Median (%)	Interquartile Range		p value*
		25th Percentile	75th Percentile	
Both nostril breathing (BN)	10.40	5.20	28.08	0.021
Right nostril breathing (RN)	12.00	5.20	33.10	
Left nostril breathing (LN)	20.40	7.55	37.03	

*Friedman test used; statistically significant at p=0.05 level

Table 5: Low Frequency Power Values with the Three Breathing Manoeuvres (n=60)

	Median (ms^2)	Interquartile Range		p value*
		25th Percentile	75th Percentile	
Both nostril breathing (BN)	836.50	327.50	1925.25	0.016
Right nostril breathing (RN)	664.50	319.25	2282.50	
Left nostril breathing (LN)	1049	651.75	2085	

*Friedman test used.

Discussion

The participants in our study had a mean age of 29.85 ± 6.22 years (range 20-40 years). Their mean height, weight and BMI were 167.7 ± 6.45 cm, 66.52 ± 9.57 kg and 23.58 ± 2.66 kg/m^2 respectively. Their baseline vital parameters measured showed the mean pulse rate to be 77.88 ± 6.71 bpm, the mean systolic blood pressure to be 117.80 ± 9.72 mmHg and the mean diastolic blood pressure to be 77.37 ± 5.12 mmHg.

Time domain parameters: A reduction in heart rate after left nostril breathing has been reported,[8] while others have reported no significant changes.[3,4] Dane et al, found an increase in heart with both nostril breathing, due to overall effect of exercise on heart rate.[9]

In our study, the highest median SDNN value was observed with left nostril breathing (62.60 ms) and least with normal breathing (46.05 ms). When SDNN values were compared, there was a statistically significant

difference between normal and left nostril breathing. Since SDNN correlates with total power of HRV, it can be concluded from our results that total power of HRV was increased with left nostril breathing, significantly, as compared to both nostril breathing. That the SDNN of right nostril breathing was almost similar to that of both nostril breathing (46.50 ms) shows a balancing effect of right nostril breathing.

In our study, the highest median value for NN50 was observed with left nostril breathing (52) and the lowest median value was observed with normal breathing (24.50). When the median NN50 values were compared for the three breathing manoeuvres, there was a statistically significant difference observed between both nostril and left nostril breathing.

Similarly, the highest median value for pNN50 was observed with left nostril breathing (20.40%) and the lowest median value was observed with normal breathing (10.40%). When the median pNN50 values were compared, statistically significant difference was observed with normal and left nostril breathing.

Both NN50 and pNN50 correlate well with the HF power of the frequency domain analysis and are indicative of parasympathetic activity. Thus, these results indicate an increase of parasympathetic activity with left nostril breathing as compared to both nostril breathing.

However, RMSSD, which is considered to be a better indicator of the short-term component of HRV, signifying parasympathetic activity, was not found to be significantly different among the three breathing manoeuvres. Also there were no differences between right nostril breathing and both or left nostril breathing in terms of RMSSD, NN50 or pNN50 shows a balancing effect of right nostril breathing with both sympathetic and parasympathetic effects on the heart.

Frequency domain parameters: A study by Raghuraj et al reported the effects of rapid breathing techniques and slow and deep breathing techniques in 12 healthy male volunteers. They reported that following the slow and deep breathing technique, it was found that there was no significant change, though a non-significant trend towards increase in HF power and LF power was noted.[10]

An unpublished report by Rajajeyakumar et al has shown increased LF power and decreased HF power with right nostril breathing.[11] The index of sympathovagal balance as reflected by LF/HF ratio increased i.e. from 1.8 to 2.2 after the intervention. All the observation showed that practiced right nostril breathing is sympathomimetic. In practiced left nostril breathing, the time domain analysis of HRV revealed a decreased heart rate and an increased pNN50. The frequency domain analysis revealed an increased HF power with decreased LF/HF ratio i.e from 2.1 to 1.5. Thus, left nostril breathing was shown to have a definite parasympathetic effect.

In our study, however, both HF and LF power was found to be highest with left nostril breathing and lowest with right nostril breathing, although the differences were statistically not significant. HF and LF power in normalized units were also not found to be statistically different among the three manoeuvres. Neither were the LF/HF ratio noted to be significantly different.

Thus the frequency domain analysis of our data seems to indicate a lack of the minute heart rate variations when subjected to spectral analysis, although there was an overall increase in total power, as well an increase in mean R-R interval with left nostril breathing.

Limitations of our study included the small sample size and the inability to conduct the breathing manoeuvres with sufficient time gap in-between. Also it would have been helpful if this study could have documented the airflow of each nostril before the start of the manoeuvres.

Conclusion

This cross sectional study was conducted with the aim to observe the effects of forced single nostril breathing manouevres on various HRV parameters.

An increase in the total power of HRV, as indicated by a statistically significant higher SDNN with left nostril breathing as compared to both nostril breathing ($p = 0.004$) was also observed in our study. Other time domain parameters like NN50 and pNN50, which correspond to HF power of the frequency domain and therefore indicate parasympathetic activation, were found to be significant higher with left nostril breathing as compared to both nostril breathing ($p = 0.003$ & 0.007, respectively). However, RMSSD, a preferred estimate of the short-term component of HRV was not found to be statistically significantly different with the three breathing manoeuvres. Neither were any of the

frequency domain parameters like LF power, HF power, LF (nu), HF (nu) and LF/HF ratio found to be statistically different among the three breathing manoeuvres.

Thus we would like to conclude that while single nostril breathing manoeuvres have an overall effect of either parasympathetic (left nostril) or, to a lesser extent, sympathetic (right nostril) activation over the control of heart rate, the frequency variations in R-R intervals do not manifest any obvious predominance by any one division of the autonomic nervous system.

As a treatment option, the advantages of such a manoeuvre are obvious in that it is non-invasive and easy to use by the patient. It will require further investigations to see if the heart-rate-reducing effect of left nostril breathing is as effective in situations of physiological tachycardia and whether such manoeuvres can be utilized clinically in situations where a prompt reduction in an elevated heart rate is essential to treatment.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Institutional ethical committee (Pondicherry Institute of Medical Sciences).

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Correlation of Body Mass Index (BMI) with Age of Menarche in Adolescent Girls

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Abstract

Background: Occurrence of menarche at the earlier age has been attributed to a significant number of adverse health outcomes. Depression, eating disorders, metabolic syndrome and Type II diabetes mellitus have been identified as the major adverse health related issues. Furthermore in relation to early age of menarche has been identified as a risk factor for breast and endometrial cancer due to the increased exposure to estrogen. Hence, it is important to give awareness in adopting healthy eating habits and involving in daily physical exercise.

Aim: To measure the body mass index in adolescent girls and correlate between the age of menarche and body mass index in adolescent girls.

Methodology: This is cross-sectional study with a sample size of 200 female students between the age group of 17 – 19 years attending different courses (MBBS, BDS, AHS and BPT) in Melmaruvathur Adhiparasakthi Institute of Medical Sciences and Research, Melmaruvathur. An informed consent will be obtained from the participants. A dietary history will be taken by questionnaire. The anthropometric measurements for calculating the BMI will be measured using calibrated instruments.

Result: The results of this study the statistically significant were seen among the age of menarche and the BMI, pearson chi-square is 21.876 and p value is 0.009 and also statistical significant was seen when compared regularity of periods with BMI, pearson chi-square is 10.018 and p value is 0.01. There was no statistical significant when compared waist-hip ratio with age of menarche and regularity of periods.

Conclusion: The age of menarche had a tight connection with BMI. Increase in BMI causes early age of menarche. So having increased body fat, increased body weight, high intake of protein, high-calories foods and sedentary life style causes early age of menarche in young healthy girls.

Keywords: *Menarche, Metabolic syndrome, Type II diabetes mellitus*

Introduction

One of the decisive stages in human growth and development process is puberty. Menarche is one of the signs of puberty[1]. Menarche is defined as the first occurrence of menstruation in girls[2]. Menstrual cycle is a recurrent occurrence during the reproductive period in female that include changes in structural, functional and hormonal in the reproductive system. Menstruation takes place due to the actions of the hormones such as estrogen and progesterone. These hormones are regulated through the hypothalamo-pituitary activity. The release of gonadotropin releasing hormone (GnRH) from the hypothalamus influences the release of gonadotropins (follicular stimulating hormone and luteinizing hormone) from the anterior pituitary acts on

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the uterus and the ovaries to cause menstruation. The release of GnRH can be affected by leptin. Leptin are hormones secreted in adipose tissue. Increase in rate of initiation of puberty is seen in girls having increased level of leptin which trigger the activation of GnRH[3]. In high BMI girls, where increased adipose cells and leptin resistance causes increase in leptin[4]. Menarche is affected by many factors such as genetic factors, race, environmental conditions, nutrition, physical activity, geographic location, urban or rural residence, health status, psychological factors, blindness, body mass index (BMI), family size, socioeconomic status, parental education level, occupation of parents, loss of parents, child sexual abuse, physical stress, tea consumption and passive smoking[5]. Among different populations the age of menarche ranges between 9 and 13 years[6]. According to a study done by Gaudineau et al., stated that the climatic changes and conservative family background were closely related to the age of menarche during the early nineteenth century[7]. The rate of decrease in the age of menarche is 3 months for every 10 years[8]. Now-a-days, the rate of decrease in the age of menarche shows equal proportions in developed and developing countries due to the fast changes taking place in the socioeconomic status, increased access to health case and excess intake of high calories food[9]. Occurrence of menarche at the earlier age has been attributed to a significant number of adverse health outcomes. Depression, eating disorders, metabolic syndrome and Type II diabetes mellitus have been identified as the major adverse health related issues. Furthermore in relation to early age of menarche has been identified as a risk factor for breast and endometrial cancer due to the increased exposure to estrogen. Hence, it is important to give awareness in adopting healthy eating habits and involving in daily physical exercise. Only few such studies have been done in India. The aim of our study is to find the influence of BMI on the age of menarche and also the duration of menstrual cycle and menses in young healthy girls.

Materials and Method: A cross-sectional study with a sample size of 200 female students between the age group of 17 – 19 years attending different courses (MBBS, BDS, AHS and BPT) in Melmaruvathur Adhiparasakthi Institute of Medical Sciences and Research, Melmaruvathur. In this study, the inclusion criteria were the healthy female students without any abnormal menstrual conditions. The exclusion criteria in this study were gynaecological disorders, anemia and history of drug intake affecting menstrual cycle and having chronic diseases. Ethical research committee approval was obtained. The study was conducted in the department of Physiology, MAPIMS. The study protocol was clearly explained to the subjects and informed written consent was obtained. Anthropometric parameters (Height in meters, Body weight in Kg, Waist circumference in cm and Hip circumference in cm) were measured in all the subjects. Cross – sectional data on age of menarche, duration of menstrual cycle and menses, diet, exercise and other relevant details were obtained through self-administered questionnaire.

Statistical analysis: Data are analyzed by using SPSS software. The data are also given in count and percentage and followed by pearson chi-square test. It showed statistical significant and the significance level was fixed at $p < 0.05$.

Result

Table 1: Comparison of mother's age of menarche with the number of girls (%)

Mother age at menarche (in years)	Number of mothers (%)	Number of girls (%)
10 – 11 years	2 (1%)	14 (7%)
12 – 13 years	46 (23%)	131 (65.5%)
14 – 15 years	104 (52%)	50 (25%)
16 – 18 years	48 (24%)	5 (2.5%)

Table 2: Comparison of Age of Menarche with waist-hip ratio

			Waist-hip ratio level		Total
			<=0.85	>0.85	
Age at menarche group	10-11 Years	Count	1	13	14
		%	2.2%	8.4%	7.0%
	12-13 Years	Count	28	103	131
		%	60.9%	66.9%	65.5%
	14-15 Years	Count	15	35	50
		%	32.6%	22.7%	25.0%
	16 Years	Count	2	3	5
		%	4.3%	1.9%	2.5%
Total		Count	46	154	200
		%	100.0%	100.0%	100.0%
Pearson Chi-Square = 4.383; p = 0.223					

Table 3: Comparison of age of menarche with BMI

			BMI classification				Total
			<18.5 Underweight	18.5-24.99 Normal	25-29.99 Overweight	Above 30 Obese	
Age at menarche group	10-11 Years	Count	0	10	4	0	14
		%	0%	6.8%	14.3%	0%	7.0%
	12-13 Years	Count	6	102	19	4	131
		%	35.3%	69.9%	67.9%	44.4%	65.5%
	14-15 Years	Count	10	31	4	5	50
		%	58.8%	21.2%	14.3%	55.6%	25.0%
	16 Years	Count	1	3	1	0	5
		%	5.9%	2.1%	3.6%	0%	2.5%
Total		Count	17	146	28	9	200
		%	100.0%	100.0%	100.0%	100.0%	100.0%
Pearson Chi-Square = 21.876 *; p = 0.009							

Table 4: Comparison of regularity of periods with BMI

			BMI classification				Total
			<18.5 Underweight	18.5-24.99 Normal	25-29.99 Overweight	Above 30 Obese	
Regular Irregular	1.00	Count	17	131	20	8	176
		%	100.0%	89.7%	71.4%	88.9%	88.0%
	2.00	Count	0	15	8	1	24
		%	.0%	10.3%	28.6%	11.1%	12.0%
Total		Count	17	146	28	9	200
		%	100.0%	100.0%	100.0%	100.0%	100.0%
Pearson Chi-Square =10.018* p = 0.018							

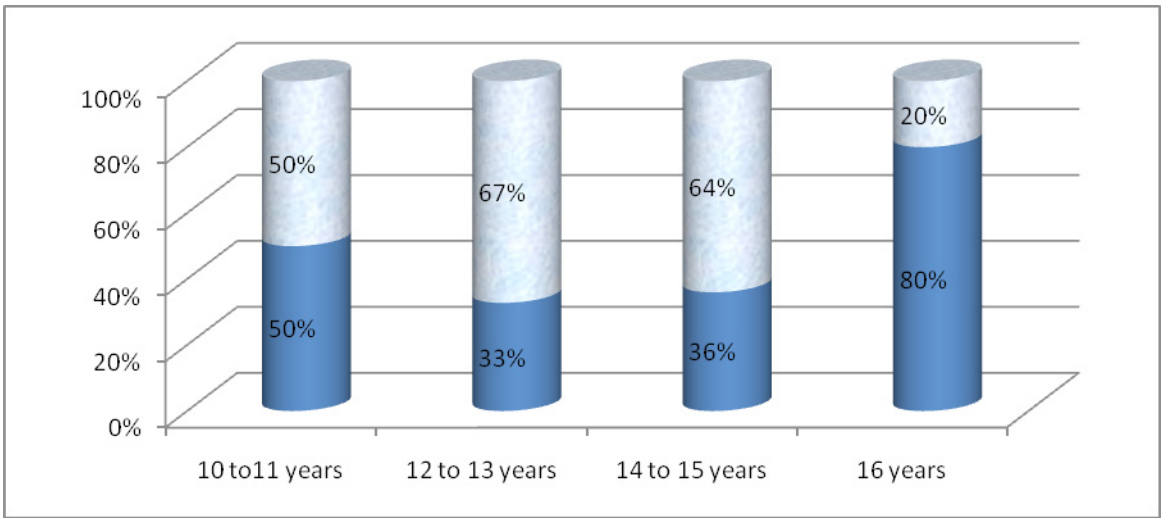

Figure 1: Comparison of age of menarche with exercise.

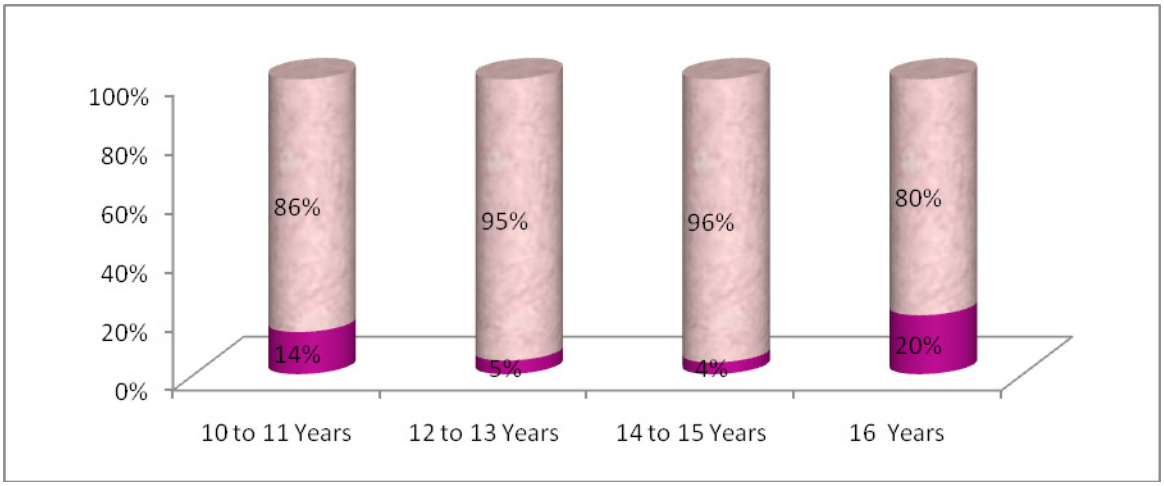

Figure 2: Comparison of age of menarche with vegetarian and non-vegetarian diet.

Discussion

In this study 200 healthy girls of MAPIMS from different courses (MBBS, BDS, BPT and AHS) were involved with age of menarche varying from 10 years to 16 years. The mean age of menarche among the girls was higher in 12-13 years group with 131(65.5%). The mean age of menarche of mothers was highly significant at the 14-15 years with 104 (52%) than the daughters age of menarche was 12 - 13 years with 131 (65.5%) which are given in table 1. In table 2, the comparison of age of menarche with waist-hip ratio showed a higher percentage of girls with 103 (66.9%) at the age of 12 - 13 years of menarche and also when compared with BMI and the age of menarche as in table 3 also showed that high BMI values are seen in girls with age of menarche at 12 – 13 years menarche group, the pearson chi-square is 21.876 and p value is 0.009. The girls had regular periods even with high waist-hip ratio which was statistically not significant but in table 4it was statistically significant that high BMI had irregular periods when the regularity of periods is compared with BMI, pearson chi-square is 10.018 and p value is 0.01. The figure 1 compares the exercising and non-exercising girls with the age of menarche, which showed that non-exercising girls are higher in 12 – 13 years of age of menarche group. When comparing vegetarian and non-vegetarian group of girls compared with the age of menarche showed higher group of girls are seen at the age of menarche at 12 – 13 years and 14 – 15 years as shown in Figure 2.

The age of menarche is important evidence in the phase of maturationin sexual life in girls. In this study, the age of menarche in young healthy girls is 12 – 13 years when compared with the age of menarche of the mothers 14 – 15 years. This statement is supported by thestudy done by Tsuzaki et al., stated that there is a trend of decrease in the years of age of menarche among the girls[10]. A study done by Kusum S Mane et al., had a positive correlation between menarcheal age of mother and their daughters[11].One of thestudy done by Guillette et al. and many other studies proved that mothers age of menarche have greater influence in genetic factors on the age of menarche of their daughters[12]. Many studies proved that there is an inverse correlation between the age of menarche and BMI. Increase in weight (overweight and obesity) causes gradual decrease in the age of menarche[13]. Girls having high BMI tend to get menarche at the earlier years than those with normal weight[14]. Pejhan A done a study to create the relationship between the age of menarche and anthropometric indices in girls and he found that the girls having higher the BMI had lower the age of menarche[15].Wronka et al., reported in his study that age of menarche and BMI are inversely correlated and he also compared with the socioeconomic status of the participants[16]. A study done of Filer BR found that the irregular cycle is seen in girls having high body fat and obesity[17]. The subjects having High BMI with sedentary life style without any exercise habits may have an effect on the level and equilibrium of endogenous hormones which are required for normal menstrual functions. In Dars S et al. in their study, the results showed that non-exercising girls had irregular periods[18].Moisan J et al., done a study on physical activity and the age of menarche proved that physical activities had a greater role in the age of menarche[19]. There was a strong relationship between the hormonal factors such as Insulin and sex hormones binding globulin (SHBG) have an effect obesity and irregular periods[20].

Conclusion: Our study concludes that the mean age of menarche was gradually decreasing from 13 – 14 years to 12 – 13 years and lowest age of menarche at 10 -11 years. The mother's age of menarche with their daughters was statistically significant. The statistical significant is also seen when compared the age of menarche with anthropometric parameters and also showed variation in waist-hip ratio. It is found that irregular periods were present in overweight and obsess girls. When age of menarche and physical exercise were compared it showed statistical significant. The non-vegetarian girls had early age of menarche when compared with vegetarian girls. Having high BMI, sedentary life style with increase in the subcutaneous fat influences the hormonal changes which are the possible causes to get early age of menarche in girls. More such studies should be done with increased population group and adding the Bio-social factors.

Interest of Conflict: No conflict

Source of Funding: Self

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Baroreflex Sensitivity in Chronic Obstructive Pulmonary Disease and its Correlation with Disease Severity-in South Indian Population

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) is systemic disorder which causes autonomic dysfunction and predisposes patients to cardiovascular mortality and morbidity. FEV1 is a predictor of cardiovascular events in COPD patients and Baroreflex sensitivity (BRS) is most reliable tool to measure autonomic dysfunction. There is paucity of literature, revealing the relationship of BRS with disease severity in COPD patients.

Objective: In our study we intended to assess BRS among different stages of COPD (GOLD CRITERIA) and also identify the association of BRS with disease severity.

Method: This study was done in collaboration between Department of Physiology & Department of Pulmonary medicine, JIPMER. It is a descriptive study done on (n=130) male COPD patients. Anthropometric parameters (height, weight, BMI, W/H ratio), basal parameters, BRS (using Finapres) & PFT (using Spirolab III) parameters were assessed in them. Later, based on the GOLD stage criteria (Mild, Moderate, Severe, Very severe) they were divided into 4 sub-groups. Data was analyzed by SPSS 16.0 version software. One-way ANOVA (>2 groups) was used to find any Statistical difference between the groups. Correlations between the variables were done using Pearson correlation test.

Results: Statistically significant ($p<0.05$)difference in BRS between different stages of COPD was determined by Kruskal- Wallis test and the post – hoc (Dunn's) test revealed that BRS levels were significantly reduced in very severe, severe and moderate COPD patients when compared to mild COPD patients. Significant positive Correlation ($r=.332$, $p=0.05$) was found between BRS and FEV1.

Conclusion: Baroreflex sensitivity is reduced in male patients of COPD and BRS correlated with lung function and disease severity.

Keywords: *Autonomic dysfunction, BRS, COPD, Cardiovascular risk, FEV1, GOLD criteria.*

Introduction

Chronic obstructive pulmonary disease (COPD) is a lung disease characterized by chronic obstruction of lung airways which is not entirely reversible.[1] According to WHO, the burden of COPD is 65 million around the world.[2] COPD was predicted to be the third most common cause of death by 2020.[2] In India, burden of COPD -14.84 million, out of which 2 to 22% are men and 1.2 to 19% are women.[3,4]

COPD causes deaths in 90% of patients in low-and-middle-income countries.[2,5] In India, the mortality rate

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of COPD is 64.7% which is highest in the world.[6] COPD is now recognized as the systemic inflammatory disease, which is known to cause extra pulmonary manifestations and predispose patients to increased mortality and morbidity.[7] The common systemic co-morbid conditions associated with COPD are cardiovascular diseases (CVD)[8] which accounts for 50% of COPD deaths.[2,9,10] For decades, cigarette smoking was thought to be the significant risk factor for cardiovascular disease in COPD . Now studies have proved that COPD is an independent risk factor for development of cardiovascular disease[12-14] and showed that lower the FEV1, the higher the risk of CVD in COPD patients.[15] This is because the levels of FEV1 were known to be reduced in low grade systemic inflammatory conditions such as in COPD.[16] Since low-grade systemic inflammation is associated with atherosclerosis, reduced FEV1 might be a significant risk factor for cardiovascular morbidity and mortality, independent of cigarette smoking, hypertension and serum cholesterol.[17,18]Lung Health Study showed that age, male gender, married state, smoking, higher diastolic blood pressure and reduced pulmonary function were the most potent cardiovascular risk factors in COPD, while smoking cessation, education, high forced expiratory volume in one second (FEV1) and alcohol use were protective.[11]

COPD also increases sympathetic drive and causes autonomic dysfunction.[19,20] This is again a possible risk factor for CVD in COPD.[21] Baroreflex sensitivity (BRS) is a sensitive indicator of cardiac autonomic function and also a measure of cardiovascular risk including morbidity and mortality.[22]BRS is defined as the change in interbeat interval (IBI) in milliseconds per unit change in blood pressure. Decrease baroreflex sensitivity is reported as an index of CV risk and several studies have denoted that BRS is the broadcaster of the CV risk.[23-25] To the best of our knowledge, there is paucity of literature, revealing the relationship of BRS with disease severity in COPD patients. Hence in the present study, we intended to assess BRS among different stages of COPD (GOLD CRITERIA) and also identify the association of BRS with disease severity.

Materials and Method

Study Design: This was a cross sectional study conducted in 130 male COPD patients from January 2016 to July 2017. Sample size was estimated conveniently based on logistics, time and budget. We have decided to include 130 male COPD patients attending Department of Pulmonary medicine during the study period will be included in the study. It was designed to assess the pulmonary function tests, baroreflex sensitivity in male COPD patients and also to correlate BRS with FEV1. The study was conducted in Department of Physiology, JIPMER in Collaboration with Department of Pulmonary Medicine, JIPMER. Before the start of the study, approval from JIPMER scientific advisory committee and Institute ethics committee for human studies were obtained. In the study group, Pulmonary function tests (using SpirolabIII) and Baroreflex sensitivity (using FINAPRES) were studied. Later, subjects were classified into four subgroups based on GOLD stage criteria into mild, moderate, severe and very severe COPD.

Selection of Subjects: Male COPD patients (GOLD–Stage I-IV) aged between 35-60 years attending JIPMER pulmonology OPD were included in the study. COPD patients who cannot maintain oxygen saturation above 88%, COPD patients with systemic complications like coronary heart disease, arrhythmia, Stroke and Alcoholics, Diabetic, hypertensive patients, Tobacco chewers were excluded from the study. Subjects were health educated about the disease and are motivated to know their Disease severity & Cardiovascular risk associated with their Disease.

Experimental Design: The study was carried out in pulmonary function testing laboratory and autonomic function testing laboratory in Department of Physiology, JIPMER between 9 am to 1 pm. The laboratory conditions were quiet, the temperature of 25-27* C and adequate lightening provided. The subjects were explained clearly about study protocol in their native language and written informed consent was obtained from them. The participants were asked to have light Breakfast around 7 am and come for tests around 9 am as the subjects will have difficulty in performing PFT and BRS with the full stomach. The subjects were told to refrain from smoking, drinking caffeinated beverages and the morning dose medications for COPD at least 12 hours before the recording. In case of any adversity in health, such as fever, exacerbation of COPD, poor sleep or physical discomfort, tests were postponed and the subjects were asked to report on another convenient day. Subjects were also asked to stop taking medications affecting their attention like psychotropic drugs (sedatives & antihistamines).

Statistical Analysis of Data: SPSS version 19 was used for statistical analysis. The data were subjected to

Kolmogorov-Smirnov normality test. The continuous data such as age, duration of illness, anthropometric parameters (Ht, Wt, WC, HC, WHR, Wht R), heart and blood pressure were expressed as mean with standard deviation and the intergroup differences in mean between mild, moderate, severe and very severe COPD groups were compared using Oneway ANOVA test. BRS was expressed in median with interquartile range and the intergroup differences between mild, moderate, severe and very severe COPD groups were compared using Kruskal- Wallis test. The correlation between BRS and FEV1 was done using Spearman correlation test. The difference was considered statistically significant if probability of chance was less than 0.05.

Results

All the anthropometric, PFT & BRS, parameters were assessed in 130 COPD patients after obtaining informed consent from them and the data were analysed.

Comparison of parameters among different stages of COPD:

Demographic characteristics: The mean age, duration of illness, anthropometric indices (height, weight, BMI, waist circumference, hip circumference, waist-hip ratio and waist height ratio) of the study group were given in Table 1.

Heart rate and Blood pressure parameters: The mean Heart rate, SBP, DBP, PP, MAP of the study group were given in Table 2.

No significant difference was noted among the four subgroups of COPD.

Blood pressure variability parameters: Comparison of Blood pressure variability parameters among patients in different COPD severity groups was done using Kruskal- Wallis test and the post – hoc (Dunn's) test was performed to find the significant difference among the groups among the BPV parameters, the BRS levels were significantly reduced (Table-3) in very severe, severe and moderate COPD patients when compared to mild COPD patients. Significant negative Correlation (r=.322, p=0.05) was found between BRS and FEV1. (Figure 1).

Table 1: Demographic characteristics of study participants (n=130)

Variables	Mean±SD
Age (Years)	53.37±5.65
Duration (Years)	6.92±2.57
Height (cm)	161.33±7.72
Weight (Kg)	55.06±9.60
BMI (Kg/m^2)	21.15±3.47
Waist (cm)	89.00±8.39
Hip (cm)	108.77±16.02
Waist Hip Ratio	0.82±0.09
Waist Height Ratio	0.55±0.04

The values are expressed in mean with SD

Table: 2 Comparison of Basal heart rate and blood pressure among COPD patients

Cardiovascular Parameters	Total (n=130)	Mild COPD (n=18)	Moderate COPD (n= 41)	Severe COPD (n= 44)	Very Severe COPD (n= 27)	P value*
HR	76.7±9.7	67.41± 3.43	74.72± 3.09	78.50±4.77	85.93± 4.30	0.002
SBP	120± 13.8	106.25± 4.24	116.53± 4.85	120.97± 5.23	130.58± 6.05	0.001
DBP	75.9± 13.4	66.76± 3.68	71.25± 5.44	79.05± 6.43	86.08± 4.90	0.004
PP	43.34± 9.58	39.49± 4.45	45.28± 6.85	41.92± 8.93	44.49± 9.21	0.016
MAP	90.9± 10.58	79.92± 3.26	86.35± 4.15	93.03± 4.36	100.90± 3.06	0.000

Values are expressed as mean (SD); Comparison of variables between groups done using ANOVA

*p<0.05 is statistically significant among the four groups of COPD

HR: heart rate (bpm); SBP: Systolic blood pressure (mmHg); DBP: Diastolic blood pressure (mmHg); PP: pulse pressure (mmHg); MAP: mean arterial pressure (mmHg)

Table: 3 Comparison of blood pressure variability parameters at rest among COPD patients

HRV Parameters	Total (n=130)	Mild COPD (n=18)	Moderate COPD (n= 41)	Severe COPD (n= 44)	Very severe COPD (n= 27)	P value*
Blood Pressure Variability Parameters						
BRS	5.41(2.88)	9.64 (4.97)	6.21 (2.16)	5.07 (2.45)	4.02 (2.21)	0.002

Values are expressed as Median (Interquartile range); Comparison of variables between groups done using Kruskal Wallis test
*p<0.05 is statistically significant among the four groups of COPD
BRS- Baroreflex sensitivity (ms/mmHg)

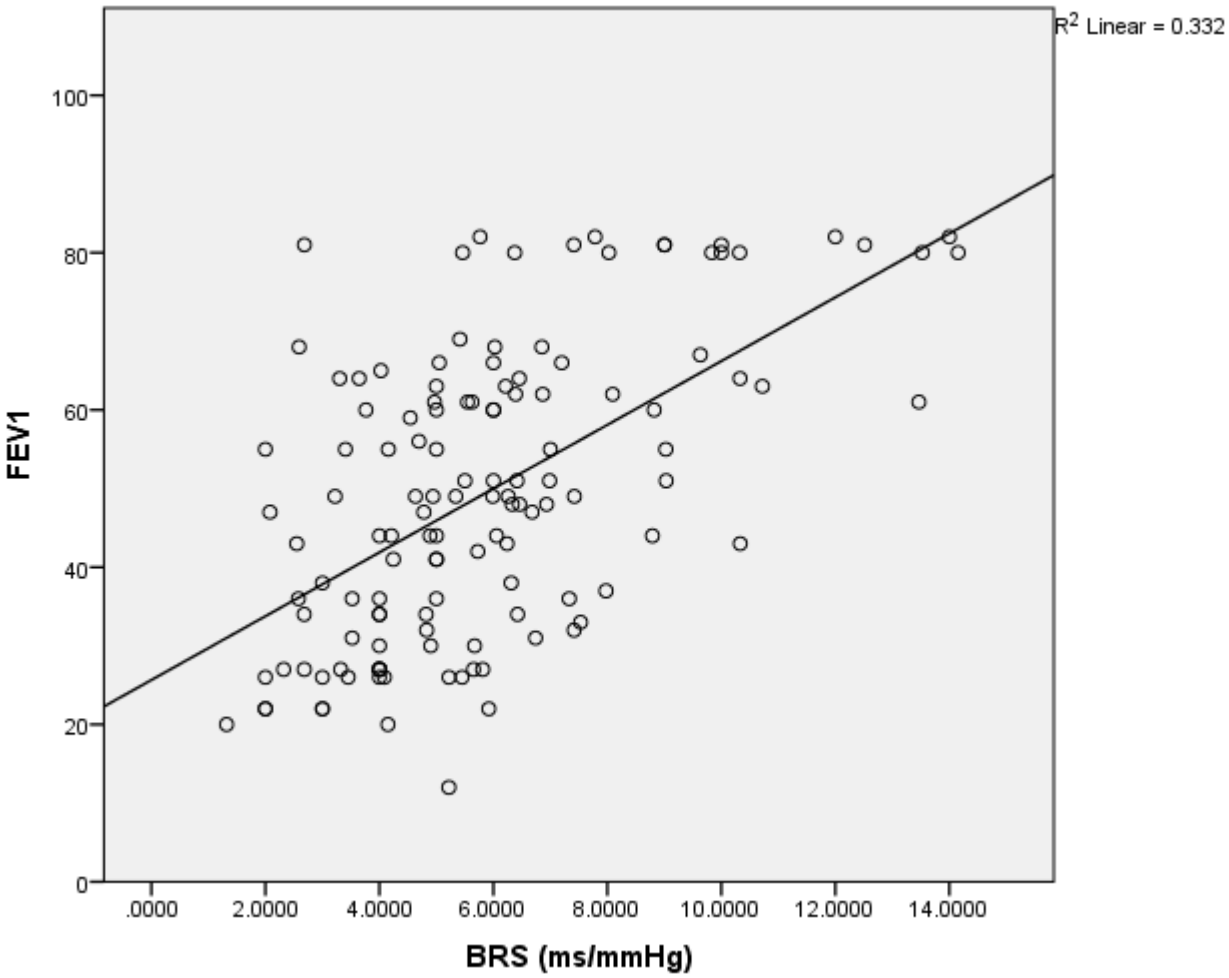

Figure 1: Linear relationship between FEV_1 and BRS.

Discussion

In our study population of 130 male COPD patients, anthropometric parameters such as height, weight, BMI, waist circumference, hip circumference, waist-hip ratio and waist height ratio were assessed. Later the mean height, weight, BMI (20.1, 20.8, 21 and 22,), waist circumference, hip circumference, waist-hip ratio (0.81, 0.82, 0.83 and 0.85) and waist height ratio (0.55, 0.54, 0.55 and 0.55) were compared among the four subgroups of COPD patients. We found that none of the anthropometric parameters showed statistical significance among the four subgroups of COPD patients. Baroreceptors sense the fluctuation in the blood pressure based on the stretch produced on the vessel wall. Baroreflex mechanism would increase parasympathetic activity and decrease sympathetic activity in response to an increase in blood pressure.[28] In our study, we measured Baroreflex sensitivity in COPD patients using FINAPRES.

In our study, we found decreased levels of BRS (5.41) in COPD patients when compared with the previous studies.[29] Decreased BRS is an indicator of reduced sympathovagal imbalance.[28] Our findings were similar to the study done by D Patakas et al., which showed that in COPD patients, the responsiveness of the baroreflex mechanism is reduced in response to rising in blood pressure.[26] However in that study, BRS was assessed by change in heart rate and blood pressure induced by injecting phenylephrine.When we compared BRS levels among four subgroups of COPD patients, we found that BRS levels were significantly reduced ($p<0.05$) in very severe, severe and moderate COPD patients when compared to mild COPD patients. We also correlated BRS with disease severity and found that Baroreflex sensitivity showed a negative correlation with disease severity. There was linear relationship existed between BRS and FEV1 (Figure-1). These results were in accordance with the study done by Christian F. Clarenbach et.al.[27] Impaired baroreflex sensitivity increases sympathetic activity, thereby increases CV risk. Studies done by La Rovere MT et al., Robinson TG et al., Johansson M et al., showed that BRS is also the broadcaster of the CV risk.[23-25] Increased sympathetic activity was again confirmed with significant increase ($p<0.05$) in rest DBP and HR as the disease severity is increased. So, COPD patients with reduced BRS have reduced sympathovagal regulation and are prone to CV risk. The risk increases as the severity of the disease is increased.

Conclusion

From the present study, we conclude that in COPD patients, as the disease severity increases, the levels of BRS were decreased. BRS is associated with COPD disease severity.

Conflict of Interest: Nil

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Ethical Clearance: Institute ethics committee for human studies, JIPMER

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Study of Variations in Heart Rate., QT and QTc During Different Phases of Menstrual Cycle

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Abstract

Aim: The present study was undertaken with the aim to investigate influence of hormonal fluctuation during menstrual cycle on ECG.

Materials and Method: The present study was carried out on 30 healthy female medical students in the age group of 18 to 23 years with normal menstrual cycle of 27-33 days. ECG was recorded on 2^{nd},11^{th},22^{nd} day of menstrual cycle (corresponding with menstrual phase, proliferative phase and secretory phase of menstrual cycle), using AD INSTRUMENT–POWERLAB®/30 Series.

Results: The study revealed that Heart rate was significantly ($P<0.05$) increased in secretory phase (98.26±10.44) compared to menstrual phase (91.85±10.27).QT and QTc interval showed increase during proliferative phase but not significant.

Discussion: Fluctuation in both estrogen and progesterone during menstrual cycle influence not only phase-II of cardiac action potential but also autonomic tone which could have led to prolonged QTc in Proliferative phase and increase in heart rate during secretory phase in present study, which provides a screening tool to avoid morbidity due to intake of drugs which prolonged QTc interval during menstrual cycle. But QTc interval in present study was not increased significantly as it was done during single cycle.

Keywords: *ECG, QTc, Menstrual cycle, influence of estrogen.*

Introduction

Women are at higher risk than men, of developing a dangerous drug-induced cardiac arrhythmia that can be fatal. This risk may be heightened during menstruation and ovulation[1]. Ventricular arrhythmias are more common in women and its incidence exhibits cyclical variation with the menstrual cycle[2].

The menstrual cycle is a repetitive phenomenon occurring during the reproductive life of a female that involves a patterned sequence of structural, functional and hormonal changes in the reproductive system[3]. It is also a window into the general health and well-being of women and not just are productive event**.** The cyclical fluctuations in the levels of FSH, LH, oestrogen and progesterone changes occurring during menstrual cycle not only affect oocyte maturation and the endometrial and vaginal environment but can also effect on the cardiovascular system which are of immense clinical significance[4].

The electrocardiogram (ECG) is a useful noninvasive tool for the diagnosis and prognosis of a wide range of cardiovascular conditions. An Electrocardiogram consists of a P wave, a QRS complex and a T wave. TheQT interval is measured from the beginning of theQRS complex to the end of the T wave. Corrected

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QT (QTc) takes into account the physiologic shortening of the QT with increases in heart rate and has commonly been calculated using Bazett's formula (QTc =QT/ ORR)[5].

The electrical events underlying the QT interval correspond with the phases of ventricular myocyte action potential (AP) generation at thecellular level. Specifically, the interval between the onset of the Q wave and the beginning of the S wave correspondsto the initial rapid upstroke of the AP (phase 0) and the early phase of repolarization (phase 1). The interval between the S wave and the peak of the T wave corresponds to theplateau phase of the AP (phase 2) and the peak of the Twaveto the end of the T wave corresponds to the final repolarization phase (phase 3) [6].

During phase 2, the L-type calcium channel current (ICa, L) plays a dominant role[7]. Up regulation of ICa, L channel currents lengthens the QT, whereas down regulation shortens the QT. During phase 3, the delayed rectifier potassium channel currents (consisting of the rapidly activating (IKr) and slowly activating (IKs) channel types) and the inward rectifier current (IK1) play a dominant role.[8] Up regulation of these channel currents shortens the QT, whereas down regulation lengthens the QT. Mechanistic studies suggest that testosterone, estrogen and progesterone have varying effects on the ICa, L, IKr, IKs and IK1 channel currents, providing a plausible mechanism for the QT alterations described in humans[9-14].

Experimental data in animals show that it regulates there polarization phase of the cardiac action potential reflected by the QTinterval[15]. Estrogen decreases potassium channel current and may lengthen the QT interval through this mechanism ie.,enhancement of IKs current in ventricular myocytes[9]. Saito et al.[16] compared the QTc of mice with high endogenous estrogen to the QTc of ovariectomizedmice with no detectable endogenous estrogen. They found a significantly shorter QTc in the ovariectomized group ($p < 0.05$). Further, when estradiol was added back to the ovariectomized group, the QTc lengthened to pre-surgical values, but these results could not be replicated in humans. Saba et., al[17] compared 36 premenopausal women (mean age 36 years) to 65 postmenopausal women (mean age 72 years). They found no significant difference between the average QTc of premenopausal (405 – 21 msec) and postmenopausal (419 – 30 msec) women (p = NS) despite significantly lower estradiol levels in the postmenopausal group. Hence it could be deduced from animal studies that these hormones could affect Electrocardiographic pattern.

This hormonal variation during menstrual cycle is known to influence autonomic nervous system with increased sympathetic activity and reduced vagal tone during secretory phase of menstrual cycle which can cause heart rate variability during different phases of menstrual cycle[21].

Among all phases of menstrual cycle estrogen is relatively high during proliferative phase. Burke et al.[24] measured the Q-Tinterval among the different phases of menstrual cycle and found no statistical difference among the 3 phases of the menstrual cycle (421 +/- 10, 423 +/- 18 and 420 +/- 18 in the menstrual, proliferative and secretory phases, respectively).

So also J.S. Hulot et al.[26] found that the mean QT interval was not different during various phases of menstrual cycle: 382.2±19.4 ms for Estrogen nadir period during menstrual phase versus 382.1±18.4 ms for Estrogen peak period (P=0.98) during proliferative phase.

In previous studies undertaken on ECG changes during menstrual cycle in humans were often contradictory and variable. So, the present study was undertaken tore-examine the findings in female of reproductive age group and thus provide a screening tool to avoid morbidity and mortality related to menstrual cycle.

Aims and Objectives: The present study was undertaken with the aim to investigate influence of hormonal fluctuation during menstrual cycle on ECG, with an objective to compare heart rate, QT interval and QTc interval in ECG changes during different phases of menstrual cycle.

Materials and Method

Source of Data: -30 Healthy female medical students aged between 18-23 years of medical students from Gandhi Medical College, Secunderabad were taken for the study.

Study Design: Cohort study

Parameters:

1. Age

2. Height
3. Weight
4. Basal Body Temperature
5. Heart Rate
6. QT and QTc Interval

Inclusion Criteria:

i. 30 healthy female medical students aged between 18-23 years were selected for the study.

ii. Normal regular menstrual cycles of 27-33 days.

Exclusion Criteria:

i. Subjects below 18 yrs and above 23 yrs of age.

ii. Subjects with endocrinal & gynecological disorders, chronic diseases, cardiac disorders and allergic conditions.

iii. Presence of infection at the time of sampling.

iv. Subjects with Diabetes.

v. Pregnant subjects.

vi. Subjects with irregular menstrual cycle.

vii. H/O drugs intake affecting menstrual cycle/cardiac function

Method of collection of data: ECG of Female medical students were recorded at the Human physiology Laboratory in the Department of Physiology of Gandhi Medical College, Secunderabad. It was done after obtaining their informed consent and institutional ethical committee clearance.

Anthropometric Variables:

Weight was recorded by using standard weighing machine and height was measured by stadiometer. BMI was calculated. Body mass index (BMI): This was calculated as weight (in Kg) divided by height in $(meters)^2$. BMI=Wt (Kg)/ht (m^2).

Basal body temperature was recorded daily to confirm ovulation. Temperature was recorded daily with the help of digital thermometer in the early morning before getting out of bed.

Recording of ECG: The ECG was recorded using ADINSTRUMENT–POWERLAB®/30Series. Gel was applied to both wrist and right foot. Red Electrode (-veelectode) wasp laced over right wrist, black electrode (+veelectode) was placed over left wrist and the green electrode (earth) was placed over right foot. These Electrodes were connected to channel 1 of Bio Amp Cable.

The subjects were instructed to abstain from tea and caffeine like beverages for 2 hrs. Prior to the experiment, have adequate rest, get at least 8 hours of uninterrupted sleep on the night prior to the experiment, have a normal breakfast on the morning of the experiment and to void urine prior to the recording. ECG changes were recorded during the following phases of menstrual cycle: Menstrual phase (2^{nd} day), Proliferative phase (11^{th} day) and Secretory phase (22^{nd} day).

All recordings were conducted between 10:30 A.M. to 1:00 P.M. It was ensured that the temperature of the human physiology lab was comfortable before and after the E.C.G. recording. After comfortable strapping and rest for 5 minon the couch. Students were instructed tore move metallic ornaments or watch, they were asked not to move their limbs during recording. Recording was taken for 2 minand the ECG analysis was done. Heartrate, QTinterval were recorded. From these recording suitable sections were taken out leaving behind the time of onset.

Statistical analysis: Was done using SPSS17.0 Software. To compare means of two independent groups, students t- test for independent samples was used. The values were considered statistically significant if $P - value < 0.05$

Results

30 female medical students were investigated during different phases of menstrual cycle namely Menstrual phase (MP), Proliferative phase (PP), Secretory phase (SP).

Table 1: Anthropometric measurement and ECG changes

Parameter	MP (Mean±S.D)	PP (Mean±S.D	SP (Mean±S.D)	MPVs PP		MPVsSP		PPVsSP	
Age (yrs)	18.53 ± 0.73	18.53 ± 0.73	18.53 ± 0.73						
Height (m)	1.57 ± 0.063	1.57 ± 0.063	1.57 ± 0.063						
Weight (Kgs)	53.73 ±9.49	53.47 ±9.40	53.63 ±9.44	0.109	P=0.95	0.041	P=0.99	0.068	P=0.95
BMI(Kg/m²)	21.79±3.37	21.89±4.52	21.75±3.37	0.097	P=0.96	0.136	P=0.87	0.046	P=0.99
Heart Rate (BPM)	91.85±10.27	93.10±8.58	98.26±10.44	2.04	P=0.63	2.04	P=0.03*	2.04	P=0.06
QTinterval (m.sec)	218.9±100.6	249.92± 59.9	243.9± 52.36	0.426	P=0.62	0.584	P=0.58	0.977	P=0.38
QTc interval (m.sec)	306.005±66.05	317.97±71.77	303.08±64.69	2.045	P=0.38	1.699	P=0.32	2.045	P=0.45

*P<0.05- BMI, Body Mass Index; MP, Menstrual Phase; PP, Proliferative Phase; SP, Secretory Phase

Discussion

This study was conducted in order to detect influence of phases of menstrual cycle on the duration of ventricular repolarization under physiological conditions and test the hypothesis that endogenous oestrogens prolong QT interval duration[15, 19.]

Age (years) i.e., height (meters) indifferent phases of menstrual cycle were (Mean±S.D) 18.53±0.73, 1.57 ± 0.063, respectively, where as Weight (Kgs), BMI (Kg/m²)(Mean±S.D) were 53.73 ±9.49, 53.47 ±9.40 and 53.63 ±9.44;21.79±3.37, 21.89±4.52 and 21.75±3.37. No statistically significant difference in weight and BMI were noted in different phases of menstrual cycle. This was consistent with study done by Haghighizadeh MH et al.[20].

Other observation in the study was Heart Rate (BPM) in MP, PP, SPwere (91.85±10.27),(93.10±8.58), (98.26±10.44), respectively. It was significantly increased in SP compared to MP. P=0.03* ie.,(P<0.05). Similar findings of mean H.R. 79.08 ± 8.84 during menstrual phase and 86.31 ± 7.98 during secretory phase were reported by Brar T.K. et., al [18]. This phenomenon can be explained by increased sympathetic tone and reduced vagal tone balance during secretory phase of menstrual cycle[21].

Oestradiol is implicated in decrease of the expression of potassium rectifier channels[22,23] Therefore slowing there polarization phase of the cardiac action potential and prolonging the QT interval. To prove this phenomenon Saba et al.[17] compared 36 premenopausal women (mean age 36 years) to 65 postmenopausal women (mean age 72 years). They found no significant difference between the average QTc of premenopausal (405 – 21 msec) and postmenopausal (419 – 30 msec) women (p = NS) despite significantly lower estradiol levels in the postmenopausal group. In the present study QT and QTcinterval (m.sec) in MP, PP, SPwere (218.9±100.6),(249.92± 59.9),(243.9± 52.36) and (306.005±66.05), (317.97±71.77) and (303.08±64.69) respectively. They were increased in PP (in this phase estrogen is relatively high) compared toot her phases but statistical significant values were not noted when compared during different phases of menstrual cycle i.e. MPVs PP, MPVsSP, PPVsSP.So also in study done by Burke et al.[24] no significant change was observed in the Q-Tinterval among the different phases of menstrual cycle. Similarly the maximum Q-Tinterval was found during proliferative phase whereas Q-Tinterval was shorter in the secretory versus the menstrual phase but not significant in other studies [25-28].

Conclusion

In the present study "The study of variation in heart rate, QT, QTc intervals indifferent phases of menstrual cycle"heart rate was significantly increased and maximum QT interval was noted during proliferative phase, though statistically not significant. This does not warrant endogenous estrogen has no influence on prolongation of QTc interval, as during a single menstrualcycle, progesterone levels but not estrogen levels have the dominant effect on ventricular repolarization in women[27].

Ethical clearance- Institutional ethical committee – Gandhi medical college

Source of Funding: Self

Conflict of Interest: Nil

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Variation in the CFF with Glycaemic Control in Type 2 Diabetes Mellitus Patients

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Abstract

Introduction: India has a large number of diabetic patients and there is a steep rise in the incidence of diabetes in the last decade. Diabetic control is categorized as poor control (HbA1c levels above 7%) and good control (HbA1c levels below 7%). Critical flicker fusion frequency (CFF) is a non-invasive test, which could help early detection of retinal dysfunction and optic neuropathic changes in Type 2 diabetes mellitus (T2DM).

Objective: To compare the CFF between

Group 1: T2DM (HbA1c < 7%).

Group 2: T2DM (HbA1c >7%).

Methodology: Sixty diagnosed T2DM patients were the subjects in this study. Thirty patients had their HbA1c < 7 g% and 30 >7 g%. The patients were recruited from Medicine department, Rajarajeswari Medical College and Hospital. CFF was measured using an in-house built apparatus. CFF values were noted and then analyzed.

Results and Discussion: The mean CFF in group I and the group II patients were 30.17+ 4.69 Hz and 26.32+ 6.70 Hz, respectively. This was highly significant (P = 0.012). The significantly lower CFF in the poorly controlled group II diabetics can be attributed to poorglycemic control in that group.

Keywords: *Critical Flicker Fusion Frequency, Diabetes Mellitus, Glycosylated Hemoglobin.*

Introduction

Diabetes mellitus is a group of metabolic disorders characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both. This metabolic disorder is the most prevalent, non-communicable disease in the world.[1]

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The global prevalence of diabetes is estimated to be 463 million people which accounts to around 9.3% of world population in 2019. The global prevalence of diabetes increases to 19.9% in the age group of 65 – 79 years. This data is collected from the prevalence data of diabetes from 211 countries covering upto 93.5% of adult population in the age group of 20-79 years. This data is alarming and warns us on the enormous increase in the prevalence of disease worldwide. [2]

Glycosylated hemoglobin is a type of hemoglobin in which glucose is irreversibly bound with it. Glycosylated hemoglobin is considered as a sensitive test for glycemic control in T2DM. It provides us an insight into the glycemic control of the patients for approximately last

120 days. Major Diabetic trials like ACCORD, UKPDS and DCCT studies have shown that good glycemic control reduces the morbidity and mortality in diabetes mellitus. HbA1c value below 7 g% would provide the patients with substantial life expectancy in diabetes mellitus. Hence in this study we consider patients with HbA1c below 7 as good glycemic control group. [3, 4]

The CFF is considered as the frequency of an intermittent light source, at which the flicker sensation disappears and is replaced by the perception of a steady light. CFF is considered as a sensitive indicator to detect visual dysfunction in patients with maculopathy, retinopathy, neuropathy and glaucoma. CFF is also used as a tool to predict the cognitive functions and also assess the Central nervous system arousal.[5, 6]

The objective of the study is to compare the CFF among the diabetics with differing glycemic control.

Materials and Method

The present study was conducted in the department of Physiology, Rajarajeswari Medical College and Hospital. Ethical committee approval was obtained. Sixty diabetic patients above the age of 35 years were recruited from the inpatient and outpatient department of Medicine. 30 patients had HbA1c values < 7 g% (Group I) and 30 had HbA1c values >7 g% (Group II). Written informed consent was obtained from subjects.

Inclusion Criteria: Diagnosed Type 2 diabetes mellitus patients of either gender above 35 years of age.

Exclusion Criteria: Patients associated with co-morbid conditions like Hypertension, Hypothyroidism were not a part of this study. Patients suffering from any kind of Demyelinating disorders like Multiple sclerosis were excluded from the study.Patients with local eye diseases like cataract, ptosis and pterygium are also excluded from the present study.

CFF Apparatus: CFF was estimated using an in-house built LED based CFF M1 model instrument which was pre-calibrated and checked for its performance. Stimulus light source was provided by a flickering red LED bulb (Light Emitting Diode, 5mm diameter, peak wavelength: 630 nm) fixed in the centre of a white background. Flickering light had equal on and off periods. The stimulus was kept at a working distance of approximately 30 cms. The LED light was mounted at the centre of a white square screen (15X15 cm). The examiner's panel has a knob to control the frequency of flicker in the red LED bulb (frequency range: 1 to 80 Hz).[7]

Red light is perceived by the eyes for a longer time than any other color and hence we used a red LED light stimulus in this study. [8]

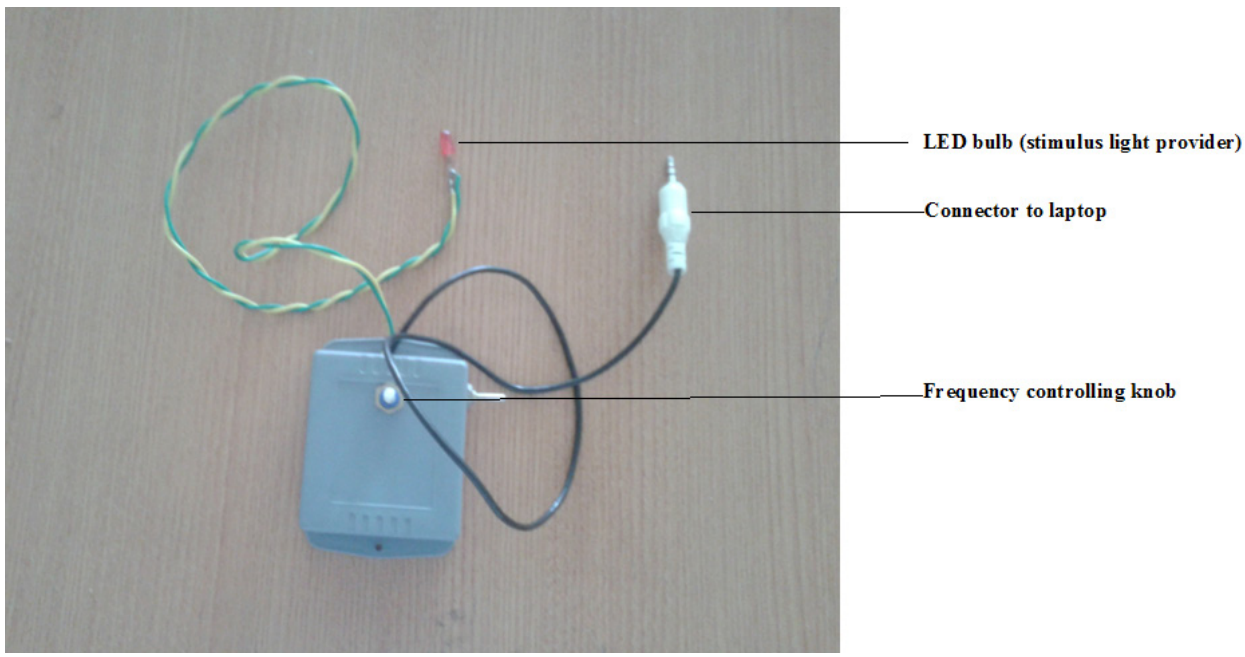

Figure 1: CFF measuring In-house built apparatu

CFF measurement protocol: The LED's mean luminance was 50 micro candles and the white background of 150 lux illumination. Two diagonal red lines are drawn across the square screen and the LED is placed at the point of crossing of two lines. A control knob is provided in the LED driving device which can increase or decrease the frequency of flicker of the LED.

During experiment all overhead lights were switched off except a 40 watt tube light, fixed in the ceiling. CFF for each eye was recorded separately with the other eye closed by a cloth. The mean CFF is calculated by using both the readings. Subjects were seated comfortably such that the testing eye was 30 cms from the light stimulus. The subject was asked to indicate when the flickering light fused into a single steady light. The stimulus frequency was gradually increased by the examiner from 1 Hz until the light was perceived as steady by the subject.

The duration of the flicker (T) at the frequency where the light was perceived as steady was noted using Audacity software.[7]3 such trials were given to the subjects and the reading with longest flicker duration was considered for the study.

The CFF was calculated as 1/T. The values were noted, tabulated and then analyzed.

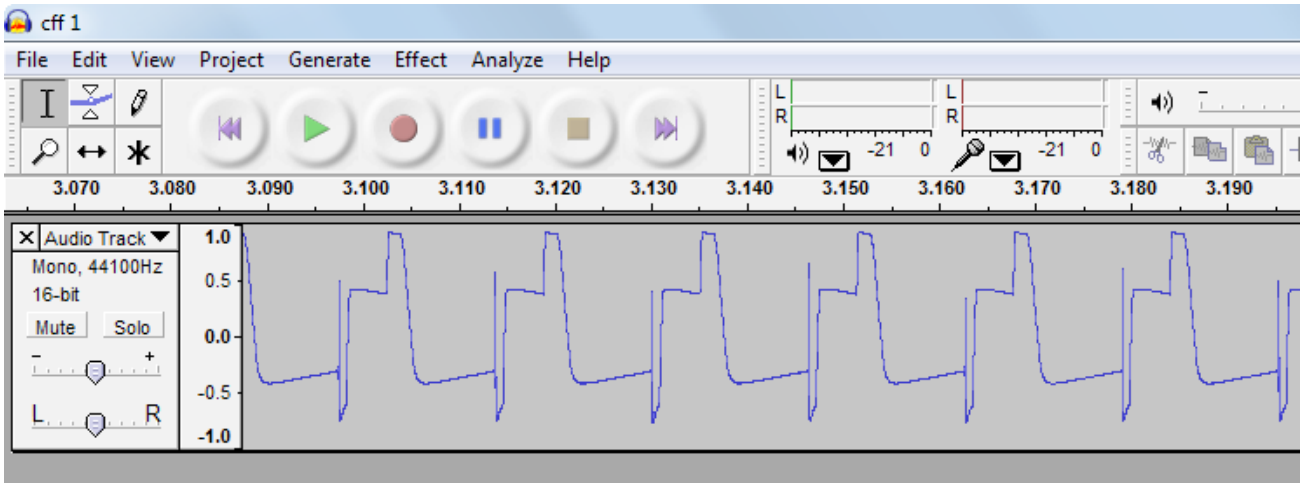

Figure 2: A sample recording of CFF by Audacity software

Results

Table 1: Gender and Age distribution between the groups

	Age (Years)	
	Males	**Females**
Group I	53.05±8.8 (n=17)	50.38±9.96 (n=13)
Group II	55.9±7.46 (n= 20)	51.3±11.23 (n= 10)

Values in Mean+SD

Table 2: Comparison of Anthropometric data among the groups

	Height (cms)	**Weight (Kg)**	**BMI (Kg/m^2)**
Group I n=30	162.56±7.56	61.7±10.7	23.17±2.628
Group II n=30	161.1 ±9.39	62.3±6.81	24.09±2.733

Values in Mean+SD

Table 3: Comparison of CFF values among the groups

	Group I, n=30	Group II, n=30
HbA1c (g%)	6.16±0.5	8.08±0.59#
CFF (in Hz)	30.17±4.69	26.32±6.70*

Values in Mean+SD, * - p>0.05, # - p>0.0001

Results

The present study had subjects of both the Gender. The mean age of the subjects of either group was similar and comparable. There was no significant difference in the Anthropometric parameters between the groups. The mean BMI of the Group I subjects (23.17+ 2.628) was comparable with that of Group II subjects (24.09+ 2.733).

The HbA1c values of Group I (6.16+0.5) was significantly lower than Group II (8.08+0.59). The mean CFF values in Group I and Group II were 30.17+4.69 and 26.32+ 6.70 respectively. CFF values were significantly higher in Group I than Group II (P value > 0.05).

Discussion

CFF was significantly higher in the better glycemic control group (Group I) than the group with the poor glycemic control (Group II).Our study results are similar to the findings of another study by Stavrou E. P and Wood J M (2005).

Flickering stimuli produce a higher demand on the metabolic function of the photoreceptors in order for them to respond to the stimuli. Thus, as patients with diabetes have compromised metabolic control, the extra demand required to respond to flickering stimuli may result in significant reduction in the CFF in diabetes subjects. [9]

A similar result was also seen in another study conducted by Lobefalo L. et al in 1997. This study was conducted in 45 childrens suffering from IDDM. The age group of diabetic children was 9 – 18 years. These children were assessed for diabetic retinopathy changes and they were included only if they did not have any retinopathy changes. Childrens with poorly controlled IDDM had a significantly lower CFF values compared to good metabolic control group. [10]

In a study conducted by Volbrecht et al, the CFF values improved (increased) as the blood sugar levels in the blood decreased in T2DM patients. According to that study, functional losses in diabetes patients are due to structural/vascular damage due to increased blood glucose levels. This results in blood vessel stress which itself may ultimately result in significant decreases in sensitivity.[11]

CFF is a very sensitive test and an optimal neurotransmission is a prerequisite for a higher CFF value. Any block in the transmission pathway will reduce the values of CFF. Any pathology involving the optic nerve transmission like optic neuropathy will definitely influence the values of CFF. [12] Hyperglycemia in type 2 diabetes mellitus initiates the process of neuropathy during the course of the disease. Any neuropathic changes involving the optic nerve in T2DM can itself reduce the values of CFF.[13]

Major limitation of CFF is its inability to differentiate between the retinal dysfunction and optic neuropathy, as CFF is altered in both the conditions. Fundoscopic evaluation of the subjects prior to measuring the CFF would help to provide more clarity with regards to the above limitation. This provides the scope for further research with CFF in diabetic patients.

Conclusion

CFF was significantly higher in better glycemic control group than the other group. This shows a better retinal function in better glycemic control group. Hence CFF can be used as a simple non-invasive bed side tool to assess the retinal and optic nerve function in type 2 diabetes mellitus patients.

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Cold Pressor Test, Moderate Anaemia in Second and Third Trimester of Pregnancy

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Abstract

Background: 2nd & 3rd trimester of pregnancy is associated with profound adaptive autonomic cardiovascular changes. Anaemia in pregnancy, which is a common problem in India is known to put pregnant female at higher cardiovascular risk.

Objective: The aim of this study is to measure & compare DBP response to CPT in both trimester in both control group & pregnancy with moderate anaemia (Case) for screening & diagnosis of autonomic imbalance.

Method: After measuring vitaldata, anthropometric data, DBP response to CPT were measured & compared among control & case group (13-39 weeks of gestation) in sitting position.

Result: A highly significant difference in Wt, SBP, DBP were observed in control group of 2nd trimester when compared with 3rd trimester. A highly significant difference was observed in Wt, DBP, DBP response to CPT of case group of 2nd trimester when compared with 3rd trimester; A highly significant difference was observed in Hb, SBP, DBP of case group of 3rd trimester when compared with control group during 3rd trimester of pregnancy;The chi-square test value shows that the observed DBP response to CPT in moderately anaemic pregnancy during 2nd & 3rd trimester is not due to chance.

Conclusion: This study has found CPT as simple, safe, cost effective, reliable test aiding to understand pathophysiology of anaemia during late gestation. It is also useful tool to predict & screen high risk pregnancy among anaemic pregnancies for early intervention.

Keywords: *Cold Pressor Test (CPT), Anaemia, Autonomic imbalance, Diastolic Blood Pressure (DBP).*

Introduction

A pre-eclampsia prevalence is of 7.5% of all pregnancies & it was found tobe slightly higher in primigravida[1] pregnancy with anemia[2,3], forms the base of doing our study in primigravida. Rang et al argued that since a higher sympathetic nervous activity has been observed in pre-eclampsia, changes in autonomic control preceding the onset of pre-eclampsia could provide early identification & it is essential for prophylactic interventions to reduce morbidity & mortality associated with this syndrome explains the aim of performing this study.[4,5] Different studies have been performed about the etiology of pre-eclampsia but there is no reliable & cost-effective screening test.[6,7] Although inflammation & extensive endothelial dysfunction of vessels are the main possible mechanisms of pre-eclampsia, but the pathogenesis of this syndrome has not been well understood.[6] Conducting this study in pregnant women with anaemia will aid to understand pathogenesis of this syndrome. The cold water causes stimulation of cold & pain receptors in the hand. The information is carried

to the brain through spinothalamic pathways. The reflex involves, rise in sympathetic outflow to the vasculature & heart resulting in rise in BP.[8] Results revealed that women when assessed at 12-20 weeks of gestation, who developed PIH subsequently, had heightened response to CPTin the form of more increase in both systolic & diastolic BP as compared to healthy pregnant women, who did not develop PIH.[9] Woisetschlerger[10] also had same observation & attributed this increase to increased vasoconstrictive response to physiological stimulus (cold).Studies show that significantly high incidences of development of PIH in late trimester in the healthy pregnant women who had shown higher cut off Values of BP response during CPT performed during early trimester of pregnancy, forms valuable objective for conducting our study to identify CPT as a routine screening test in pregnancy with moderate anaemia.[11]

Materials and Method: After obtaining approval from Institutional Ethical Comittee, CPT was performed in Applied Physiology laboratory from 9.00 a.m. to 11 a.m. at 24°C–26°C room temperature,of pregnant females (13–39 wksof gestation period) attending Antenatal Clinic of SMIMER Hospital, age 18-45 yr, with singleton pregnancy, who were ready to give written informed consent. In the control group, pregnant females with Hb level ≥11.0 g/dl & In a case group, pregnant females with moderate anaemia having Hb level between 7.0 g/dl to 9.9 g/dl, were assessed. For both group exclusion criteria were:

- H/o Multiple Pregnancy (e.g. Twins, triplets,etc.)
- H/o Significant illness of any system especially cardiovascular & Ventilatory System & other illness (e.g. malaria, asthma, tuberculosis)
- H/o Habit of smoking,drugs/alcohol intake or use of therapeutic drugs Esp. sympathomimetic drugs/ blockers.
- Females with pregnancy induced complication (e.g. Hypertension, Diabetes, Pre-eclampsia, Toxaemia of pregnancy).

Subjects were explained the procedure & were asked to avoid tea, coffee, food 2 hrs. prior to study. Anthropometric Data (height, weight) were measured on Standard Measuring Scale. Vital Data temperature, pulse rate, BP were assessed in supine position. **CPT (cold pressor test):** The test is performed in sitting position.[8] Digital BP instrument was calibrated with standard sphygmomanometer. First the baseline BP was measured using digital BP instrument & then the subject was instructed about the test. Cold water of 10°C was prepared & maintained at that temperature. The subject was asked to immerse the hand in water up to the wrist for 1 min. without touching the bottom of the cold water bath. After that the hand was removed from the water & it was covered with towel. The DBP was measured in contra lateral arm just before the hand was taken out of water. The DBP was taken again at 1.5 min & 4 min after the hand was withdrawn from the cold water. Highest DBP value was considered for calculation. Data were analysed using licensed SPSS 16.0 software. Statistical tests In dependant t–test, ANOVA (Mann–Whitney test), Chi–square test were used to analyse the obtained data. Results were considered significant at p value<0.05 & highly significant at p value<0.01.

Observation:

Table No. 1: Comparison of Mean of Parameters Between 2nd & 3rd Trimester (Control Group)

Parameter	Trimester	N	Mean	SD	p-value
Age (Years)	2nd	30	22.40	3.74	0.932
	3rd	46	22.32	3.30	
Hb (gm%)	2nd	30	11.36	0.50	0.085
	3rd	46	11.63	0.73	
Ht (cm)	2nd	30	150.90	5.23	0.417
	3rd	46	152.02	6.22	
Wt (kg)	2nd	30	48.56	12.82	0.0001*
	3rd	46	81.85	7.48	

Parameter	Trimester	N	Mean	SD	p-value
Pulse Rate (bpm)	2nd	30	90.40	10.80	0.464
	3rd	46	92.65	14.27	
SBP (mmHg)	2nd	30	104.33	9.26	0.006**
	3rd	46	96.10	14.15	
DBP (mmHg)	2nd	30	64.86	7.15	0.0001**
	3rd	46	109.58	12.85	
CPT (mmHg)	2nd	30	8.30	11.89	0.157
	3rd	46	5.27	6.46	

A highly significant difference in Wt, SBP, DBP were observed in Control Group of 2nd trimester when compared with 3rd trimester. No significant difference was observed in Age, Ht, Hb, Pulse rate, DBP response to CPT (Table No. 1).

Table No. 2: Comparison of Mean of Parameters between 2nd & 3rd Trimester (Case Group)

Parameter	Trimester	N	Mean	SD	p-value
Age (Years)	2nd	50	21.94	2.90	0.835
	3rd	52	21.82	2.88	
Hb (gm%)	2nd	50	9.06	0.79	0.949
	3rd	52	9.07	0.80	
Ht (cm)	2nd	50	150.18	5.06	0.102
	3rd	52	152.25	7.35	
Wt (kg)	2nd	50	47.10	5.49	0.0001**
	3rd	52	84.60	8.32	
Pulse Rate (bpm)	2nd	50	87.76	10.72	0.121
	3rd	52	91.07	10.67	
SBP (mmHg)	2nd	50	105.18	8.64	0.579
	3rd	52	103.94	13.27	
DBP (mmHg)	2nd	50	65.28	7.69	0.0001**
	3rd	52	91.09	13.89	
CPT (mmHg)	2nd	50	8.30	9.70	0.015*
	3rd	52	4.47	5.41	

A Highly Significant Difference was observed in Wt, DBP, DBP response to CPT of case group of 2nd trimester when compared with 3rd trimester; No significant difference was observed in Age, Hb, Ht, pulse rate, SBP (Table No. 2).

Table No. 3:Comparison of Mean of Parameters Between Case & Control Group (2nd Trimester)

	Group	N	Mean	SD	p-value
Age (Years)	Case	50	21.94	2.90	0.541
	Control	30	22.40	3.74	
Hb (gm%)	Case	50	9.06	0.79	0.000**
	Control	30	11.36	0.50	

	Group	N	Mean	SD	p-value
Ht (cm)	Case	50	150.18	5.06	0.545
	Control	30	150.90	5.23	
Wt (kg)	Case	50	47.10	5.49	0.480
	Control	30	48.56	12.82	
Pulse Rate (bpm)	Case	50	87.76	10.72	0.291
	Control	30	90.40	10.80	
SBP (mmHg)	Case	50	105.18	8.64	0.681
	Control	30	104.33	9.26	
DBP (mmHg)	Case	50	65.28	7.69	0.812
	Control	30	64.86	7.15	
CPT (mmHg)	Case	50	8.30	9.70	1.000
	Control	30	8.30	11.89	

Except Hb value, No Significant Difference in Age, Wt, Ht, Supine Pulse Rate, SBP, DBP, DBP response to CPT as observed in Case Group of 2nd trimester when compared with Control Group of 2nd trimester (Table No. 3).

Table No. 4: Comparison of Mean of Parameters between Case & Control Group (3rd Trimester)

	Group	N	Mean	SD	p-value
Age (Years)	Case	52	21.82	2.88	0.427
	Control	46	22.32	3.30	
Hb (gm%)	Case	52	9.07	0.80	0.000**
	Control	46	11.63	0.73	
Ht (cm)	Case	52	152.25	7.35	0.870
	Control	46	152.02	6.22	
Wt (kg)	Case	52	84.60	8.32	0.090
	Control	46	81.85	7.48	
Pulse Rate (bpm)	Case	52	91.07	10.67	0.535
	Control	46	92.65	14.27	
SBP (mmHg)	Case	52	103.94	13.27	0.006**
	Control	46	96.10	14.15	
DBP (mmHg)	Case	52	91.09	13.89	0.000**
	Control	46	109.58	12.85	
CPT (mmHg)	Case	52	4.47	5.41	0.051
	Control	46	5.27	6.46	

A Highly Significant Difference was observed in Hb, SBP, DBP of Case Group of 3rd trimester when compared with Control Group during 3rd trimester; But No Significant Difference was observed in Age, Ht, Wt, Pulse rate, DBP response to CPT (Table No. 4).

Table No. 5:Association of Value of DBP During CPT in Moderately Anaemic Pregnancy & in Healthy Pregnancy

AFT	Value	2nd Trimester			3rd Trimester		
		Control (n=30)	Case (n=50)	p-value	Control (n=46)	Case (n=52)	p-value
CPT (mmHg)	≥ 10†	13	20	0.769	21	21	0.598
	<10††	17	30		25	31	

† is considered as Normal response to Test., †† is considered as Abnormal response to Test.

The Chi-square Test value shows that the observed DBP response to CPT in moderately anaemic pregnancy during 2nd & 3rd trimester is not due to Chance (Table No. 5).

Discussion

CDKUOetal (2000) has described Biphasic Changes in Autonomic cardiovascular Control during Pregnancy which include higher Vagal & lower Sympathetic Modulation in the 1st trimester in Supineposition, because of increased Blood Volume, which is lasting upto mid-pregnancy. As gestational age increases further, Aortocaval compression caused by the Enlarging Gravid Uterus further compromises VenousReturn & CO,leading to a shift in Autonomic Nervous Activity towards an evenHigher Sympathetic & Lower Vagal Modulation in the 3rd trimester of Pregnancy.[12] which is observed during our study irrespective of level of Hbin Blood. There are reports of an increase in Resting Peripheral sympathetic Activity during 3rd trimester as measured by Peroneal Nerve Microneurography in patients withPIH as compared to Healthy Pregnant & Non-pregnant Females, Which returned to normal level in post-partum period.[13] It is generally accepted that the pre-eclampsia is characterised by the low Circulationg Volume & high Vascular Resistance[14,15] & also a higher CO was observed in early Pregnancy, who developed pre-Eclampsia later in pregnancy compared to healthy Pregnant Women.[16,17] this supports the high SBP value observed in our study group 2nd trimester of pregnancy with Moderateanaemia. There is increased refractoriness to Circulating Angiotensin II during normal Pregnancy, But women who destined to develop PIH or Pre-eclampsia have increased sensitivity to Angiotensin II, as a result of an Alteration in vessel wall Refractoriness rather than the Consequence of Changes in blood Volumeor Circulating renin-angiotensin Levels. Majortiy of study authors observed no Difference in Heart Rate between healthy Pregnant Woman & Pre-eclamptic Woman.[4] this explains unreliability of Heart Rate as a sole parameter to rule out High risk Case. Studies have shown that Neurovascular Transduction is generally Reduced in Normotensive Pregnancy, thereby dissociating Sympathetic Nerve activity from Vascular Resistance & arterial Pressure during CPT.[18] This explains the Variability in Observations of our Study. BP is maintained by CO & TPR;these two show Significant inverse Relationship that is, Higher the CO the lower is the Vascular Resistance. Sympathetic Nerves play a major role in regulating BP by Controlling the Resistance of the arterioles & the capacity of the Veins. During Cardiac function at Rest, they play only a minor Role in controlling the Strength & the Rate of the Heart Beat. During Physiological Stress however, increased Sympathetic Activity combined with Decreased Parasympathetic Activity increases the Rate & force of Contraction of the heart leading to an increase in CO.[19] MELANIE J BLAKE, Allison Martin et al (2000) has found that there occurs Significant change in supine SBP & DBP during different trimester in Normotensive Pregnancies[20], which is consistent with finding of our study. **Total Peripheral Resistance** (TPR) falls Significantly by at least 6 weeks of gestational age & reaches a Nadir of 40% below Non-pregnant Values by mid-gestation. Fall in TPR also makes CO to fall. The CO depends on patient position & is greatest when measured in Lateral Recumbent position. This is most notable during last Trimester. When, with the woman in supine Position, the gravid uterus & foetus impede venous Return (VR)to the heart. There is decrease inCO by 0.6 L/min in supine position. There is selective regional distribution of this Physiologic increase inCO. Uterine blood flow increases 10 fold to between 500 to 800 ml/min. Renal Blood Flow increases significantly by 50% during Pregnancy.[21,22] **BP** decreases in Pregnancy beginning as early as 7th week. This early drop probably represents incomplete Compensation of the fall inTPR by the increase in CO. When measured

in Sittingor Standing positions, SBP remains relatively stable throughout Pregnancy, whereas DBP decreases by a maximum of 10 mm Hg at 28 wks of gestation & then increases towards non-pregnant levels by term. In left Lateral position both decreases below Non-pregnant values at 24-32 wks of gestation[23,24]; which is not included in our study. The rise in Systemic Resistance & fall in CO without change in Arterial Pressure observed after assumption of the Upright posture in adult imply Peripheral Vasoconstriction & indicate that the circulatory changes of chronic Anaemia are labile rather than fixed.[25] explains the need to select stress test like CPT for our study group. The reduced BP response reported could be due to antagonistic effect of the products of the utero Placental unit, such as progesterone or a diminished Contractile Response of the blood vessels to Adrenaline[26] probably explains the low DBP response than the cutoff value while performing CPTin both the groups. No Significant difference in pulse rate observed in our study. Data suggested that Tachycardia & Increased flow Velocity are not physiologically adapted to prolonged strain but rather are mechanisms to meet acute bodily stresses such as fever,exercise, hyper metabolism & acute anaemia.[25] William B Porter et al[25] has described four mechanisms operating in anaemic patients which may increase the supply of oxygen to tissues when the oxygen carrying capacity of the blood is reduced;under conditions of rest, a rapid velocity flow & tachycardia with an increase in minute volume of CO is the first response to anaemia. As compensation develops, tachycardia & increased velocity flow are largely replaced by selective Shunting of blood & the removal of an increasing percentage of Oxygen in the tissue capillaries from each gram of circulating Hb. A reduction in TPR reduces cardiac work, thus tend to balance the effect of the elevation in CO. In patients with highest CO, tachycardia was not a prominent feature. Even breathing 100% oxygen show no change in elevated CO in anaemia.[25, 27] this supports our study result;the high SBP & low DBP observed during 3rd trimester of pregnancy with moderate anaemia. Martin et al[25] revealed that the severity ofChronic anaemia didnot correlate well with the level ofCO.They also revealed that the mean Venous Pressure was within normal limits for the anaemic Group & generally was unchanged after the therapy of Anaemia. The decreased Arterial Pressurein Anaemia might be a reflection of a number of events including generalised Vasodilatation & a reduced Bloodvolume. Maintenance of a normal Venous Pressure may well represent an effort to overcome these latter changes by Vasoconstriction & increasing the return of blood to the heart. The acute, immediate reversal of the high Output state of Anaemia by orthostatic Stress or by vasoconstrictor Drug indicates that the increased Blood flow is primarily mediated by lowered Peripheral Resistance due to vasodilatation rather than to low Blood Viscosity.[28,29]It has been postulated that the Hyperkinetic Response to anaemia in patients at rest occurs only when the Concentration of Hb falls beneath 7 gm/dl[30] explains the role of CPT to find out underlying Subclinical pathogenesis. Martin Duke et.al.[25] had revealed that in many patients, the hemodynamic values that appeared within normal limits in the Anaemic state were actually Altered when compared to that particular individuals normal state after therapy;explains the objective of performing this study.

Conclusion

This study has found CPT as simple, safe, cost effective, reliable test aiding to understand Pathophysiology of Anaemiaduring Late Gestation. It is also useful tool to Predict & Screen high risk Pregnancy among Anaemics for early Intervention. Many such studies & further evaluation are needed to support our observation forms the limitation of our study.

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Assessment of Quality of Sleep in Nurses: A Cross Sectional Study

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Abstract

Shift-work is common in healthcare professionals and has been associated with sleep problems. Decrease in the sleep quality results in increase in stress level which negatively impacts the health and quality of life. Objective: To assess the of quality of sleep among nurses

Method: Design A Cross-sectional comparative study was conducted on a group of 100 nurses who work during morning, afternoon, night shifts in different department of Saveetha Medical college hospital from January 2019 to March 2019. Healthy nurses aged 23-35 were included in the study after obtaining Ethical approval. The Pittsburgh Sleep Quality Index (PSQI) was used to measure of sleep quality.

Results: This study revealed that there was a significant sleep disturbances in 16% and the sleep duration was less than 6 hrs in 12%, also the Subjective sleep quality was bad in 11%, the Sleep latency was more than 31 min in 11% and the habitual sleep efficiency was less than 84% in 21%. The PSQI scores which were poor in 39% of the studied population.

Conclusion: In our study we found that there was significant sleep disturbances among the nurses which would contribute to stress and stress related disorders.

Keywords: *Sleep quality, Nurses, Pittsburgh Sleep Quality Index (PSQI), Thandalam.*

Introduction

Sleep is a naturally recurring state characterized by reduced or absent consciousness, relatively suspended sensory activity and inactivity of nearly all voluntary muscles. Sleep is also a heightened anabolic state which helps in the growth of the immune, nervous, skeletal and muscular systems. Sleep also helps in the consolidation of memory.

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Sleep wake cycle is controlled by circardian clock and the circadian rhythm determines the timing of structured and restorative sleep episodes. Human sleep needs vary by age and among individuals and sleep is considered to be adequate when there is no daytime sleepiness or dysfunction.

Nursing is the main force at hospitals. Nurses compromise their own health for promoting the health of others by working long 12 hours shift that are typically extended because nursing duties do not have a clock in or out time. In most of the hospital workers the major stress contributors are over work, under-staffing, tight schedules, paper work, demanding patients and patient deaths. Family commitments (household chores, childcare etc. in addition to the work strain can cause difficulty falling asleep, frequent awakening, premature

awakening, unhealthy behavior, such as taking sleep medications and mood disturbance.

Shift-work is very common in healthcare and has been associated with sleep problems and decrease in the sleep quality results in further increase in stress level. Everyone experiences stress and chronic stress had become a mainstay in modern life and people who are stressed end up eating more, indulge in smoking and drinking. They also tend to sleep and exercise less. These habits further worsen the problem. Thus shift work and the poor sleep quality causes negative impact on health and quality of life. This study is aimed at assessing of quality of sleep and its association with stress level among nurses.

Methodology

Study design A Cross-sectional comparative study was conducted on a group of 100 nurses who work during morning, afternoon, night shifts in different department of Saveetha Medical college hospital from January 2019 to March 2019. Healthy nurses aged 23-35 were included in the study after obtaining Ethical approval from the Institutional Ethics Board, Saveetha Medical college and Hospital. Prior written informed consent was obtained from all the participants. Nurses with systemic illness such as diabetes, hypertension, nurses who consumed antidepressant drugs and participants with defect in adrenal cortex that rises cortisol level in blood were excluded from the study. The Pittsburgh Sleep Quality Index (PSQI) was used to measure of sleep quality.

The Pittsburgh Sleep Quality Index (PSQI) was developed by Buysse and colleagues to provide a standardized measure of sleep quality. The PSQI is based on eighteen self reported questions; measuring the components of: subjective sleep quality, sleep latency, habitual sleep efficiency, use of sleeping medication, sleep duration, sleep disturbances and daytime dysfunction. The score from each category is added to achieve a global score that ranges from 0 - 21 . A cutoff score of 5 or above is indicative of a sleep disturbance.

Statistical analysis: Then the data was entered in database Statistical Package for the Social Sciences (SPSS) software version 21. Statistical analysis of the data was done using Data analysis was done using Fisher's exact test and P value < 0.05 was considered as significant.

Results

The study was conducted on a group of 100 nurses who work in different department of Saveetha Medical college hospital using PSQI and the results are tabulated below.

Table 1: Distribution of Study Participants Based On Their Subjective Sleep Patterns (N=100)

Characteristics	Categories	Frequency (n=100)	Percent
Subjective sleep quality	Very good	39	39%
	Fairly good	50	50%
	Fairly bad	8	8%
	Very bad	3	3%
Sleep latency	< 15 mins	68	68%
	16- 30 mins	21	21%
	31- 60 mins	9	9%
	> 60 mins	2	2%
Sleep duration (hours)	>7	71	71%
	6-7	17	17%
	5-6	9	9%
	<5	3	3%
Habitual sleep efficiency (score)	>85%	79	79%
	75- 84%	20	20%
	65- 74%	1	1%

Table 1 shows that the Subjective sleep quality was bad in 11%, the Sleep latency was more than 31 min in 11%, sleep duration was less than 6 hrs in 12% and the habitual sleep efficiency was less than 84% in 21%.

Table 2: Sleep Quality (PSQI scores)

Sleep Quality	Number	Percent
Good	61	61%
Poor	39	39%
Total	**100**	**100%**

Table 2 shows the PSQI scores which were poor in 39% of the studied population.

Table 3: Association between subjective characteristics and quality of sleep

Characteristics	Categories	Quality of Sleep			Fisher's Exact Test	P value
		Good	Poor	Total		
Sleep Disturbances	No Disturbances	0	1	1	6.621	<0.05
	Mild	55	28	83		
	Moderate	6	9	15		
	Severe	0	1	1		
Hours of Sleep	> 7	53	18	71	19.78	<0.05
	6-7	6	11	17		
	5-6	2	7	9		
	<5	0	3	3		
	Total	61	39	100		

Table 3 shows that 16% had sleep disturbances and the sleep duration was less than 6 hrs in 12%

Discussion

The goal of this study was to assess sleep quality nurses who work in different department of Saveetha Medical college hospital. This study revealed that there was a significant sleep disturbances in 16% and the sleep duration was less than 6 hrs in 12%, also the Subjective sleep quality was bad in 11%, the Sleep latency was more than 31 min in 11% and the habitual sleep efficiency was less than 84% in 21%. The PSQI scores which were poor in 39% of the studied population.

Shift-work is common in healthcare professionals and has been associated with sleep problems. Decrease in the sleep quality results in increase in stress level which negatively impacts the health and quality of life. Studies by other researchers on sleep quality shows how shift work and stress affects health and quality of life. In 2006 Gangwisch and colleagues studied the effect that sleep duration had on the risk factors for diabetes. There was a noted increase in the risk for diabetes for the subjects who slept < 5 or > 9 hours pernight.[1]

In 2007 Stamatakis and Brown examined the correlation between sleep duration and obesity-related risk factors and found that the subjects that had short sleep duration had more risk factors for obesity.[2] Also in a study by Baker & Driver in 2007 it was found that sleep disturbances in nurses exposed them to physical, emotional, mental and social stress. Sleep changes in women affects the different phases of the menstrual cycle, Pregnancy, postpartum recovery and menopause.[3]

Furthermore, sleep difficulties are also closely associated with psychiatric disorders such as depression, alcoholism and bipolar disorder and up to 90% of adults with depression are found to have sleep difficulties. Lack of sleep contributes to reduced concentration, short-term memory, learning ability and behavioral self control. Additionally, researchers at the National Institute of Health have reported that decreased sleeping may lead to a decrease in total lifespan.[4]

In a study by Labyak et al in nurses, it was found that poor sleep quality tends to increase rates of cancer,

cardiovascular diseases, digestive diseases and irregular menstrual cycles.[5] Poor sleep has also beenpositively associated with nurses‘ medical errors and with driving accidents which affect public safety.[6] Consequently, medical errors by nurses are significantly associated with poor mental health.[7]

Chung et al in their study found that persistent day-night rotating shift work, smoking and baseline metabolic syndrome components associate with the progression toward metabolic syndrome for middle-aged female workers. Johnson AL and Brown K Studied the relationship between Sleep deprivation and psychomotor performance among night-shift nurses and found A significant (p<.001) relationship was found between psychomotor performance and hours of sleep.

Conclusion

Critical care nurses are trained to provide specialized nursing care, to makerapid decisions and to perform advanced assessments and motor skills. Night shift work can lead to sleep deprivation, which in turn can threaten the health and safety of both patients and nurses

The findings of the study can help the nurses to increase the awareness of how the nurses to increase the awareness of how they stressed. So this will them to plan healthy intervention to improve quality of life and practice simple strategies to cope with their stress

Limitations of the Study: The sample size is less so, Similar study can be repeated in other intensive care units and by increasing the size of the sample.

Source of Funding: Self

Conflict of Interest: Nil

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Association between Quality of Sleep and Academic Performance in Medical Students: A Preliminary Study

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Abstract

Background: Medical students are more prone to daytime sleepiness, sleep deprivation and irregular sleep schedules, as they have less free time, longer courses and working hours compared to other professional students.

Aim: To assess the quality of sleep and to find out the association between sleep quality and academic performance among medical students.

Methodology: This cross sectional study was conducted among 176 medical students. They were subjected to Pittsburgh Sleep Quality Index (PSQI) questionnaire to assess their sleep quality over a one-month period. A PSQI global score of 5 and greater than 5 was considered indicative of poor sleep. Academic performance was assessed from their internal assessment scores conducted during that period. The data was analyzed using the unpaired students 't' test and Pearson's correlation test

Results: Our study included 176 students from all the phases of MBBS curriculum. 24 percentage students had poor quality of sleep. In our study, there was no statistically significant difference in the performance of good sleepers (57.94 ±18.06) and poor sleepers (58.80 ±17.37) with a p value of 0.785. Our study results showed a negative correlation between global PSQI scores and assessment scores of the students (r = 0.57 and P =0.449).

Conclusion: In our study association between sleep quality and academic performance was not statistically significant. Assessment of sleep quality helps to indentify the students at risk and plan the specific programs to improve the quality of sleep.

Keywords: *Sleep quality, academic performance, medical students.*

Introduction

Medical students are exposed to multitude of changes when they enter into their professional life after completing their school education. Owing to highly demanding professional and academic requirements medical students are considered to be a vulnerable population of poor quality of life.[1] Medical students have compromised quality of life as they have to undergo long and intensive academic years.

Medical students are more prone to daytime sleepiness, sleep deprivation and irregular sleep schedules as they have less free time, longer courses and working hours compared to other professional students. Over the period of time, poor sleep quality will lead to chronic inability to recover from stressful conditions

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which may lead to burnout.[2] Sleep plays an integral role in learning, consolidation of memory and performance. Sleep deprivation causes loss of concentration, memory impairment and compromised physical and academic performance[3]

Sleep disturbances are found to be more prevalent among medical students owing to their demanding academic activities and work culture. Research in this area will sensitize the medical students and professionals about their mental and physical well being. As limited number of studies is reported in India in this regard our study aimed to measure the quality of sleep and also to find out the association of sleep quality and academic performance among medical students.

Methodology

This cross sectional study was conducted among 176 medical students of age group 17-25 years studying in PSG Institute of Medical Sciences and Research belonging to all phases after obtaining their informed consent and institutional ethical committee clearance. They were subjected to Pittsburgh Sleep Quality Index (PSQI) questionnaire to assess their sleep quality. 176 students who are willing to be a part of study were included in the study. Students who have history of chronic cardiovascular and respiratory diseases, neuromuscular diseases, arthritis, diabetes mellitus, sleep disorders like insomnia and any other psychiatric illness were excluded from the study.

Students were provided with Pittsburgh Sleep Quality Index (PSQI), 19 item scale along with seven components, to measure their quality of sleep over a one-month period. The sum of the scores for the seven components such as subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction helps to yield global sleep score. A PSQI global score of 5 and greater than 5 was considered to be indicative of poor sleep [4.] Academic performance was assessed from their internal assessment scores conducted during that period.

Statistical Analysis: Statistical analysis was done using an IBM SPSS software 23.0 version. The data was analyzed using the unpaired students 't' test and Pearson's correlation test. Continuous variables were presented as mean ± Standard Deviation (SD). Correlation of academic scores with the PSQI scores was performed using Pearson's correlation. To compare the academic scores between good sleepers and poor sleepers independent student 't' test was used. For all statistical tests p value < 0.05 was considered statistically significant.

Results

Our study included 176 students from all the phases of MBBS curriculum., 65% were females and 35% were males .42 students had the sleep scores of 5 above 5 and they were classified as poor sleepers. In our study, academic scores and sleep scores were analysed and there was no statistically significant difference in the performance of good sleepers (57.94 ±18.06) and poor sleepers (58.80 ±17.37) with a p value of 0.785). (Table 1).

Table 1 Academic scores of good and poor sleepers

Variables	Academic Score Mean ± SD	p value
Good sleepers	57.94 ±18.06	0.785
Poor sleepers	58.80 ±17.37	

Our study results showed a negative correlation between global PSQI scores and assessment scores of the students (r = - 0.057 and p =0.449). This revealed that academic performance of students decreased when sleep scores increased. (Table 2).

Table 2 Correlation between Sleep score and academic performance

Variables	Correlation Coefficient (r)	p value
PSQI scores	- 0.057	0.449
Academic Score		

Discussion

In the present study 24% students were reported to have poor quality of sleep .Studies conducted among medical students in Brazil and Mexico showed 28.2% and 24 % of students were found to have insomnia.[5,6] Extensive medical curricula,long duration and high intensity of study contribute to poor quality of sleep among medical students. Once they enter the medical profession students encounter increased academic pressures and stress levels. They are forced to change their sleep and work pattern in order to adjust and cope up with their daily academic schedule.[7,8] In United States, sleep quality of medical students (measured by PSQI) was found to be poor compared to general

population.[9] Magnitude of sleep problem on medical students affects students' cognitive ability and also leads to health-related problems such as anxiety, depression and burnout.[10,11] Poor sleep quality among medical students was reported in several studies. Results of a study conducted by Anjum, Bajwa & Saeed among Pakistani medical students showed that the prevalence of disturbed sleep patterns was found to be higher than non-medical professionals.[12]

Sleep enhances cognition, medical students should have good quality of sleep as they are in position to comprehend and retain complex facts which they have to reason out and apply in their practice.[13] Curcio et al. in his study suggested that student learning and academic performance are closely related to sleep quality and quantity.[14] The consequences of sleep deprivation and daytime sleepiness result in increased risk of academic failure and compromised learning. In a study conducted among Hong Kong medical students poor sleep quality have negative impact on their academic performance.[15] Similarly in our study, students with sleep score ≥5 showed average academic performance. In the present study a significant association was not observed between sleep quality assessed by PSQI and academic performance. Our result was in line with the study conducted among first year medical students in Kerala[16] Moreover academic performance of students also depends upon their commitment, concentration, motivation towards academic activities. Along with sleep disturbances, incidence of burnout is found to be reported higher among business students, medical students and dental students.[17, 18]

Limitations: Assessment of quality of sleep based on the self reported questionnaire made our data more subjective. Other factors which affect academic performance of students like nutrition, socioeconomic status & their mode of stay (hostler or day scholar) which also play role in their performance were not considered. Multicentric longitudinal studies with large sample size considering all the factors is warranted to study relationship between sleep quality and academic performance among medical students

Conclusion

In our study, association between sleep quality and academic performance was not statistically significant. Assessment of sleep quality helps to indentify the students at risk and plan the specific programs to improve the quality of sleep to ensure health, safety and academic performance of medical students.

Conflict of Interest: Nil

Source of Funding: Self

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Quality of Life Assessment in Treated Breast Cancer Patients Before and After Yoga Therapy

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Abstract

Back ground: Globally the incidence of breast cancer is second to that of lung cancer . Breast cancer remains the leading cause of cancer related deaths among women. Important aetiology for breast cancer are hormonal exposure & genetic causes. Breast cancer is managed by surgery, radiotherapy & chemotherapy. The cancer and various treatment modalities produces complications like hair loss, fatigue, skin changes, pain, fatigue and restriction of mobility. Yoga improves the quality of life both health related & psychology related problems.

Aim: The aim of this study was to assess the quality of life before and after yoga therapy in breast cancer patients who had completed active treatment

Materials and Method: 30 patients with breast cancer in the age group between 35 – 50 yrs participated in the study. Patients were selected from oncology department, RGGGH, Chennai. After obtaining the informed consent, Yoga & relaxation exercises were taught to all patients and continued for a period of three months under supervision . Quality of life was assessed by European Organization for Research and Treatment of Cancer (EORTC) Breast Cancer-Specific Quality of Life Questionnaire (QLQ-BR23) before and after yoga.

Result: There was a significant improvement in quality of life following yoga therapy with P value <0.0001 .

Conclusion: Yoga therapy can be recommended as one of the lifestyle modification practices in breast cancer patients.

Keywords: *Breast cancer patients, yoga, Quality of life assessment.*

Introduction

Globally the prevalence of breast cancer is second to that of lung cancer . Breast cancer represents the leading cause of cancer related deaths among women. It accounts for 1 – 3 % of all deaths in woman in developing countries. In worldwide about 12% of women are affected with this disease.

Both genetic & hormonal factors play an important role in breast cancer [1]. About 5 – 10% of breast cancers are hereditary[2] & occur in patients with mutation of BRCA1, BRCA2 or TP53 genes. Risk factors for breast cancer are prolonged oestrogen exposure, early menarche, late menopause and use of Hormone Replacement Therapy (HRT).

Breast cancer is often managed by surgery, radiotherapy & chemotherapy. Cancer and it's therapy cause depression, pain, sleep problems, mood disturbances & anxiety[3]. Psychological symptoms

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interfere with the daily activities of patients including self care[4] .

Radiation also affects the skin and mobility of the patients[5]. These changes affect their normal function, working ability, relations within the family & society.

Danhaur SC [6] et al gave restorative yoga which has active relaxation intervention to breast & ovarian cancer patients & found yoga has benefit to relieve psychological stress, anxiety, negative affects and overall quality of life is improved .

This study aims to evaluate whether yoga therapy improves the quality of life in treated breast cancer patients.

Benefits of Yoga Therapy: Yoga improves the quality and circulation of the blood. It strengthens the endocrine and nervous system. By eradicating insomnia, it lead to good, normal or deep sleep. It reduces backache, headache, fatigue, anxiety. Yoga training eliminates pain in the lower back, pressure of the spinal nerves, improves the appetite and digestion. By improving the production of Endorphin, it makes relaxation of bodyand mind. It relives the stress by supplying more oxygen to the body and prevents stress related headache.

Aim: The aim of this study was to assess the quality of life before and after yoga therapy in breast cancer patients who had completed active treatment.

Inclusion Criteria:

- Female patients with breast carcinoma under stages 1 and 2
- Age group of 35–50 yrs
- Patients who underwent Mastectomy
- Patients who completed Chemotherapy
- Patients who completed Radiotherapy

Exclusion Criteria:

- Male carcinoma breast cancer
- Breast cancer patients on chemotherapy
- Pregnant patients
- Lactating patients
- Inflammatory breast disease patients
- Patients with benign disorders of breast
- Cardiac patients
- Patients suffered from chest malformation
- Chronic pulmonary disease patients
- Other concurrent medical illness (i.e. respiratory, cardiac or renal failure)

Methodology

After obtaining ethical clearance Quality of life was assessed in breast cancer patients by European Organization for Research and Treatment of Cancer Breast Cancer-Specific Quality of Life Questionnaire (EORTCQLQ-BR23) questionnaire method. Yoga & relaxation exercises were taught to the patients. They continued the exercises for a period of three months under my supervision. After three months quality of life was again assessed .

Breast Cancer Module: QLQ-BR23

European Organization for Research and Treatment of Cancer (EORTC) Breast Cancer-Specific Quality of Life Questionnaire (QLQ-BR23) consist of 23 questions. The breast cancer module incorporates five multi-item scales to assess systemic therapy side effects, arm symptoms, breast symptoms, body image and sexual functioning.

Table 1: Recommended Asana for Breast Cancer Patients

S.No.	Yoga Asana	Time Duration
1	Suryanamaskara	5-8min
2	Ardha halasana	2-3min
3	Matsyasana	2-3min
4	Sethu bandhasana	2-3min
5	Bhujangasana	2-3min
6	Yogamudra	2-3min
7	Ushtrasana	2-3min
8	Gomukasana	2-3min
9	Trikonasana	3-4min
10	Deep relaxation technique	3-5min
11	Ujjayi pranayama	3min
12	Nadisodana	3min
13	Trataka	5-7min
14	AUM Meditation	5-7min
	Total	**43-47 min**

In addition, single item assess sexual enjoyment, hair loss and future perspective. Item range is the difference between the possible maximum and the minimum response to individual items; most items take values from 1 to 4.

Result

The total EORTC QLQ-BR23 score in this study population before yoga therapy was MEAN ± SD 68.57 ± 3.47 & after yoga was 48.83 ± 3.15 . There was a significant improvement in quality of life after yoga therapy with P value <0.0001 (Table.1, Fig. 1)

Table 2: Eortc QLQ-BR23 Total Score in Treated Breast Cancer Patients Before and After Yoga

Total QLQ–BR23 Score	Before Yoga	After Yoga	P - Value
Mean±SD	68.57±3.47	48.83±3.15	0.0001 ***

***P value <0.0001: Extremely statistically Significant

Discussion

This study was done in 30 breast cancer patients completed treatment in the age group of 35 – 50 years, yoga therapy was effective in improving the quality of life.

Studies by Raghavendra M Raoal [7] and Cramp F[8] et al also showed the same findings .

Various postures were attained by doing yoga asana. These postures make muscles more flexible & improves its strength . While performing breathing exercises, abdominal and chest muscles become active & work rapidly.

Nikkanen TA[9] et al reported that these training reduces the upper limb dysfunctions following surgery, declines the back pain & produce improvement in shoulder joint motion .

Yen LL Patric WK [10] had reported in his study that the relaxation techniques practiced reduces the body's resistance . Yoga increases flexibility, body energy level, relaxation of body and mind & a sense of wellbeing[11]. It also reduces body pain and stress[12].

Yoga asana gives calmness to mind, relieves irritation, tension and depression. It also increases the sleep quality, body circulation, energy level of body. Thus Yoga asana improves the quality of life.

Conclusion

Yoga & breathing asana practiced in breast cancer patients improves the quality of life. So Yoga therapy may be recommended as one of the lifestyle modification practices in breast cancer patients.

Ethical Clearance: Taken from Madras medical college Ethical Committee

Source of Funding: Self

Conflict of Interest: Nil

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Role of 'C' Reactive Protein, Haemoglobin, Red Blood Cell, White Blood Cell and Platelet in Sickle Cell Disease Patients of Tribal District

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Abstract

Sickle cell gene is widespread among many tribal and other general population groups in India. This disorder is recessive in nature. The heterozygous [HbAS] are absolutely asymptomatic but the homozygous [HbSS] suffer from serious complications leading to short life span. This may be due to vaso-occlusive crisis which occurs in HbSS patient. The present study aimed to assess the importance of CRP, WBC count, Haemoglobin, RBC and platelet count in sickle cell disease patient, measurement of these lifesaving parameters should be done as routine follow up for patient with sickle cell disease to increase awareness among these patient.

About 30 sickle cell patient attending sickle cell OPD run by pathology department at Shri Vasantrao Naik Govt Medical College Yavatmal are taken for the present study, their average age was 12 to 50 years. Any diagnosed case of sickle cell disease having CBC and HPLC already done and presenting in painful crisis were approached with a request to participate in our study. Less than 5 ml of blood is withdrawn from cubital vein of sickle cell patient in a plane bulb for CRP estimation. In this test highest dilution of serum showing agglutination 0.6 ml/dl is taken as highly sensitive

Comparison of above parameters in CRP positive and CRP negative HbSS and HbAS patients shows that the values of haemoglobin, RBC, WBC and Platelet are highly significant in CRP+ve HBSS patient as compare to CRP-ve HBAS pt.

Keywords: *Sickle cell disease, homozygous, heterozygous, C-reactive protein.*

Introduction

Yavatmalis located in the region of Vidarbha in the east central part of the state. In India, haemoglobinopathies, especially sickle haemoglobin is the commonest genetic disorder in the tribal belt of central and southern India. As the present study had been undertaken in Yavatmaldistrict, the patients suffering from Sickle cell disease, were may be migrants/residents of Vidarbha, Madhya Pradesh and Chhattisgarh state where high prevalence of Sickle cell gene has been found.[1,2]

Sickle Cell Disease is a genetic disorder characterise by haemolytic anaemia, vaso-occlusive crisis and progressive organ damage. Most patient with Sickle Cell Disease experience moderate to severe pain throughout their life time. [3]

Its clinical severity varies from the milder sickle cell trait (Heterozygous) to severe sickle cell anaemia (Homozygous). Variation in haemoglobin occurs due to substitution of glutamic acid by valine at position six of

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the beta chain of haemoglobin.

The clinical manifestations of sickle cell disease arises as sickle haemoglobin which tend to polymerise at reduced oxygen tension resulting in deformation of red cell into the characteristic rigid sickle shape, such inflexible RBCs cannot pass through micro circulation efficiently resulting in destruction of the red cell and intermittent vaso-occlusion. It causes anaemia, tissue damage and periodic episodes of pain and ultimately damages tissue and vital organs and may lead to death in early childhood or abnormal lifespan with complications.[4]

With this background our study was planned to assess the importance of CRP, WBC count, Haemoglobin, RBC and platelet count in sickle cell disease patient andto compare above parameters in Hb AS and Hb SS patients as CRP +ve and CRP –ve.

Material and Method

About 30 sickle cell disease patient attending sickle cell OPD run by pathology department at Shri Vasantrao Naik Govt Medical College Yavatmal are taken for the present study, their average age was 12 to 50 years. Any diagnosed case of sickle cell disease having CBC and HPLC already done and presenting in painful crisis were approached with a request to participate in our study.

The HPLC of the patient was done by variant haemoglobin testing system by biorad and complete blood count was done by MTHIC 18 cell counter at Shri Vasantrao Naik Govt Medical College Yavatmal.

A voluntarily willing patient was screened with all the inclusion and exclusion criteria for further recruitment. After filling all the required proformas, informed consent form, case record form, less than 5 ml of blood is withdrawn by cubital vein of sickle cell disease patient in a plane bulb for CRP estimation. This was done at microbiology department of Shri Vasantrao Naik Govt Medical College Yavatmal. Patient was not burdened financially for this.

For 'C' reactive protein high sensitivity slide test was done. In this test highest dilution of serum showing agglutination 0.6 ml/dl is taken as highly sensitive.

Statistical Analysis: Statistical significance is calculated by epi info two by two test and the values are highly significant P<0.0001 for RBC, WBC, Platelet P<0.007, Hb P<0.01 and CRP P<0.0009

Ethical Consideration:

1. Permission from institutional ethical committee was taken.
2. Proper written informed consent of patients was taken before starting study.
3. Right to withdraw from the study: patients have been given choice not to participate or to leave the study at any time. We have assured them that both participation in this study or refusal to participate will not have any bearing on the treatment of patients.
4. Confidentiality: All study records were kept confidential at all times. Patient's identity was not revealed except as required by law. The results of this study may be published for scientific purpose. Patient's identity will not be revealed in these publications

Findings

Table No. I

Parameter Hb	Decreased Hemoglobin	Normal Hemoglobin	Total
CRP positive	10	00	10
CRP negative	13	07	20
Total	23	07	30

CI = 95%, P< 0.01

Table I shows decreased and normal Haemoglobin in sickle cell disease patient who are C reactive protein positive and C reactive protein negative .the values are highly significant in CRP positive with decreased Haemoglobin.

Table No. II

Parameter RBC	Decreased RBC count	Normal RBCCount	Total
CRP positive	10	00	10
CRP negative	01	19	20
Total	11	19	30

CI = 95% P < 0.0001

Table II shows decreased and normal red blood cell count in sickle cell disease patient who are C reactive protein positive and C reactive protein negative, the values are highly significant in CRP positive with decreased RBC count.

Table No. III

Parameter WBC	Increased WBC count	Normal WBC Count	Total
CRP positive	08	00	08
CRP negative	02	20	22
Total	**10**	**20**	**30**

CI = 95% P < 0.0001

Table IIIshows increased and normal white blood cell count in sickle cell disease patient who are C reactive protein positive and C reactive protein negative, the values are highly significant in CRP positive with increased WBC count.

Table No. IV

Parameter Platelet	Increased platelet count	Decreased platelet Count	Total
CRP positive	10	00	10
CRP negative	08	12	20
Total	**18**	**12**	**30**

CI = 95% P < 0.0007

Table IV shows increased Platelet count [HbSS] and decreased Platelet count [HbAS]in sickle cell disease patients who are C reactive protein positive and C reactive protein negative, the values are highly significant in CRP positive with increased WBC count.

Table No. V

Parameter	CRP positive	CRP negative	Total
HBSS pt.	08	12	20
HBAS pt.	00	10	10
Total	08	22	30

CI = 95% P < 0.000

Table Vshows CRP +ve & CRP -ve in HBSS & HBAS patients and the values are highly significant CRP +HBSS patients as compare to CRP-ve HBAS patients

Table - I to V shows that the values of haemoglobin, RBC, WBC and Platelet are highly significant in CRP+ve HBSS pt.as compare to CRP-ve HBAS pt.

Discussion

In the Present study early detection of important parameter like CRP, WBC, RBC, Hb and Platelet count may plays important role in decreasing symptoms, increase awareness regarding the disease and increase life span of sickle cell disease patient. Increased C-reactive protein in HbSS patients with higher WBC, decreased RBC, Hb and increased platelet count may have an increased risk for vaso-occlusive crisis as compare to the C-reactive protein negative HbAS patients with normal WBC, Red blood cell, Haemoglobinand decreased platelet count.

Jowaireia Gaber et al[5] in their study have shown that there was strong association between increased C-reactive protein and increased White blood cell count for vaso-occlusive crisis, but in our present study increased C-reactive protein and WBC count with decreased RBC decreased Hb and increased platelet have life threating danger to the life of SCD pt.

It is seen that VOC results from the polymerisation of deoxy HbS leads to tissue ischemia which will lead to acute and chronic pain as well as organ damage that can affect any organ in the body including bones, joints, brain,eyes, liver, kidneys and lungs. VOC activates and damages the endothelial cells leading to inflammation & production of C-reactive protein. Polymerisation of the abnormal haemoglobin represents a key step in the pathophysiology of SCD. [6]

The factors such as acidosis,or increased erythrocyte 2,3-biphosphoglycerate, both of which lower oxygen affinity of red blood cells, will enhance the formation of deoxyhaemoglobin and, thereforewill promote intracellular polymerization and eventual sickling. In addition, sickling is highly dependent on haemoglobin concentration. Any pathophysiologic process which tends to pull water out of sickle RBCs will greatly increases their tendency to sickle. Thus the hypertonic environment of renal medulla can cause local sickling and the formation of papillary infarcts, even in individuals with sickle traits. While sickle cell disease patient have increased adherence to capillary endothelial cells, thereby increase the extent of polymer formation.[7]

In our present study decreased haemoglobin and red blood cell count may cause formation of deoxyhaemoglobin and therefore will promote intracellular polymerisation and sickling in HbAS pt. while HbSS red cells have increased adherence to capillary endothelial cells HbSS homozygotes have a severe haemolytic anaemia with increased haematocrit values.

Elevation in WBC count and haemoglobin levels

have been associated with developing acute pulmonary complications .VOC activates and damages the endothelial cells leading to inflammation, production of CRP is a part of a nonspecific acute phase response to inflammation and tissue necrosis . It may stimulate leucocyte migration, reacts with bacterial surfaces to facilitate phagocytosis signals an enhanced immune response induces lymphocyte blast transformation or enhances lymphocyte cytotoxicity.

Excessive haemolysis is a major pathogenic pathway in the development of pulmonary hypertension in SCD pt.El Kebir D[8] et al in their study stated that Platelets are essential for haemostasis but can also promote inflammation. Platelet activation is elevated in SCD pt. under steady state conditions and may increase in VOC. Activated platelet may promote the adhesion of sickle RBC to vascular endothelium by secreting thrombospondin and may contribute to thrombosis and pulmonary hypertension in SCD. Platelet can also bind to erythrocyte, monocyte and neutrophils to form aggregates.

Above parameter count is significantly increased in CRP +veHbSS patient as compare to CRP –ve Hb AS patient. Increased CRP level and WBC count may be an early predictor along with decreased haemoglobin, red blood cell count & increased platelet in Sickle Cell Disease patient.

Conclusion

Measurement of these biomarkers should be done as routine follow up for increasing life span of Sickle Cell Disease patient. We prompt further study in this regard.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: Taken from institutional ethics committee.

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Gender Difference in Brainstem Auditory Evoked Response among the Headphone Users

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Abstract

About 5.6 billion people use mobile phones worldwide. India ranks second position with about 885 million users. Apart from its function of making calls, listening to music has become one of the popular functions, the sound delivered via headphones at high intensities. The purpose was to assess the possible deleterious effects of headphone usage on Brain stem Evoked Response Audiometry (BERA) in both genders. The study involved the recording of BERA using 30 volunteers between the age group of 18-21 years. They were divided into 2 groups. Group 1: Headphone users <3hrs/day. Group 2: Headphone users > 3hrs/day. Both the groups comprised both genders. Data were compared by unpaired Student's t test and one-way ANOVA. There was no significant difference in peak latencies of waves I to V and inter-peak latencies between genders on right and left ear of headphone users, except wave V ($p<0.01$)on the left ear of headphone users with latency being more in males than in females. We conclude from the observation that prolonged headphone usage has a negative influence on brain stem auditory evoked potentials and there was no remarkable difference between the genders.

Keywords: *Brain stem Evoked Response Audiometry, Gender difference, Head phone users, Mobile phones, Music.*

Introduction

Headphone usage is drastically increased nowadays with about 173 million users, especially among teenagers[1]. The electromagnetic fields acquire importance due to the prevalence of symptoms like warmth, headache and fatigue[2]. Most of the students have cultivated a habit of listening to earphone music. This may lead to music-induced hearing loss[3]. Sound ≤85d B is considered safe. The threshold value is 85 d B, above which prolonged exposure to music for ≥ 8 hours causes permanent hearing loss.

Brainstem Auditory Evoked Response or Brainstem Evoked Response Audiometry [BERA] is an objective way of eliciting brainstem potentials in response to audiological click stimuli. They are recorded by electrodes placed over the scalp. According to Jewett and Williston in 1971, the waves recorded were labeled as I to V. All the 5 waves are positive deflections that occur in first 10 milliseconds after the onset of auditory stimulus[4]. BERA is used to screen newborn's hearing ability, auditory threshold estimation, to determine the type and degree of hearing loss. It is also used in intra operative monitoring and to identify the lesions in the auditory nerve and the brainstem.

The advantage of analyzing the above topic is to create awareness among the teenagers about the

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deleterious effects of loud noise and electromagnetic waves emitted by the headphones. As little information is available on the influence of prolonged headphone usage on BERA, this study has been chosen to assess the possible deleterious effects of headphone usage on BERA in both genders.

Material and Method

An observational study was conducted among 30 volunteers aged between 18 and 21 years in the department of Physiology at Sri Venkateshwaraa Medical College Hospital and Research Centre in Puducherry, after obtaining Instituitional Ethical Committee (IEC) clearance before the commencement of study. After obtaining the prior consent from the subjects, they were divided into 2 groups. Group 1: Headphone users < 3hrs/day. Group 2: Headphone users > 3hrs/day. The subjects were selected by convenient sampling method and the selection was based on the following criteria. The subjects with history of systemic diseases like diabetes mellitus, hypertension and presbycusis were excluded. Informed written consent was obtained from all the subjects prior to the study. An ID code was assigned for the subjects to maintain confidentiality of the data obtained.

Brainstem evoked response audiometry (BERA): The pure Tone Audiometry (PTA) was done prior to the BERA recording in our hospital. PTA is a subjective assessment of hearing threshold, which is plotted on an audiogram displaying intensity as a function of frequency. Complete ENT examination including Rinne's test, Weber's test and absolute bone conduction test were carried out to rule out ear pathology. The BERA was recorded in our physiology research lab in the morning time at a pleasant temperature in a quite air conditioned room using Physiopac PP_4, Medicaid Systems, Chandigarh. The subjects were asked to lie down on semi-reclined bed, made to relax completely in order to minimize the artefacts. Ornaments like earrings, hair clips were removed as it may alter the readings. Ground electrode was placed around the wrist. After cleaning the site with spirit (to prevent contact impedance) active electrode was placed on the respective mastoid of the ear through which the click stimuli has to be given. References electrode was kept in the vertex using cup electrode and the electrode paste. All the electrodes were plugged to the junction box. Contact impedance was constantly monitored using impedance meter to keep electrode impedance below 5 Kohms. The electrical activity of the brain stem was picked up by the electrodes when the click stimuli were given. The filtered, amplified, averaged values were displayed on the screen. The machine is provided with inbuilt artefact rejection facility[5].

For recording the ABR 2000 click stimuli were given at 60d B intensity. The rare type stimuli were generated by passing 0.1ms square pulses through head phones. Monaural stimulation was used at the rate of 10 pulses per second and the contra lateral ear was masked with white noise with intensity less than that of the click stimuli. The responses in the first 10 ms were averaged. Filtration was done between 5Htz to 3000Htz. The commonly seen waveforms are I, II, III, IV and V. These wave's latency, amplitude and duration were analyzed by the computer software – ABR – PHYSIOPAC PP_4, MEDICAID SYSTEM, Chandigarh. Peak latencies of the waves I to V and inter-peak latencies I-V, I-III, III-V were analyzed. Both ears of each subject were taken as independent samples since anatomically both auditory pathways are different.

Statistical Analysis: The data were analyzed by using SPSS 17.0 software and expressed as mean ± standard deviation. Student's 't' test and one way ANOVA test were used to demonstrate the findings. The statistical probability of $P< 0.05$ was considered to be significant.

Results

Table 1: Right ear peak and inter-peak latencies of BERA among male and female head phone users

PEAK LATENCY(ms) Mean±SD	Male	Female	P Value
I	1.53±0.27	1.40±0.17	0.28
II	2.44±0.34	2.42±0.29	0.90
III	3.50±0.25	3.50±0.29	0.99
IV	4.51±0.37	4.44±0.30	0.70
V	5.22±0.20	5.29±0.29	0.57

INTERPEAK LATENCY(ms) Mean±SD	Male	Female	P Value
I-III	1.96±0.27	2.10±0.31	0.38
I-V	3.68±0.29	3.76±0.15	0.53
III-V	1.71±0.32	1.66±0.35	0.77

Table 1 shows that there was no significant difference in peak and inter- peak latencies between genders in right ear of head phone users

Table 2: Right ear peak and inter-peak latencies and of BERA among male and female head phone users

PEAK LATENCY(ms) Mean±SD	Male	Female	P Value
I	1.49±0.35	1.42±0.24	0.64
II	2.39±0.30	2.44±0.24	0.75
III	3.42±0.23	3.61±0.20	0.12
IV	4.59±0.45	4.43±0.35	0.45
V	5.15±0.14	5.38±0.34	0.19
INTERPEAK LATENCY(ms) Mean±SD	**Male**	**Female**	**P Value**
I-III	1.93±0.46	2.19±0.24	0.16
I-V	3.66±0.37	3.96±0.42	0.20
III-V	1.73±0.23	1.77±0.45	0.86

Table 2 shows that there was no significant difference in peak and inter- peak latencies between genders in right ear of head phone users

Table 3: Left ear peak and inter-peak latencies and of BERA among male and female head phone users

PEAK LATENCY(ms) Mean±SD	Male	Female	P Value
I	1.62±0.21	1.44±0.19	0.09
II	2.31±0.27	2.46±0.38	0.40
III	3.61±0.38	3.62±0.20	0.94
IV	4.40±0.38	4.60±0.35	0.31
V	5.45±0.23	5.11±0.09	0.003*
INTERPEAK LATENCY(ms) Mean±SD	**Male**	**Female**	**P Value**
I-III	1.98±0.41	2.19±0.31	0.31
I-V	3.82±0.34	3.67±0.18	0.30
III-V	1.84±0.43	1.48±0.23	0.07

Table 3 shows that there was a significant difference in peak latency of wave V ($P<0.01$) and no change in inter-peak latencies between genders in left ear of head phone users

Table 4: Left ear peak and inter-peak latencies and of BERA among male and female head phone user

PEAK LATENCY(ms) Mean±SD	Male	Female	P Value
I	1.63±0.25	1.78±0.18	0.22
II	2.48±0.28	2.37±0.32	0.54
III	3.49±0.31	3.64±0.27	0.35
IV	4.84±0.32	4.63±0.41	0.33
V	5.26±0.34	5.41±0.28	0.40

INTERPEAK LATENCY(ms) Mean±SD	Male	Female	P Value
I-III	1.85±0.46	1.86±0.31	0.98
I-V	3.63±0.53	3.63±0.28	0.99
III-V	1.77±0.11	1.77±0.39	0.99

Table 4 shows that there was no significant difference in peak latencies of waves I to V and inter-peak latencies between genders in left ear of head phone users.

Discussion

The mobile phones have become indispensable as communication tools; however there is only limited information exists about the interaction between headphone usage and cognitive functions. Studies showed that chronic exposure to sound more than 90 d B can result in permanent hearing loss[6] an MP3 player can effectively produce a sound of 120 d B, which is further amplified as much as 6-9 d B, while it is being used with an earphone. Thus, listening to louder sounds over long term produce hearing loss. The cell phone music has become one of the most common devices for listening to music in adults and teens. The students very often put on their ear phone and listen to music whenever they get time and usage has become more rampant.

Hearing loss is often thought of as a natural by product of aging process. However, studies are beginning to show that hearing loss is becoming increasingly more common amongst younger people, which is due to chronic exposure to loud noise above 90 d B, according to the National Institute on Deafness and other Communication Disorders. Additionally the use of ear buds (earphones) placed directly into the ear can amplify the sound signal by as much as 6-9 d B. The enhanced sound quality, convenience and portability translate into more time spent listening to music and consequently increased the potential for hearing loss.

In our study, the peak latencies of waves I to V have remained same between headphone users of both genders. The wave I also provides valuable real time information regarding blood flow to cochlea[7]. The increased latency wave V might be due to the damage to the inner hair cells. The statistically insignificant variations (P>0.05) in inter-peak latencies I-III, I-V and III-V in both the ears which have been discussed above, can be explained to be due to an overall prolongation of the absolute latencies of the waves I, III, V. In the present study, as the I-V latency remained normal which shows the integrity of VIII cranial nerve.

On the contrary, a study done by Mazlan et al[8] to evaluate the ear infection and hearing loss amongst headphone users, there was no significant association between hearing loss and exposure to sound from headphone usage. In our study, there was no significant difference in peak and inter-peak latencies of the BERA waves between the genders, except the peak latency of wave V in the left ear of headphone users. This finding was expected since the sounds from the headphones are of low intensity. The average measurement of sound intensity from the headphones was found to be 58d B. It was generally below 85d B, which was the threshold above which prolonged exposure of music for 8 hours or more which may cause a permanent hearing loss.

Conclusion

Thus, we conclude from our observation that the peak latency wave V has shown a significant difference between genders, with latency being more in males when compared to females. This study may help in the objective assessment of the amount of hearing loss that is to occur on prolonged exposure to the electromagnetic waves and the loud noise emitted by the headphones. The student population needs awareness and understanding of the harmful nature of prolonged usage of earphone music. In future, this may emerge as a risk factor for hearing loss and reduced cognitive functions which may be noise induced/electromagnetic radiation induced.

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Conflict of Interest: Nil.

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Students and Faculty Perception on Integrated Teaching in MBBS Phase I

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Abstract

Introduction: The knowledge learnt in isolation is rapidly forgotten. The syllabus which is taught to students appears like different blocks and unable them to integrate and correlate the knowledge. The present scenario creates disinterest among the students and as a result the art and practice of medicine is not grasped as a whole. One of the method to remove the hurdle is by integrated teaching. This type of teaching allows the student to develop the skills in investigation, analysis and also to perceive the patient as a whole. It acts as a bridge for connecting knowledge and practices.

Objectives: To assess the students and faculty perception on Integrated teaching and to assess the effectiveness of integrated teaching.

Method and Materials: The study was conducted in first year MBBS students of 2017. The integrated teaching was planned for two main topics. The 150 students and 20 faculty perception was taken through pre-validated questionnaire. The effect of integrated teaching on the performance of the students was assessed through pre- test and post- test and statistical analysis was done using paired 't' test.

Results: Majority of the students accepted that the integrated teaching method was interesting and interactive (48.6%). 55% of the faculty were comfortable and satisfied with this method. The mean values of the post and pre- test were statistically significant (mean ±SD,7.57 ±0.958) and (5.72±0.684) respectively.

Conclusion: Integrated Teaching sessions were well-appreciated by students and faculties. To improve the critical reasonings kills and self-directed learning of students, integrated teaching should be implemented in the curriculum.

Keywords: *Integrated teaching, perception, faculty.*

Introduction

The knowledge learnt in isolation is rapidly forgotten . Basic science courses are typically taught as standalone, independent content domains in most of the medical colleges in India and there is negligible opportunity for interlinking of concepts learned in one discipline with the other. Thus the lack of integration in current curriculum models leads to poor conceptual understanding.[1] The syllabus which is taught to students appears like different blocks and unable them to integrate and correlate the knowledge. The present scenario creates disinterest among the students and as a result the art and practice of medicine is not grasped as a whole.[2] One of the method to remove the hurdle is by integrated teaching. Integration is defined as organization of teaching matter to interrelate or unify subjects frequently taught in separate academic courses or department[3]. This type of teaching allows the student to develop the skills in investigation, analysis and also to perceive the patient as a whole.[4] Regulation on undergraduate medical education 1997, gives more importance for encouraging integrated teaching by using a problem based learning appoarch.[5] Integrated teaching acts as a bridge for connecting knowledge and practices. There is more stress on need based curriculum. The integrated teaching will help to explore and understand problems and develop new solutions.[6] The main aim of the study was to asses the students and faculty perception

on Integrated teaching and to assess the effectiveness of integrated teaching.

Materials and Methodology

After taking ethical committee clearance and consent from faculty and students, the study was conducted in first year MBBS students, 2017 batch at Kamineni Academy of Medical Sciences and Research Center, L. B nagar, Telangana. The batch consists of 150 students. It is a cross sectional study. With the permission of the Head of Department of Physiology, Anatomy and Biochemistry, the integrated teaching was planned for two main topics (Jaundice and Coronary circulation). One topic was conducted in one month and the other topic in the next month. The 150 students and 20 faculty perception was taken through pre-validated questionnaire. The effect of integrated teaching on the performance of the students was assessed through pre test and post test and statistical analysis was done using paired 't' test.

Results-Out of 150 students,144 students were present and 6 were absent. Majority of the students accepted that the integrated teaching method was interesting and interactive (48.6%)(Fig 1). 55% of the faculty were comfortable and satisfied with this method. (Fig 2). The mean values of the post and pre test were statistically significant (mean ±SD,7.57 ±0.958) and (5.72±0.684) respectively. (Table -1).

Table 1: Comparison of Pre and Post test marks (Total marks=10)

Marks	Mean	SD	"t" value	P value
Pre test	5.72	0.684	-30.79	0.00
Post test	7.57	0.958		

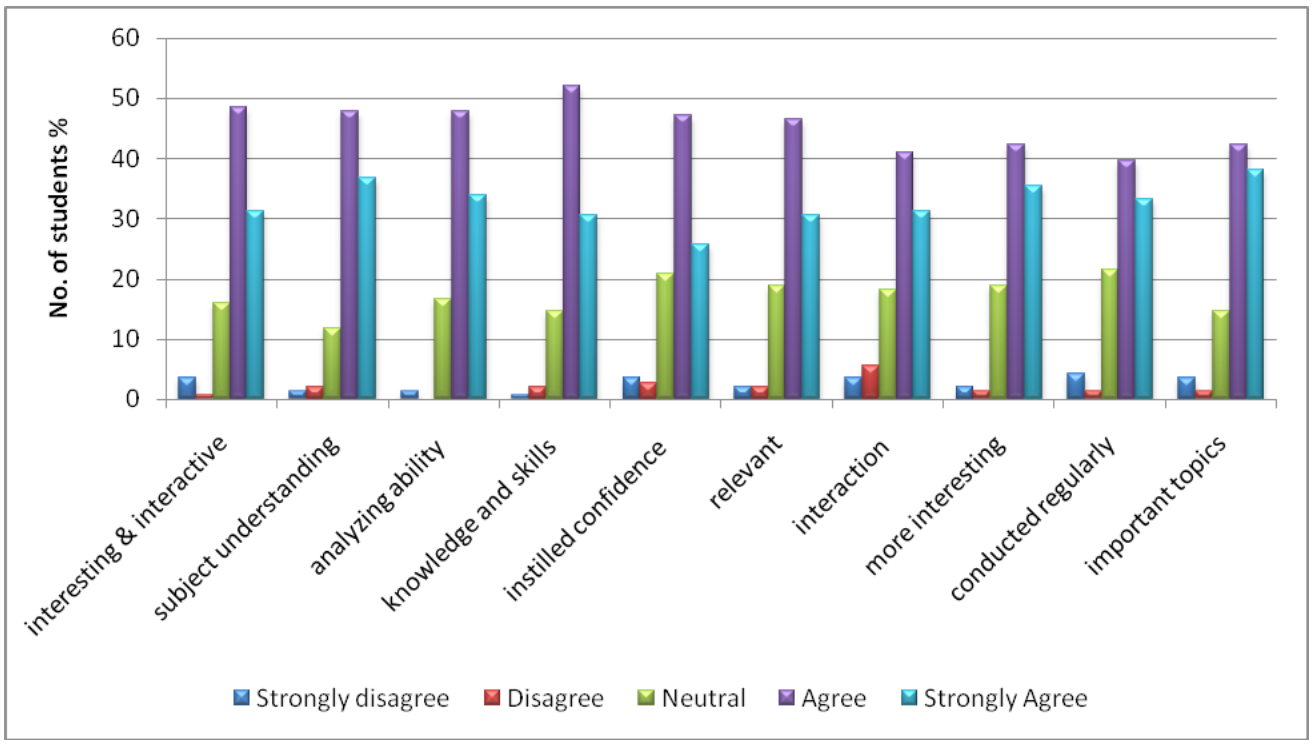

Figure 1: Perceptions of students on Integrated teaching as % responses on 5 point Likert scale (n=144).

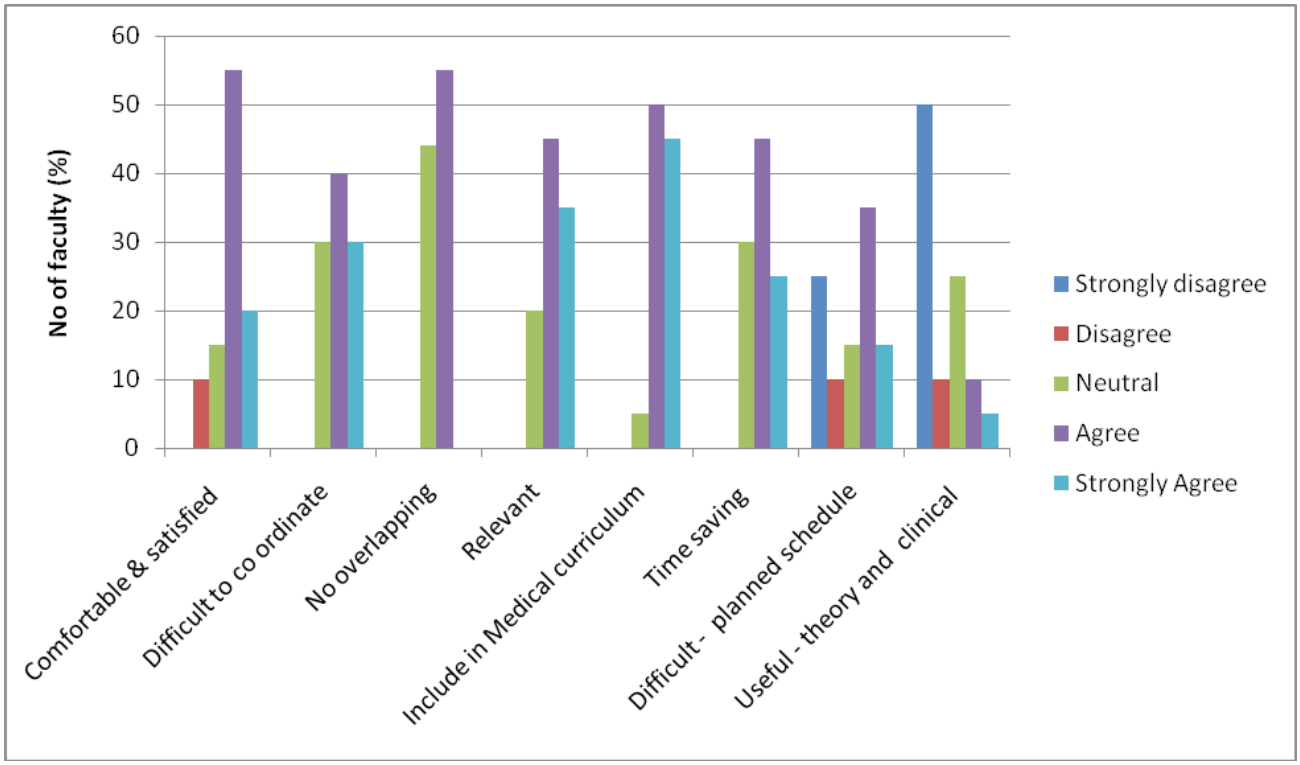

Figure 2: Perceptions of faculty on Integrated teaching as % responses on 5 point Likert scale (n=20)

Few suggestions by the students were:

1. Should distribute notes on the related topics.
2. Black boards and chalk can be used.
3. PPT to be shared with students.
4. Should not be extended for a long time.
5. Assessment can be conducted in between.
6. More classes should be taken by this method.
7. All lectures should be integrated.
8. Not to conduct these sessions during post lunch.

Comments from the teachers were:

1. Case Demonstration can't be done during these sessions.
2. It is Time taking to prepare time table and plan of execution of classes.
3. Difficult to introduce during normal planned schedule.

Discussion

48.6% of the students accepted that the integrated teaching method was interesting and interactive. 30.6% of the students were interested to conduct these sessions regularly. S. Joglekar found that integrated approach improved students' understanding, removed topic phobia, developed interest in the topic.[7]

He also revealed the following advantages of integration: 1. Integrated teaching reduces the fragmentation medical courses. 2. It prevents repetition and waste of time. 3. Students learn to apply their knowledge to clinical practice. 4. Promotes interdepartmental collaboration. 5. Rationalization of teaching resources .Similar findings were observed in study done by Basu M et al where they found that overall rating by students about integrated teaching was very good new method.[8]

Few students found integrated teaching to be boring. Similar findings were found by Madhuri Kate[4]. In her study the students gave a feedback that Preclinical subjects were boring because they are theoretical and taught in a fragmented manner

55% of the faculty were comfortable and satisfied with this method. 45% of the faculty preferred that, this method was time saving. Similar findings were observed by Neelam Anupama Toppo[3]. In our study

47.9% students had an increase in the analyzing ability. Similar findings were seen by Schmidt HG[9]. Students trained with integrated curriculum were more accurate in diagnosis of the clinical disorders than those trained in a conventional curriculum. Another study done in 2013 revealed that the students were enthusiastic, have improved cognitive domains by the new teaching learning method and were benefitted by the integrated teaching[10.]

The mean values of the post and pre test were statistically significant (mean ±SD,7.57 ±0.958) and (5.72±0.684.) respectively. Similar studies were done at Seth GS Medical College, Mumbai and they revealed that the marks obtained by the students who had undergone integrated teaching was statistically significantly greater than those who did not.[4]A change from conventional classroom teaching to newer method which encourage interactive learning through active participation. It is well known that students learn more when involved actively in learning than when they are passive recipients of instructions[11].

Conclusion

Integrated Teaching sessions were well-appreciated by students and faculties. To improve the critical reasoning skills and self-directed learning of students, integrated teaching should be implemented in the curriculum.

Source of Funding: Self

Conflicts of Interest: There are no conflicts of interest.

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A Study of the Correlation of Obesity with Sex Hormones in Young Male Adults

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Abstract

Background: Epidemiological studies support a bidirectional relationship between serum testosterone and obesity as well as between testosterone and the metabolic syndrome. Low serum total testosterone predicts the development of central obesity and accumulation of intra-abdominal fat. Also low total and free testosterone and sex hormone binding globulin (SHBG) levels are associated with an increased risk of developing the metabolic syndrome, independent of age and obesity.

Method: A cross sectional study was conducted on 100 male medical students (age 18 to 24 yrs). Blood samples were collected and investigated for serum testosterone level. Anthropometric measurements-BMI, Waist circumference and waist to hip ratio (WHR) were done.

Results: 57 subjects out of 100 subjects with BMI <25 and serum testosterone level near to higher end of normal range and 43 subjects with BMI >25 and serum testosterone level near to lower end of normal range. 26 subjects with WHR <90 and serum testosterone level near to higher end of normal range and 74subjects with WHR >90 and serum testosterone level near to lower end of normal range.

Conclusion: Serumtestosterone level increase with decrease in BMI and WHR. serumtestosterone level decrease with increase in BMI and WHR.Hence Sex hormone (Androgen) level is inversely related with obesity.

Keywords: *Testosterone, BMI, WHR, Anthropometric indices.*

Introduction

With the improvement in socioeconomic conditions, the obesity arises as a major health issue since early age. Obesity is proinflammatory state resulting in increased release and secretion of proinflammatory cytokines and adipokines, free fatty acids and estrogens from adipose tissue[1,2]. These increases are important risk factors that may contribute to the development of metabolic syndrome and type 2 diabetes as well as androgen deficiency. Visceral fat is an active secretary tissue producing inflammatory cytokines and adipokines, biochemical modulators and other pro inflammatory factors including interleukins (IL)-6, IL-1 β, plasminogen activator inhibitor-1, tumor necrosis factor (TNF)-α, angiotensin, vascular endothelial growth factor and serum amyloid-A. These factors contribute to systemic and peripheral vascular inflammation and dysfunction. Aromatase the enzyme that converts testosterone to estradiol, is mainly located in adipose tissue. Obesity associated with elevated estrogen in men activate hypothalamic–pituitary gonadal axis. Treatment with aromatase inhibitors reverse the hypogonadotropic hypogonadism associated with obesity. Men with obesity and insulin

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resistance showed attenuated Leydig cell responsiveness to exogenious gonadotropin stimulation[1,3].

In general androgens promote protein synthesis and growth in tissues having androgen receptors leading to anabolic effects[4].

Androgenically it leads to sexual differentiation and maturation along with development of secondary sexual characteristics. Testosterone is produced mainly by testes in male human beings. Sex steroids are involved in the metabolism, accumulation and distribution of adipose tissues. It is well known that the receptors of sex hormones are located in adipose tissues. Therefore their actions could be direct. But sex hormones carry out their functions in adipose tissues by both the ways genomic as well as non-genomic mechanism[5,6].

Leptin and lipoprotein lipase are two key proteins in the visceral adipose tissues that are regulated by sex hormones.

Another way of action through receptors located on plasma membrane and second messenger system. This involves activation of cyclic AMP cascade. This activate hormone sensitive lipase that lead to lipolysis. Through diacylglycerol pathway there is activation of protein kinase-C that is involved in control of preadipocyte proliferation and differentiation. Imbalance between these two mechanisms may lead to obesity[7].

Material and Method

The present study was conducted in the dept of physiology M.L.B. Medical College Jhansi. The participants in the study were malemedical students of M.L.B. Medical College Jhansi. The cross sectional study carried out on 100 male medical students with age ranges from 18 to 24 years. Working proforma was in the form of a questionnaire containing name, age, sex, history of physical illness, exercise, addiction, drug history, personal and family history of diabetes mellitus, hypertension and cardiovascular disease. The consent of ethical committee was taken.

Aim: The aim of this study was to established, the correlation between obesity and sex hormone (testosterone).

Objective: To study the early age health issue due to obesity in young male adults.

Inclusion Criteria: The subjects suffering from long term stress due to study and examination and willing to participate in the study.

Exclusion Criteria: The subjects with chronic disease, endocrinopathies, taking any form of testosterone altering drugs, alcohol, smoking were excluded.

Procedure: Anthropometric indices were measured and calculated. Blood samples were sent to lab for serum testosterone estimation.

The subjects were divided into four groups in two categories based on BMI and WHR.

Category-1: Based on BMI

Group-A subjects with BMI < 25, Group –B subjects with BMI > 25.

Category-2: Based on WHR

Group-C subjects with WHR < 0.90, Group-D subjects with WHR > 0.90.

Anthropometric Indices:

Weight: Measured in Kilograms to near 0.5 kilograms on portable machine with subjects in light clothing and without shoes.

Height: Measured in centimeters to near 0.1 cm with subjects standing against wall without shoes, heels together buttocks, shoulder and head touching the wall.

BMI: Calculated by formula (Weight in Kg/Height in meter square).

Waist circumference- measured in centimeters to near 0.1 cm at the level of umbilicus at the end of expiration while breathing silently with a plastic measuring tape.

Hip circumference- measured in centimeters near to 0.1 cm at the level of greater trochanter with plastic measuring tape.

WHR: Calculated as (waist circumference/Hip circumference).

Serum Testosterone: Investigated by department of pathology by ELISA method.

Study Design: Cross sectional study.

Sample Size: 100 by random sampling method.

Statistics: To study the correlation between the variables in data the Pearson's coefficient correlation method was applied.

Observation: The essential data was collected, arranged and analyzed. Modality used for obtaining the correlation between serum testosterone and obesity (BMI and WHR) is Pearson's Correlation Coefficient as shown in the following table:

Table 1: Correlations

	Pearson's Coefficient	Serum Testosterone	BMI	WHR
Serum Testosterone	Pearson's Coefficient	1	-0.387	-0.200
	Significance (two tailed)	-	0.000	0.046
	N (subjects)	100	100	100
BMI	Pearson's Coefficient	-0.387	1	0.201
	Significance (two tailed)	0.000	-	0.045
	N (subjects)	100	100	100
WHR	Pearson'sCoefficien	-0.200	0.201	1
	Significance (two tailed)	0.046	0.045	-
	N (subjects)	100	100	100

Correlation of serum testosterone with BMI is negatively related (r=-0.387, p 0.001) significantly. Serum testosterone and WHR are also related negatively (r=-0.200, p 0.047) (Table-1).

The data was also analyzed and studied by Z-Test, where IZI<1.96 is insignificant and >1.96 is significant as follows:

Table 2: Comparison

BMI	N	Mean+/-SD	IZI
<25	57	21+/-2.3	15.4894
>25	43	26.81+/-1.435	

The IzI value for BMI is found (15.4894) significant. (Table -2)

Table 3: Comparison

Waist Circumference	N	Mean+/- SD	IZI
<90	46	81.1522+/-7.93856	11.7962
>90	54	97.11111+/-4.9855	

For waist circumference the IzI value in Z-Test is observed as (11.7962) (Table-3). This value again shows a significant relation.

Discussion

As per data analysis based on Pearson's correlation coefficient and Z-Test serum testosterone level is related negatively.

Men with very low testosterone are also more likely to become obese. Fat cells metabolize testosterone to estrogen, lowering testosterone level. Also obesity reduces level of sex hormone binding globulin (SHBG), a protein that carries testosterone in blood. Some other factors also causes reduce testosterone level in blood like –smoking, thyroid related issues, high cholesterol, stress or anxiety, alcohol consumption, diabetes, high BP

Men with diabetes are more likely to have low testosterone. And men with low testosterone are more to later develop diabetes. Testosterone helps the body tissue take up more blood sugar in response to insulin men with low testosterone more often have insulin resistance: need to produce more insulin to keepup blood sugar normal

The lower value is found in overweight subjects (BMI >25)[8]. The value decreases with increase in body weight regardless of any range of BMI.

As for as fat distribution that is measured by waist circumference and WHR. The waist circumference is found increased with increase in body weight. Collection of fat in waist region is related with serum testosterone level[9].

Abdominal or central obesity is most likely to be associated with increased risk of cardiometabolic syndrome (hypertension, diabetes mellitus and atherogenic dyslipidemia).

Comparison among subjects based on anthropometric indices revealed that obesity is found in less than half of sample studied as per BMI. WHR >90 is found in more than half of the sample studied shows the central obesity is more prevalent in this group of study. Serum testosterone level is tending towards upper range of normal level. This trend may be responsible for low obesity in our study group.

Conclusion

The multidirectional relationship between serum testosterone and SHBG with obesity Obesity is accompanied by increased adipokines, cytokines and other pro inflammatory factor production from adipocytes and macrophases mainly in visceral fat. These factors may alter secretion of testosterone. Testosterone replacement reduces body fat and waist circumference in hypogonadal men with and without obesity, BMI may improve and body fat decreases. The indices were correlated with serum testosterone level negatively. The study emphasizes that sex hormones are the factors that regulate fat metabolism and affect accumulation and distribution of fat in adipose tissues. Increase in serum testosterone level decreases central as well as overall obesity. This correlation could be applied to prevent cardiometabolic syndrome prospectively.

Ethical Clearance: Present study was approved by institutional and review committee, MLB Medical College Jhansi, UP India

Conflict of Interest: Nil

Source of Funding: Self

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Effects of Cell Phone Conversation on Visual and Auditory Reaction Time in Students of a Medical College in Bangalore

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Abstract

Background: In today's era cell phone usage has become so rampant and its being used while doing different task like driving, working in laboratory or office without realizing the distractions these cell phone can cause. People are not aware of the consequences these distractions can lead to & also the harmful effects of electromagnetic radiations emitted by the cell phone.

Objective: To study the distracting property of cell phone use by assessing the visual reaction time in students of a medical college while conversing over the cell phone. To know the effect of long term use of mobile phone on visual and auditory reaction time based on history of no of hrs of phone usage per day. To find out gender difference in VRT & ART .

Methodology: study population consist of 90 medical students, aged above 18yrs who were using mobile phones were selected randomly. After taking informed consent VRT & ART was recorded using PC 1000 reaction time apparatus .student was allowed to converse on phone for 5 min during which VRT was recorded. After completing the conversation, once again ART & VRT was recorded. Data was analyzed statistically using SPSS version 22.

Results and Conclusion: Mean VRT was significantly high during conversation when compared to conversation before. In comparison with gender, males have faster reaction time compared to females.

So we conclude that simultaneous use of cell phone causes distractions and reduces visual cognition performance leading to undesirable consequences. Dual tasking should be avoided and everyone should be educated to use mobile phone cautiously.

Keywords: *ART (auditory reaction time), VRT (visual reaction time).*

Introduction

Reaction time is a type of cognitive function test in which a stimulus is presented to elicit a response. The reaction time is the time from the onset of the stimulus to the beginning of the response. It is a measure of the latency between sensory perception of the stimulus by the nervous system and the effector motor response, including the neural processing.[1]it has physiological significance and is a simple noninvasive test for central and peripheral nervous system.[2]Slow reaction time can be dangerous while controlling moving machineries. Speedy reaction is helpful in sports such as football, basketball, tennis etc. It can be used as an index of cortical arousal which is an easy method.[3]

In present era mobile or cell phones have become an integral part of modern telecommunications in every individual life. In many countries, over half of the

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population uses mobile phones and the mobile phone market is growing rapidly.[4]

Harmful effects of use of cell phones can be broadly put into 2 categories:

1. Distractions caused by usage of cell phones, especially while focusing on task such as driving, working and in classrooms.
2. Effect of electromagnetic force emitted by these cell phones on biological systems.[4]

Mobile phones emit radio frequency energy, a form of non-ionizing electromagnetic radiation, which can be absorbed by tissues close to the phone. The amount of radio frequency energy a mobile phone user is exposed depend on many factors as the technology of the phone, the distance between the phone and the user, the extent and type of mobile phone use and the user's distance from cell phone towers.[5] Some investigators have reported that exposure to cell-phone microwave fields can affect mental processes (or cognitive functions) as attention function, short-term memory tasks, information manipulation, or response-reaction times.[6] Study conducted by national safety council have reported that, human brain doesn't perform multiple tasks at the same time. Rather, it handles the task sequentially by switching occurs between one task to other. At any one time only one task can be performed even when we are under the impression that we are doing two or more tasks simultaneously. Cognitive distraction prevents attention to visual scene which increases reaction time.[7] A study conducted by Preece et al. had reported that exposure to microwave radiation from simulated cellular telephone transmissions affects cognitive function in humans in particular, a choice reaction time. Among 15 different cognitive function tests in randomized laboratory test sessions, subjects showed a significant microwave power-dependent decrease in reaction time (or an increase in speed) compared with the control subjects.[8] At the same time study done by M Koivisto et al and N. Edelstyn results indicated that attention functions were differentially enhanced after exposure to the microwave fields emitted by mobile phones.[9]

Young people, especially teenagers nowadays are in the habit of multitasking while on the phone. More numbers of road traffic accidents are being reported because of mobile phone use during driving. It is very common to see the youngsters walking on road while typing on the smart phone with earphones in the ear unaware of the surroundings most of the time

There are lot of debates between those who believe that these cell phones are benign and those who believe that they are in fact dangerous, or at least potentially harmful. The primary research focus is on studying the distracting properties of cell phone use by recording visual reaction time while conversing over phone and to know the effect use of cell phone on cognition by recording visual and auditory reaction time before and after use of phone for 5 min.

Objectives:

1. To study the distracting property of cell phone use by assessing the visual reaction time in students of a medical college while conversing over the cell phone.
2. To know the effect of long term use of mobile phone on visual and auditory reaction time based on history of no of hrs of phone usage per day.
3. To find out gender difference in VRT & ART .

Material and Method

This was a cross sectional study conducted in 1st year MBBS students in the Department of Physiology in a medical college in Bangalore. After getting approval from institutional ethical committee, students who volunteered were enrolled for the study. Ninety students of both male and females who are above 18 years and who are using mobile phones were selected randomly. Students having visual problems or color blindness, having injury or any defect in upper limbs, any neurological impairment, influence of alcohol, psychiatric illness or on psychotropic drugs were excluded from study.

After taking informed consent from the students, distant Vision was tested using Snellen's chart, near vision by jaeger's chart and color vision by Chart of Ischihara, Tuning fork test (Rinne's and weber test) were conducted to test the hearing capacity. History about number of hours of usage of phone per day was taken. Visual and auditory simple reaction time were measured using a reaction time apparatus PC 1000 Hertz's Reaction Timer which works on audacity software.[10]

Prior to testing, participants were given instructions. They were asked to observe the flashing of red light in the reaction time apparatus for visual reaction time and for auditory reaction time they were given ear phones in

which they had to respond to sound stimulus. They were allowed to practice using dominant index finger. As light stimulus was given the subjects were instructed to react by pressing the button in reaction time apparatus. After recording visual reaction time, auditory reaction time was recorded by giving sound stimulus for which subjects were instructed to respond by pressing the button.

Initially baseline recording of auditory and visual reaction time was taken. Subjects were asked to converse over the phone for 5 min and while conversing visual reaction time was recorded. At the end of conversation once again visual and auditory reaction time was recorded using a reaction time apparatus which works on audacity software.

Data was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Continuous data represented as mean and standard deviation. Paired t test was used as test of significance to identify the mean difference before and after the exposure. Pears on correlation was used to find the correlation between two quantitative and qualitative variables. P value <0.05 was considered as statistically significant after assuming all the rules of statistical tests

Results

Study was conducted in department of Physiology among ninety 1st MBBS students, who are above 18 years and volunteered to participate in the study.

Table 1 shows the mean age and sex distribution of the subjects in the study. Mean age of the subjects was 19.04 ± 1.005 years. Out of 90 subjects 41 subjects were female and 49 were male.

Table 2 gives the mean VRT and ART in msecs comparing before, during and after conversation. In our study there was significant increase in Mean VRT during conversation compared to before conversation, but there was no significant difference in mean VRT after conversation in comparison with before conversation VRT.

There was no significant difference in mean ART after conversation in comparison with before conversation ART.

Table 3 shows Correlation between Number of Hours of usage with VRT and ART. In our study there was no significant correlation between Hours of use of phone with VRT and ART before, during and after conversation. Except for VRT during conversation, were in significant negative correlation was observed between Hours of mobile usage and VRT during conversation and vice versa.

Table 4 shows Mean VRT and ART in msecs comparison with respect to Hrs of phone use. There was no significant difference in mean VRT and ART between those who were using mobile phones <6 hrs and >6 hr.

Table 5 shows the comparison of mean ART and VRT between males and females. In our study we found that there was significant difference in mean VRT between males and females. Mean VRT was high among females compared to males.

Similarly there was significant difference in mean ART between males and females. Mean ART was high among females compared to males.

Table 1: Age and Sex distribution of subjects in the study

		Count	Percentage
Age	18	27	30.0%
	19	44	48.9%
	20	11	12.2%
	21	4	4.4%
	22	4	4.4%

		Count	Percentage
	Mean Age	19.04 ± 1.005 years	
Sex	Female	41	45.6%
	Male	49	54.4%
BMI	Underweight	11	12.2%
	Normal	61	67.8%
	Overweight	16	17.8%
	Obese	2	2.2%
	Mean BMI	22.09 ± 3.36	

Table 2: Mean VRT and ART in msecs comparison before, during and after conversation

		Mean	SD	Median	Minimum	Maximum	P value
VRT (milli sec)	Before Conversation	212.44	52.78	197	128	337	
	During Conversation	412.26	121.50	372	221	778	<0.001*
	After Conversation	224.44	77.93	209	116	592	0.078
ART (milli sec)	Before Conversation	187.11	59.67	163	104	325	
	After Conversation	184.44	70.61	156	104	441	0.625

Table 3: Correlation between Number of Hours of usage with VRT and ART

Correlations							
		NO OF HRS of phone usage	Before Conversation		At Conversation	After Conversation	
			VRT	ART	VRT (milli sec)	VRT (milli sec)	ART (milli sec)
NO OF HRS of phone usage	Pearson Correlation	1	0.066	-0.026	-0.215*	-0.099	-0.152
	P value		0.536	0.808	0.042*	0.354	0.153
	N	90	90	90	90	90	90

Table 4:Mean VRT and ART in msecs comparison with respect to Hrs of phone use

		Hrs of Phone use				P value
		<6 hrs		>6 hrs		
		Mean	SD	Mean	SD	
VRT	Baseline recording	206.56	50.01	222.00	58.32	0.123
ART	Baseline recording	182.44	57.78	205.78	65.05	0.479

Table 5: Mean VRT and ART in msecs comparison with respect to Gender

		Gender				P value
		Female		Male		
		Mean	SD	Mean	SD	
VRT	Baseline recording	238.66	50.30	190.51	44.48	<0.001*
ART	Baseline recording	205.39	62.00	171.82	53.60	0.007*

Discussion

Reaction time is a cognitive function test which measures the latency between sensory perception and effector motor response. It's a simple test which helps us to analyze the sensory motor association**.** In present era, mobile phones have become an integral part of communication in every individual life. Apart from the harmful effects caused by the electromagnetic radiations emitted from these cell phones, the distractions caused by using cell phones while doing other task such as driving, operating heavy machinery in the laboratories are leading to lot of untoward incidences in our day to day life. This may be due to fact proven that our brain cannot concentrate on multiple task at a time and it handles the task sequentially by switching between one task to other. There are many studies which have proven that exposure to cell-phone microwave fields can affect mental processes (or cognitive functions) such as attention function, short-term memory tasks, information manipulation, or response-reaction times.[6] So present study was done to assess & compare the visual reaction time before and during conversation, To know the effect of long term use of cell phone on visual and auditory reaction time and also gender differences in VRT & ART.

Cross-sectional study was done among 90 medical students, aged around 19 years who volunteered to participate in the study. After collecting the data, was analyzedusing SPSS 22 version software. Analysis of our study concludes that ART is faster than VRT, which supports existing studies done by authors like Pain & Hibbs, Thomson et al.[11,12] As Auditory signals reach cortex faster than visual signals ART is faster than VRT.

There was significant increase in visual reaction time while having a conversation over the phone compared to the VRT before conversation which confirms that use of cell phone can cause distractions while performing another task. This outcome of our analysis is supported by the study done by national safety council who has reported that, human brain doesn't perform multiple tasks at the same time. At any time only one task can be performed even though we assume that we are doing two or more tasks simultaneousl.[7] Also study done by Preecee et al has reported that exposure to microwave radiation from simulated cellular telephone transmissions affect cognitive function in humans in particular choice reaction time.[8] In contrary to our study, study done by M Koivisto et al and N. Edelstyn examined the relationship and reported facilitating effect between cognition and cell-phone exposure.[1] There was no significant difference in mean VRT after conversation in comparison with conversation before and also there was no significant difference in mean ART after conversation in comparison with conversation before**.**

On comparison of mean ART & VRT between males and females in our study there was significant difference in mean VRT between males and females. Mean VRT was high among females compared to males. Similarly, there was significant difference in mean ART between males and females. Mean ART was high among females compared to males. Study done by misra et al, Shelton kumar et al have also got similar findings that males have faster reaction time compared to females.[13,14] This could be possible because of faster motor responses in males compared to females according to study done by silverman IW. [15]

In comparison with respect to no of hrs of usage of phone per day there was no significant difference in mean VRT and ART between those who were using mobile phones <6 hrs and >6 hrs.

Conclusion

Mobile phones are highly misused in today's era. Having seen the increase in visual reaction time during conversation, we can say that simultaneous use of cell phone causes distractions and reduces visual cognition performance leading to undesirable consequences. So dual tasking should be avoided and everyone should be educated to use mobile phone cautiously.

Limitation of the Study: Only visual and auditory reaction time was assessed. Other cognitive function test can also be used in future.

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An Observational and Comparative Study of Diurnal Variation of Spirometry Test Parameters among First and Second Year Normal and Healthy Medical Undergraduate Students

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Abstract

Introduction: This study was designed to assess and compare diurnal variability of FEF25, FEF50, FEF75, FEF25-75, PEF and FEV1 by measuring these parameters during morning and evening hours in normal healthy subjects.

Materials and Method: 190 students were enrolled and divided intogroupsof 8-10 students. Each group were directed to appear at different dates in Pulmonary Function Test (PFT) Laboratory at 7:30 AM and again at 5:00 PM for spirometry testing. Spirometry was performed with Spiro Excel 1.1 as per the ATS guidelines and by trained technician. Finally, data from 169 subjects was found to be complete and appropriate and was taken for the analysis.Diurnal variability in FEF25, FEF50, FEF75, FEF25-75, PEF and FEV1 were determined and compared.

Results: Allparameters were more in male than female. All the parameters were significantly high in evening tests as compared to morning tests except FVC. Diurnal variability among different spirometry parameters was significantly different (ANOVA, $p<0.05$) in morning and evening tests. The diurnal variability was highest in large airways as reflected by FEF75 and lowest in smaller airways as reflected by FEF25. The diurnal variability was lowest for FEV1%. It revealed that all parameters exhibit significant diurnal variability.

Conclusion: FEV1, FEF and PEF had shown diurnal variability which was directly related to the airway calibre. Greater variability was seen in PEF as compared to FEV1 i.e. proximal airways showed greater diurnal variation than distal airways.

Keywords: *Spirometry test, Pulmonary Function Test, Diurnal variability, FEV1, PEF.*

Introduction

Variability in calibre of airways is a normal physiological process in normal personsand this variability may become exaggerated in patients of asthmatic and chronic obstructive pulmonary disease (COPD).Measurement of bronchial hyper-reactivity and airways variability has always posed challenge performing experiments on pulmonary function. Variability in peak expiratory flow (PEF) has been suggested as indicator for bronchial hyper-reactivity.[1-8]

The phenomenon of nocturnal asthma has always perplexed clinician's and researcher's mind. Peak expiratory flow rate (PEFR) variability has been

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suggested as a marker for bronchial hyper-reactivity in asthmatic individuals.[9,10] PEFR variation has been widely advocated and used in clinical practice and asthma research. The National Heart Lung and Blood Institute (NHLBI) and others have recommended, a diurnal variation of 20% or more, as a diagnostic benchmark for asthma.[11,12]

Airway function exhibit variability over 24-h periods. This variability has a base that lung function gets worse at night in nocturnal asthma patients and to a lesser extent with COPD.[13-16] As nocturnal asthma is common and troublesome,[13,14,17] circadian variation in airway function has been of considerable interest in respiratory medicine. It has been recognized that diurnal variation in airway calibre occurs in healthy subjects as well.[18-20]

It has been suggested that diurnal variation of PEFR in excess of 20% can be used for diagnosis of bronchial asthma in remission where routine spirometry may not show any significant obstructive defect.[19,21] Previous studies mentioned that PEFR shows time to time variation with respect to day and night cycle with specific pattern of lowest at early morning and highest at evening in normal as well as in asthmatics.[6,7,22] PEFR variation has been widely advocated and used in clinical practice and asthma research.

Several evidences suggest that airway variability exhibits a definite circadian pattern in which morning PEF levels are lower than daytime values, with a minimum in early morning and peak in evening. [6,7,22,23] The pattern of variability is exaggerated in smokers and in COPD and in asthmatic patients.[6]

The various spirometry indices reflect airflow characteristics of different airways. Forced expiratory flow (FEF), at 25% FVC, i.e. FEF25 reflects small airways, at 75% FVC (FEF75) reflects large airways and at 50% FVC (FEF50) reflects mid/small airways. FEF from 25% to 75% FVC (FEF25-75), reflects mid/small airways and is also known as mid expiratory flow. Forced expiratory volume in one second (FEV1) reflects the calibre of both large and small airways, whereas PEF is more a reflection of the calibre of large airways.[24,25] In general FEV1 is a more reliable indicator of airflow limitation than PEF. [26]

Unfortunately, most studies that describe diurnal variability in airways calibre in asthmatics have used PEF rather than FEV1. Moreover, the diurnal variability of small, mid and large airways has not been studied systematically. This study was designed to assess and compare diurnal variability of FEF25, FEF50, FEF75, FEF25-75, PEF and FEV1 by measuring these parameters during morning and evening hours in normal healthy subjects.

Materials and Method

Study Site/Place: This study was conducted in the Department of Physiology of Katihar Medical College, Katihar.

Study Duration: September 2018 to February 2019 (Six months).

Inclusion Criteria:

1. First and second year MBBS students
2. 17 to 30 years of age and all the gender
3. Healthy students having almost similar daily routine

Exclusion Criteria:

1. Students have history of smoking.
2. History of severe chest trauma, with chest and spinal deformity.
3. Personal/family history of asthma, chronic obstructive pulmonary diseases and
4. Personal/family history of other cardiovascular and/or respiratory diseases.

Study Design: An observational and prospective study.

190 students,100 from first and 90 from second year MBBS batch students were selected for this study after considering inclusion and exclusion criteria. The study protocol was duly approved by Head of the Department of Physiology and Pharmacology. After enrolment students were explained about the study.A thorough clinical history was taken and anthropometric measurements (height and weight) were recorded. Brief clinical examination was done to rule out any obvious cardio-pulmonary compromise.

The Pulmonary Function Test was done using Digital Spirometer Machine (Spiro Excel 1.1 by Medicaid Systems). Parameters which had been interpreted like Forced Expiratory Volume in 1 second (FEV1), Peak Expiratory Flow(PEF), Forced Vital Capacity (FVC), Forced Expiratory Flow (FEF), Forced Expiratory Time (FET) and Flow/Volume Curves.

Enrolled students were divided into different groups with 8-10 students in a group. Each group were directed to appear at different dates in Pulmonary Function Test Laboratory at 7:30 AM and again at 5:00 PM for spirometry testing. Spirometry was performed with Spiro Excel 1.1 by trained technician between 7:30 to 8.00 AM in morning and 5:00-5:30 PM in evening. PFT was done as per the ATS guidelines[27] The test curve with the highest sum of the FVC and FEV1 were taken for further analysis.

Recorded data was scrutinized and any incomplete or inadequate test record was rejected. Finally, data from 169 subjects was found to be complete and appropriate and was taken for the analysis.

Statistical Analysis: Paired t-test was used to analyse and compare FEV1, FEF25, FEF50, FEF25-75, FEF75 and FVC values obtained from morning and evening tests of each student. Diurnal variation (dv) i.e. difference between morning and evening values of all parameters for each student were calculated as mean ± SD. The Diurnal variabilities of different parameters were compared using one-way analysis of variance. The statistical analysis was performed by Instat GraphPad Software. A p-value ≤0.05 was considered as significant.

Results

Out of enrolled 190 students,data of 169 students were analysed. Male (n=96) and female (n=73) ratio was 1.32:1. Mean age of all students was 24.48±3.12. Mean height and mean weight of students was 168.22±8.68 and 60.37±10.42 respectively.

Table 1: Anthropometric and Spirometrydata (Mean±SD) between male and female students measured at 7:30 AM

Basal Parameters	Males (n=96)	Females (n=73)
Age	24.68±3.20	24.10±3.28
Height	171.85±8.06	157.04±5.12
Weight	63.88±11.14	54.07±9.23
FEF25	7.08±1.12	6.46±1.31
FEF25-75	4.06±0.81	3.48±0.87
FEF50	4.47±0.92	3.75±0.80
FEF75	1.97±0.49	1.68±0.58
FEV1	3.84±0.41	3.11±0.33
FVC	4.49±0.48	3.56±0.29
FEV1%	85.06±4.97	86.57±5.37
PEF	9.15±1.11	8.21±0.96

Table 2: Spirometry parameters (Mean±SD) recorded in all students (n=169) in morning (7:30 AM) and in evening (5:00 PM) and their diurnal variability

Parameter	Morning Values	Evening Values	p value	Diurnal Variability	p value
FEF25	6.90±1.21	7.09±1.24	HS	7.83±6.23	S
FEF25-75	3.88±0.86	4.07±0.91	HS	9.57±9.64	S
FEF50	4.28±1.04	4.45±1.15	HS	10.75±11.31	S
FEF75	1.89±0.54	2.01±0.55	HS	13.15±11.92	S
FEV1	3.64±0.52	3.68±0.51	S	3.91±3.63	S
FEV1%	85.42±4.97	86.63±4.86	HS	3.25±2.90	S
FVC	4.29±0.77	4.32±0.76	NS	4.27±4.90	S
PEF	8.89±1.15	9.11±1.10	HS	6.42±5.78	S

HS- highly significant (p<0.001) S- significant- (p<0.05), NS- not significant (p>0.05)

All the spirometry parameters were significantly high in evening tests as compared to morning tests except FVC. Diurnal variability among different spirometry parameters was significantly different (ANOVA, p<0.05) in morning and evening tests. The diurnal variability was highest in large airways as reflected by FEF75 and Lowest in smaller airways as reflected by FEF25. The diurnal variability was lowest for FEV1%.

Discussion

Spirometry parameters had shown gender variation. All parameters were more in male than female. Showed a clear evidence that sex is a factor that affects PEF.[28]

Spirometry parameters exhibits circadian pattern andthey were less in morning compared to evening time. Diurnal variability may be seen due to variability in airway calibre during morning and evening time.[6,7,22,23]

Various studies have shown the diurnal variability of different spirometry parameters like Kondo S, Erban J et al. and Troyanov S et al. had demonstrated that spirometry parameters had significant difference during morning and evening time especially FEV1% and PEF and consistent with the results obtained from present study.[29-31]

Present study had made an attempt to differentiate the diurnal variability in spirometry test due to change in calibre of proximal and distal airway using PEF and FEV1. Present study results were consistent withthe study done by Hegewald MJ et al., who had exhibited that intrinsic variability in a single session (both morning and evening) spirometry test was higher for PEF than FEV1 also diurnal variability of PEF was higher than FEV1 in healthy subjects.[32]

Changes in proximal airway calibre results in changes in PEF while changes in FEV1 is related to calibre of proximal and peripheral airway.[24]

Studies have interpreted that the variability in proximal airways is largely due to changes in airway geometry. Fractional reduction in large airway calibre leads to greater decrease in flow compared to smaller airways. And it occurs due to a theory according to that flow rate or resistance is inversely proportional to the fourth power of radius. Also, it is a fact that the proximal and distal airways differ in smooth muscle content and nerve supply. The density of nerve supply and smooth muscle mass decreases as we proceed from proximal to distal airways.[33] This is why the diurnal variability in smaller airways is lower than larger airways.

Correlation between PEF and FEV1 and their diurnal variability was significant. This feature was representation of changes in proximal airways calibre corresponding to changes in distal airways calibre. Morning and evening mean of both PEF and FEV1 were significantly different and showed diurnal variability. Previous study also supported results of this study.[2,6,23]

FEV1 was clinically more suitable to know the diurnal variability because total variability was lowest and maximum variability seen was less than 10%. Clinical use of Mid Expiratory Flow was not justified because it showed high variability. FEV1 and PEF showed variability according to the previous study.

Conclusion

FEV1, FEF and PEF has shown diurnal variability which was directly related to the airway calibre. Proximal airways showed greater diurnal variation than distal airways due to in their calibre, reflected by greater variability in PEF as compared to FEV1. In this study only two readings were taken to investigate the diurnal variability. Further study with multiple recordings in 24-hour duration should be tried to better characterize the circadian pattern of spirometry parameters and exploring their physiological basis.

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Effects of Nonpharmacological Interventions on the Components of Metabolic Syndrome in Tirunelveli City Police

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Abstract

Background: Life style modifications like walking, slow deep breathing and dietary modifications play a major role in modifying the components of metabolic syndrome. This study was conducted to determine the effects of non-pharmacological interventions on components of metabolic syndrome among the police personnel in Tirunelveli city.

Method: This is a before and after intervention study in which 44 police personnel working in Tirunelveli city in the age group of 30-58 years with metabolic syndrome were included. After getting due permission from the Deputy Commissioner of Police, Tirunelveli and Head of Department of Bio chemistry Department, Institutional Ethical Committee clearance and oral informed consent from the volunteers the study was started. The study was conducted during the period from August to November, 2013. Height, weight, waist circumference, blood pressure estimation and bio-chemical investigations were measured at baseline and 12 weeks after intervention in the study group.

Results: It is found that the physiological parameters measured before and after non pharmacological intervention in the study group indicate a distinct and statistically significant reduction in all the values and a significant increase in HDL.

Recommendation: Physical fitness schedule, along with stress alleviation techniques and dietary modifications may be made mandatory to keep the police personnel physically and mentally healthy.

Keywords: *Metabolic syndrome, Non pharmacological intervention, Police, Tirunelveli.*

Introduction

Many people think that their health can be restored from non communicable diseases only by taking pharmacological treatments. But it is not so, as there are many non pharmacological interventions or life style modifications, which can bring back the disturbed body functions to normal physiological status or at least reduce the disturbances, which have been proved by many research studies. In the context of metabolic syndrome, life style modification plays a major role in modifying its components. Major non pharmacological interventions are walking (moderate physical activity), slow deep breathing exercise (relaxation technique) and dietary modifications.

According to the Ministry of Health and family welfare, Government of India and the public health foundation of India, food containing whole grains, whole pulses, vegetables, fresh fruits, nuts and fish with low carbohydrate and low saturated fat and decreased salt is considered as optimal diet to be consumed for an healthy living[1]. This diet contains more antioxidants and acts as a protective factor in combating oxidative stress which is one of the cause for insulin resistance. This optimal diet is considered to be rich in dietary fiber. According to WHO, Dietary fibers are defined as the portion of plant

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foods that are resistant to digestion by digestive enzymes and form the bulk of the food.[2]

Physical inactivity is an important modifiable risk factor in the etiology of metabolic syndrome [3, 4]. Walking for about 30-45 minutes per day for at least 5 times a week is considered as an optimal physical activity for maintaining good health.[5] Certain interventions have shown that the physical activity was an effective means of reducing weight, visceral fat, lowering blood pressure, increasing HDL cholesterol and decreasing the level of triglycerides[6-9].

Studies have shown that slow deep breathing has reduced blood pressure and also increase in vagal and parasympathetic shift in autonomic nervous functions, there by relaxing the individual.[10,11,22]

Metabolic syndrome has been reported to be on the rise in general population[12], more so in personnel involved in occupational stress[13]. Police personnel are exposed to unhealthy life style circumstantially which predisposes them to metabolic syndrome at an early age.

There have been attempts by way of non-pharmacological intervention to reduce blood pressure, decrease hyperglycemia, correction of dyslipidemia[14] and improve the psychological well being to better handle the stressful situations with lesser health complications. Studies have been undertaken to evaluate the usefulness of the various non-pharmacological adjuncts reversing the symptoms of metabolic syndrome, so as to prevent or delay its complications.[15,16]

Hence the present study is under taken.

Aims and Objectives: To determine the effects of non-pharmacological intervention such as dietary changes, walking and slow deep breathing exercise on components of metabolic syndrome among the police personnel in Tirunelveli city.

Materials and Method

This is a before and after intervention study in which 44 police personnel working in Tirunelveli city in the age group of 30-58 years with metabolic syndrome were included. After getting due permission from the Deputy Commissioner of Police, Tirunelveli and Head of Department of Bio chemistry Department, Institutional Ethical Committee clearance and oral informed consent from the volunteers the study was started. The study was conducted during the period from August to November, 2013.

Materials Used:

1. Proforma - A written proforma cum consent form containing subject details and clinical examination findings
2. Stadiometer - To measure the height
3. Portable weighing machine - To record the weight
4. Sphygmomanometer - To record the blood pressure
5. nVac Tube (serum tube) - Non-Vacuum Blood Collecting tube with clot activator to collect blood (5ml tube)
6. Sterile syringes - 3ml sterile disposable syringes for drawing venous blood
7. Auto analyzer - Estimation of serum glucose and lipid profile
8. Intervention program in a written format

The individuals included in the study were contacted personally and the details of study were explained to them. Instructions were given to come prepared with overnight fasting for the investigation to be conducted next day. On the day of examination, the proforma containing the written informed consent was filled up in order to get the data regarding personal details, such as dietary habits, sleep duration, physical activity, history of smoking, alcohol etc, The height was measured using stadiometer and the weight was recorded using standard portable weighing machine. The waist circumference was measured using a non- elastic measuring tape that was kept in the horizontal plane, mid- way between the inferior margin of the ribs and the superior border of the iliac crest, at the level of umbilicus. After an interval of 10 minutes rest, the blood pressure was recorded using Sphygmomanometer by the Standard technique of Auscultatory method.

Under aseptic precautions 3ml of blood was drawn from the mid-cubital vein using sterile disposable syringe by a trained paramedical staff. The blood was collected in a sterile serum tube (nVac) which contains clot activator in it. The labeled blood samples were carefully taken to the central laboratory of Tirunelveli Medical College immediately and given for estimation of fasting plasma glucose levels and lipid profile

The blood investigations were carried out in the Auto analysers in the laboratory.

Plasma glucose was determined using glucose oxidase peroxidase method (Trinder's Method). Total cholesterol and triglycerides were determined by using standard enzymatic method. HDL-C was measured by direct assay method. VLDL was calculated by dividing triglycerides by 5 and LDL was calculated by taking the difference of total cholesterol and VLDL.

Based on the criteria for metabolic syndrome as mentioned in the modified National Cholesterol Education Program – Adult Treatment Panel III (NCEP-ATP III), the individuals suffering from metabolic syndrome were identified.

The criteria for diagnosing metabolic syndrome is the presence of at least three of the following five factors.

1. **Blood pressure** - SBP > 130 mmHg/or DBP > 85mmHg or previously diagnosed hypertension on treatment
2. **Waist Circumference** - >90cm in males >80cm in females
3. **Fasting blood glucose** - >110mg/dl or previously diagnosed diabetes on treatment.
4. **Triglycerides** ->150mg/dl or on drug for treatment for elevated triglycerides
5. **High density lipoprotein-cholesterol** - <40mg/dl in males

<50mg/dl in females or on drug treatment for low HDL.

The study group were given clear instructions of the non-pharmacological adjuncts in a written format and also oral explanation. They were asked to follow the following Life Style Modification activities in their daily routine under the monitoring of an Inspector of police.

1. **Walking:** Minimum 45 minutes, morning/evening.
2. **Relaxation:** Slow deep breathing for 15 minutes, minimum twice a day in the leisure time.
3. **Dietary modification:** Included 6 meal plan and break time snacks.

7-8am breakfast, 10-11amsnacks, 1-2pm lunch, 4-5pm snacks, 7-8pm dinner, 10-11pm salads (vegetable/ fruit).

- One cup of sprouted/boiled pulses/cucumber/fruits as snacks
- Reduce the quantity of rice and add other grains like wheat or millets
- Increase the quantity of vegetables
- Green leafy vegetables at least thrice a week
- Avoid excess salt/oil
- Refrain from alcohol, smoking and carbonated drinks.

At the end of 12 weeks, weight, waist circumference, blood pressure estimation and bio- chemical investigations were repeated in the study group. The data obtained prior to and after the non pharmacological intervention were tabulated, compared and statistically analyzed.

Results Analysis

Table 1: Age distribution among the study group willing for Non- pharmacological intervention. (N= 44)

Age (Years)	Number	Percentage
30-35	07	15.9 %
36-40	05	11.4 %
41-45	14	31.8 %
46-50	08	18.2 %
51-55	09	20.5 %
Above 55	01	2.3 %

This table shows the age distribution of study group. Here the majority of individuals fell in the age group of 41 to 45 years (14) (31.8 %)

Table 2: Physiological parameters before and after non pharmacological intervention for 12 weeks in the study group. (N=44)

Physiological Parameters		Initial Values Mean (SD)	Values at end of 12 weeks Mean (SD)	Statistical Inference (P-values)
Weight (kg)		84.34(9.87)	81.57 (9.44)	.000
BMI (kg/m^2)		27.92(3.08)	26.94(2.87)	.000
WC (cm)		98.86(7.80)	76.89(7.58)	.000
Blood pressure (mm of Hg)	SBP	127.55(14.51)	117.34(10.21)	.000
	DBP	90.41(11.87)	80.86(6.01)	.000
	MAP	102.79(12.14)	93.01(6.34)	.000
Fasting blood sugar (mg/dl)		140.41(52.75)	92.95(16.79)	.000
Lipid profile (mg/dl)	T.cho	170.43 (26.57)	160.39(33.79)	.041
	TGL	227.8(101.13)	159.09(67.57)	.000
	LDL	92.11(24.33)	78.77(17.34)	.000
	HDL	33.93(5.12)	49.30(14.12)	.000
	VLDL	44.02(18.96)	32.07(13.56	.000

T.Cho-Total cholesterol, TGL- Triglycerides, LDL- Low density Lipoprotein. HDL-High Density Lipoprotein, VLDL-Very low density lipoprotein,

It is found that the physiological parameters measured before and after non pharmacological intervention in the study group indicate a distinct and statistically significant reduction in all the values and increase in HDL. It is understood that the higher level of HDL > 40mg/dl is desired for healthy status of the individual. This table shows the mean HDL level has actually increased from 33.93 to 49.30 mg/dl – which is a welcome improvement.

Discussion

The present study included 44 police personnel in Tirunelveli city, identified as suffering from metabolic syndrome, willing to adopt the non-pharmacological adjuncts for a period of 12 weeks as an attempt to evaluate their effects in improving the health condition.

At the end of 12 weeks after following non-pharmacological intervention, 44 participants underwent the estimation of physiological parameters and bio-chemical investigation.

The results, when tabulated and compared, showed significant reduction in almost all the parameters except the HDL level which showed a distinct increase. When the values obtained before and after non-pharmacological intervention were statistically analyzed, all the changes were found to be statistically significant

The optimal diet prevented the accumulation of extra calories, increased the bulk of food (high dietary fiber), decreased gastric empting time and helped in attaining feeling of satiety and thereby reduced the weight.

The levels of fasting blood glucose was reduceddue to optimal diet and also due to increase in physical activity in the form of walking.Glucose was used as energy for active muscles during exercise and this was facilitated by insulin dependent GLUT-4 receptors in muscles. Regular exercise activities sustained and maintained the sugar level for hours after exercise.

The lipid levels were lowered due to decrease in insulin resistance which in turn was due to increased physical activity. The HDL was increased significantly because of the restoration of “reverse cholesterol transport”

The blood pressure was reduced significantly due to the effect of deep breathing exercise, increased physical activity and reduction of salt in their diet.

Studies by Parikka et al., 2010[17], Orchard TJ, et al., 2005[18] and Azadbakht L et al[19]., show that dietary modifications and life style changes reduced the components of metabolic syndrome.

Studies by Watkins LL et al[20]. and Kaukab Azeem[21] showed that there was reduction in systolic blood pressure, diastolic blood pressure, body massindex, waist-hip ratio after 12 weeks of brisk walking which very well coincides with the results of this study.

The study of Pal GK, Velkumary et al[22]. says that regular practice of slow breathing exercise for 12 weeks improves autonomic functions.

Chacko N. Joseph, et al[23], concluded that slow breathing reduced the blood pressure and enhanced the baroreflex sensitivity in hypertensive patients and Jane AMcElroy,et al[24]. in their study results found that the decrease in the blood pressure due to slow breathing was due to improvement in both the parasympathetic and sympathetic activity.

A study by Brazelian public health system showed a decrease in body mass index and waist circumference through life style intervention program. It also concluded that the levels of HDL cholesterol increased with traditional diets which coincides with the result of this study[25].

In police personnel the increased incidence of metabolic syndrome can be reduced by following the Physical fitness schedule, along with stress alleviation techniques and dietary modifications which may be made mandatory to keep the police personnel physically and mentally healthy.

Conflict of Interest: Nil

Ethical Committee Clearance: Obtained

Source of Funding: Self

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Prevalence of Metabolic Syndrome and its Determinants in Tirunelveli City Police

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Abstract

Introduction: Metabolic syndrome has been reported to be on the rise in general population, more so in personnel involved in occupational stress. Hence the present study is undertaken to find out the prevalence of metabolic syndrome and to determine the factors associated with it among the police personnel in Tirunelveli city.

Method: This is a cross-sectional study in which 133 police personnel working in Tirunelveli city in the age group of 30-58 were included. After getting due permission from the Deputy Commissioner of Police Tirunelveli city, Head of Department of Bio chemistry, Institutional Ethical Committee clearance and oral informed consent from the volunteers, the study was started. The study was conducted during the period of August, 2013. Analysis was done using Chi square test and t test using SPSS software version 16. Results: Among the 133 police personnel examined, 92 of them were identified with metabolic syndrome. Hence, prevalence was found to be 69.1%. Majority of them 26 (28.3%) fell in the age group of 41 to 45 years. History of Smoking, Hypertension and Diabetes were found to be higher among those with metabolic syndrome (31.5%, 20.7% and 17.4%) as compared to those who were not affected (7.3%, 7.8% and 2.4%) and they were found to be statistically significant with P values of 0.003, 0.007 and 0.017 respectively. The mean values of Age, BMI, Waist circumference, Systolic BP, Diastolic BP, Mean Arterial BP, Fasting Blood Sugar, Serum Triglycerides and VLDL were significantly higher among those who were having metabolic syndrome as compared to other participants.

Keywords: *Metabolic Syndrome, Police, Tirunelveli city, Determinants.*

Introduction

Metabolic syndrome, an emerging worldwide problem showing a prevalence of 20-25% is considered as a risk factor for the cardiovascular diseases and type-2 diabetes mellitus. As per WHO estimation, more than 300 million people will suffer from diabetes by the year 2025, globally and 3 out of 4 of these will be living in developing countries[1].

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The overall prevalence of metabolic syndrome in India varies between 20-46.3% [2,3,4,5]. Recently the importance of health status of police personnel has been realized and many studies have been undertaken in India.[6,7,8,9] In a study among the Chennai City Police, carried out in 2008 by Shabana Tharkar et.al., the prevalence of Metabolic syndrome in Police Personnel when compared to general population was found to be significantly on a higher scale showing the rate to be 57.3 vs 28.2%.[9]

In the modern stressful life style, people are in a rush after money and success and following sedentary life style due to luxury and comfort of the contemporary civilization[10]. The reason for attention towards metabolic syndrome remains simple; as the components of this syndrome are associated with increased morbidity

and mortality especially cardiovascular diseases in particular[11].

In the modern society, safety and justice of the public is entrusted with the law enforcement officers and so the police work is considered as one of the highly stressful job at present[1]. Studies have found that the police work being a stressful occupation acts as factor for psychological stress[4]. In the bargain, the health and performance of the police personnel are at risk. It has been reported at present that the police officers suffer increased rates of cardiovascular and metabolic disorders, psychological disturbances etc. more than the general population[5].

Metabolic syndrome which has been reported to be on the rise in general population[6], more so in personnel involved in occupational stress[13]. Police personnel are exposed to unhealthy life style circumstantially which predisposes them to the symptoms of metabolic syndrome at an early age. Police personnel, when employed, are medically fit and healthy but in matter of few years most of them suffer from abnormalities of health conditions that culminate in the components of metabolic syndrome.

Hence the present study is undertaken to findout the prevalence of metabolic syndrome and to determine the factors associated with it among the police personnel in Tirunelveli city.

Materials and Method

This is a cross-sectional study in which 133 police personnel working in Tirunelveli city in the age group of 30-58 years were included. Police personnel below 30 years were excluded from the study. After getting due permission from the Deputy Commissioner of Police, Tirunelveli, Head of Department of Bio chemistry Department, Institutional Ethical Committee clearance and oral informed consent from the volunteers, the study was started. The study was conducted during the period August 2013.

Materials Used:

1. Proforma - A written proforma cum consent form containing subject details and clinical examination findings
2. Stadiometer - To measure the height
3. Portable weighing machine - To record the weight
4. Sphygmomanometer - To record the blood pressure
5. nVac Tube (serum tube) - Non-Vacuum Blood Collecting tube with clot activator to collect blood (5ml tube)
6. Sterile syringes - 3ml sterile disposable syringes for drawing venous blood
7. Auto analyzer - Estimation of serum glucose and lipid profile

The individuals included in the study were contacted personally in groups of 25-30 on five different days and the details of study were explained to them. Instructions were given to come prepared with overnight fasting for the investigation to be conducted next day. On the day of examination, the proforma containing the written informed consent was filled up in order to get the data regarding personal details, such as dietary habits, sleep duration, physical activity, history of smoking, alcohol etc. The height was measured using stadiometer and the weight was recorded using standard portable weighing machine. The waist circumference was measured using a non- elastic measuring tape that was kept in the horizontal plane, mid- way between the inferior margin of the ribs and the superior border of the iliac crest, at the level of umbilicus. After an interval of 10 minutes rest, the blood pressure was recorded using Sphygmomanometer by the Standard technique of Auscultatory method.

Under aseptic precautions, 3ml of blood was drawn from the mid-cubital vein using sterile disposable syringe by a trained paramedical staff. The blood was collected in a sterile serum tube (nVac) which contains clot activator in it. The labeled blood samples were carefully taken to the central laboratory of Tirunelveli Medical College immediately and given for estimation of fasting plasma glucose levels and lipid profile.

The blood investigations were carried out in the Auto analysers in the laboratory.

Plasma glucose was determined using glucose oxidase peroxidase method (Trinder's Method). Total cholesterol and Triglycerides were determined by using standard enzymatic method. HDL-C was measured by direct assay method. VLDL was calculated by dividing Triglycerides by 5 and LDL was calculated by taking the difference of Total Cholesterol and VLDL.

The data including anthropometric measurements, blood pressure and results of bio- chemical parameters

were tabulated for individual cases in the form of master chart for 133 volunteers included in the study. Based on the criteria for metabolic syndrome as mentioned in the modified National Cholesterol Education Program–Adult Treatment Panel III (NCEP-ATP III), the individuals suffering from metabolic syndrome were identified.

The criteria for diagnosing metabolic syndrome is the presence of at least three of the following five factors.

1. **Blood pressure:** SBP > 130 mmHg/or DBP > 85mmHg or previously diagnosed hypertension on treatment
2. **Waist Circumference:** >90cm in males & >80cm in females
3. **Fasting blood glucose:** >110mg/dl or previously diagnosed diabetes on treatment.
4. **Triglycerides:** 150mg/dl or on drug for treatment for elevated triglycerides
5. **High density lipoprotein-cholesterol:** <40mg/dl in males & <50mg/dl in females or on drug treatment for low HDL.

Among the 133 police personnel, 92 of them were diagnosed with Metabolic Syndrome.

Results Analysis

Table 1 shows that about 23.8% of the respondents were in the age group of 41 to 45 years.

Among the 133 police personnel examined, 92 of them were identified with metabolic syndrome. Hence, prevalence was found to be 69.1 %.

Table 1: Age distribution among the total individuals examined (N=133)

Age (Years)	Number	Percentage
30-35	29	21.8 %
36-40	25	18.8 %
41-45	31	23.8 %
46-50	16	12 %
51-55	26	19.5 %
Above 55	06	4.5 %

Majority of them 26 (28.3%) fell in the age group of 41 to 45 years (Table 2).

Table 2: Age distribution of the individuals identified with metabolic syndrome (N=92)

Age (Years)	Number	Percentage
30-35	12	13 %
36-40	15	16.3 %
41-45	26	28.3 %
46-50	14	15.2 %
51-55	20	21.7 %
Above 55	05	5.4 %

Table 3: Comparison of history of smoking, alcohol, HTN, DM between affected and unaffected individuals

Parameters		Affected (N=92)	Not Affected (N=41)	Total (N=133)	Statistical Inference (P value)
Smoking	Yes	29(31.5%)	3 (7.3%)	32(24.1%)	0.003
	No	63(68.5%)	38(92.7%)	101(75.9%)	
Alcohol	Yes	25(27.2%)	9(28%)	3(25.6%)	0.524
	No	67(72.8%)	32(78%)	99(74.4%)	
Hypertension	Yes	19(20.7%)	1(2.4%)	20(15%)	0.007
	No	73(79.3%)	40(97.6%)	113(85%)	
Diabetes mellitus	Yes	16(17.4%)	1(2.4%)	17(12.8%)	0.017
	No	76(82.6%)	40(97.6%)	116(87.2%)	

Table 3 shows that history of Smoking, hypertension and diabetes were found to be higher among those with metabolic syndrome (31.5%, 20.7% and 17.4%) as compared to those who were not affected (7.3%, 78% and 2.4%) and they were found to be statistically significant with P values of 0.003, 0.007 and 0.017 respectively.

Table 4: Comparison of General characteristics between affected and non affected individuals (N=133)

Characteristics		Affected (n=92)		Not Affected (n=41)		Statistical Inference
		Mean	SD	Mean	SD	P- value
Age (Years)		44.72	7.44	39.63	7.99	.001
Height (cm)		173.36	3.910	169.73	7.56	-
Weight (kg)		83.57	9.430	73.20	8.721	.000
BMI(kg/m^2)		27.81	2.86	25.45	2.59	.000
Waist circumference (cm)		98.55	7.287	89.88	7.69	.000
Systolic blood pressure		130.46	17.48	116.83	10.14	.000
Diastolic blood pressure		91.59	13.65	80.44	8.86	.000
Mean arterial pressure		104.76	15.19	92.56	8.70	.000
Fasting blood sugar		141.73	59.27	96.49	15.04	.000
Lipid profile (mg/dl)	T.cho	168.79	27.78	161.56	29.21	.175
	TRIG	220.29	91.85	129.61	54.29	.000
	LDL	91.97	25.14	102.39	23.31	.026
	HDL	34.03	5.31	32.9	6.47	.292
	VLDL	42.66	16.95	25.85	10.89	.000

T. Cho-Total cholesterol, TRIG- Triglycerides, LDL- Low density Lipoprotein. HDL-High Density Lipoprotein, VLDL-Very low density lipoprotein,

Table 4 shows that the mean values of age, BMI, waist circumference, systolic BP, Diastolic BP, mean arterial BP, fasting BP, serum triglycerides and VLDL were significantly higher among those who were having metabolic syndrome as compared to other participants.

Discussion

The present study included 133 volunteers of police personnel in Tirunelveli city as an attempt to identify individuals suffering from metabolic syndrome which is found to be on rise in the general population and more so in people under chronic stress because of altered modern lifestyle. When recruited, they are in excellent physical fitness and later on after some years of continuous service they are exposed to occupational stress conditions that can result in alterations in emotional and physical changes.

The study was proceeded with detailed history taking related to occupation, personal and dietary habits in the proforma. Clinical examinations and relevant estimation of physiological parameters such as height, weight, waist circumference, blood pressure and bio chemical investigation that included fasting blood sugar level and lipid profile were taken.

On tabulation of the data collected from the 133 participants in the study, 92 were identified with metabolic syndrome who had criteria as stipulated in modified national cholesterol education programme –adults treatment panel III (NCEP-ATP III). This shows the prevalence rate in this study to be 69.1% . Earlier reports from Chennai study by Shabana Tharkar et.al have mentioned the prevalence rate of metabolic syndrome in police personnel as 57.3% (2008)[9]. Our study results can therefore be considered to indicate the increasing incidence.

Among the 133 individuals examined, 32 of them gave a positive history of smoking habit and among them 29 were affected with metabolic syndrome, these results coincides with the study of Yusuf et al, 2004[14], which says that two third of the risk for cardiovascular diseases comes from smoking. Also study by Joshi P et al, 2007[15] points out that smoking is a major risk factor for early myocardial infarction in South Asians.

The increase in the prevalence rate of metabolic syndrome can be attributed to the chronic stress among police personnel. Chronic stress causes activation of sympathetic nervous system and leads to visceral obesity, insulin resistance, hyper tension, dyslipidemia

and type 2 diabetes mellitus[16,17]. Also studies show that work stress and sleep disturbance cause hyperglycemia leading to type 2 diabetes mellitus.[18,19] Studies also show that increased sympathetic activity and decreased parasympathetic activity due to stress is associated with insulin resistance[20] and visceral adiposity.[21] Increased activity of both HPA - axis and sympathetic nervous system are being activated in persons with metabolic syndrome which is due to psychosocial factors[22]. Stress also releases cytokines from the visceral adipose tissue[23]. causes low grade inflammation causes insulin resistance. TNF-α impairs insulin signalling[24] and also impairs capillary recruitment [25] and also cause increase in Reactive Oxygen Species levels which activates the stress kinase JNK and intum increases IRS—1 serine phosphorylation[26] and cause insulin resistance through oxidative stress.

Further studies on interventions like Physical fitness schedule, along with stress alleviation techniques and dietary modifications and their effects on metabolic syndrome may be conducted to keep the police personnel physically and mentally healthy.

Conflicts of Interest: Nil

Ethical Committee Clearance: Obtained

Source of Funding: Self

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Subjective Sleep Quality in Women with Premenstrual Syndrome and its Correlation with Serum Magnesium Level

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Abstract

Background: Premenstrual Syndrome (PMS) is defined as a cyclical disorder in the late luteal phase with occurrence of non-specific somatic, psychological or behavioural changes. Sleep disturbances are more common in Premenstrual syndrome. Apart from hormonal causes, micronutrients like magnesium, calcium and zinc are also involved in the pathogenesis of Premenstrual syndrome.

Objective: To assess the Subjective sleep quality in women with Premenstrual Syndrome and its correlation with serum Magnesium level.

Method: It is a cross- sectional study involving 175 women of age group 18-40 years. After obtaining ethical committee clearance, Premenstrual Syndrome is diagnosed using Premenstrual syndrome scale (PMSS). Subjective sleep quality in them are assessed using Pittsburgh Sleep Quality Index (PSQI) and then 5 ml of venous blood are collected for Serum Magnesium Level estimation.

Results: Among the study population of 175 women with PMS, good sleep quality was reported by 87 women (49.71%) and poor sleep quality by 88 women (50.29%). The mean value of serum Magnesium level was 1.74 ± 0.56 mg/dl. Using Pearson's coefficient correlation, there was a positive correlation between sleep quality and serum magnesium level which was statistically significant.

Conclusion: Magnesium replacement therapy could be beneficial in improving the poor sleep quality in Premenstrual syndrome.

Keywords: *Premenstrual syndrome, sleep quality, Magnesium.*

Introduction

Premenstrual syndrome (PMS) is a cyclical disorder observed in late luteal phase presenting with behavioral changes that can affect interpersonal relationships and normal daily activity[(1)]. Clinical characteristics can be divided as physical, psychological and behavioral changes. PMS affects 90% of women in childbearing age. Sleep disturbances are also common. Women with PMS report sleep disturbances as increased sleep latency, number of awakenings and decreased sleep efficiency[(1,2)]. The most commonly used sleep questionnaire in assessing the subjective sleep quality is Pittsburgh Sleep Quality Index (PSQI). Progesterone, which is a hormone of luteal phase plays a key role in the pathogenesis of PMS. Apart from hormonal imbalances, micronutrients like magnesium,zinc and calcium are also implicated in the pathogenesis of PMS[(3)].

Magnesium deficiencies causes depletion of brain dopamine without affecting brain serotonin and nor-

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epinephrine. It also increases threshold for stressful stimuli and in its deficiency aldosterone level is increased in response to environmental stimuli. Magnesium is an agonist of GABA (γ-aminobutyric acid), the principle inhibitory neurotransmitter. At the same time, it is an antagonist of NMDA(N- methyl D- aspartate). NMDA and GABA play a key role in sleep regulation [3,4].

There were limited studies using subjective method in order to detect sleep quality in PMS. In this study Pittsburgh Sleep Quality Index (PSQI) has been used to evaluate the subjective sleep quality. Score of more than 5 indicates poor sleep quality.While overnight Polysomnograph is a gold standard objective method, it has disadvantages like cost-effectiveness and equipment[2]. Thus PSQI is practically good scale for estimating sleep disturbances. Here we also evaluate the correlation between the sleep quality and Serum Magnesium level. Sleep architecture, especially slow wave sleep, is closely associated with the glutamatergic and GABAergic system[5]

Aim:

- To diagnose the Premenstrual syndrome using Premenstrual Syndrome Scale (PMSS) in the women of age group 18 to 40 years
- To assess the subjective sleep quality in women with Premenstrual syndrome using Pittsburgh Sleep Quality Index (PSQI).
- To correlate subjective sleep quality with serum Magnesium level.

Materials and Method

A cross sectional study was conducted in 175 women with Premenstrual Syndrome who were recruited from Gynaecology department, RSRM, Stanley Medical College between July 2019 and September 2019.

Inclusion Criteria:

- Women with Premenstrual Syndrome
- Age group 18-40 years
- Women having regular menstrual cycles

Exclusion Criteria:

- Pregnancy or post partum period
- Chronic illness like Diabetes Mellitus, Hypertension, Chronic Kidney disease, Coronary Artery Disease
- Neurological illness
- Endocrine disorders
- Any gynaecological disorders
- Intake of OCP's and drug abuse
- Smoker, alcoholics and betel nut chewer

Data was collected after obtaining Ethical Committee clearance. The purpose of the study was explained to the subjects and a written informed consent was obtained. After Clinical Examination, Women diagnosed with Premenstrual Syndrome using "Premenstrual Syndrome Scale (PSS) were assessed for Subjective sleep quality using Pittsburgh Sleep Quality Index (PSQI).

Under sterile precautions 5 ml of venous blood was collected and the serum was separated and stored in deep freezer. Serum Magnesium was estimated by Spectrophotometer atomic absorption technique

Statistical Analysis:

Data were collected and entered in MS Excel and analyzed using Epi Info software. The categorical variables were expressed in frequency and percentage and analyzed using Chi-square test. The continuous variables were expressed in mean and standard deviation. Pearson's coefficient correlation was used to determine the correlation between PMS and serum magnesium level. p values (p= <0.05) were considered as statistical significant

Results

Among the study population of 175 women with PMS, good sleep quality was reported by 88 women (50.71%) and poor sleep quality by 87 women (49.29%). The mean value of serum Magnesium level was 1.74±0.56 mg/dl. There was a positive correlation between sleep quality and serum magnesium level which was stastically significant. The correlation coefficient r = + 0.2 which implies as the quality of sleep worsen serum Magnesium level.

Table 1: Demograpic and Clinical parameters of study population

n=175	Mean ± SD
Range	
Age (18-40 yrs)	26.94 ± 6.32
Marital Status	
Married	110 (43%)
Unmarried	65 (27%)

n=175	Mean ± SD
PSQI	
Subjective Sleep Quality (0-3)	1.85 ± 0.43
Sleep Latency (0-3)	0.45 ± 0.21
Sleep Duration (0-3)	0.54 ± 0.23
Sleep Efficiency (0-3)	1.87 ± 0.33
Sleep Disturbance (0-3)	1.21 ± 0.46
Use of Sleep Medication (0-3)	0
Daytime Dysfunction (0-3)	1.60 ± 0.34
Global Score (0-21)	
Good sleep Quality (0-5)	88 (51%)
Poor Sleep Quality (6-21)	87 (49%)
Serum Magnesium Level (1.7-2.4mg/dl)	
Good Sleepers	1.86 ± 0.42
Poor Sleepers	1.75 ± 0.25

P < 0.05 Significant

Discussion

Sleep disturbance is one of the utmost concerns of women with PMS, which could even significantly affect their quality of life[6]. In accordance with Ozisik et al, there were significant difference in subjective sleep quality, sleep efficiency and daytime dysfunction with total PSQI score.We also see that there was a positive correlation between sleep quality and serum Magnesium level which was statistically significant [9].

Conclusion

This study would serve as a wakeup call to give prime concern to the sleep related complaints to improve the quality of life in women with PMS. Dietary intake of micronutrients especially Magnesium can prevent or reduce the sleep related issues and can improve the quality of life.

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Conflict of Interest if any: No

Privacy/Confidentiality of the study subjects: Will be maintained.

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Glossary of Abbreviation:

OCP- Oral Contraceptive Pills

GABA- γ-aminobutyric acid

NMDA- N- methyl D- aspartate

PMS- Premenstrual Syndrome

PMSS- Premenstrual Syndrome Scale

PSQI -Pittsburgh Sleep Quality Index

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Effect of Feedback on Direct Observation of Procedural Skills in Estimation of RBC Count among First Year Medical Students

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Abstract

Background: Formative evaluation has been effective in promoting active learning and a better future performance in students after immediate personalized feedback.

Aim and Objectives: To analyze the effect of "Direct observation of procedural skills" (DOPS) assessment and immediate feedback for first year MBBS students in estimation of RBC Count.

Methodology: The study was done on first year MBBS students (n=120) during the Physiology practical class. Checklist for estimation of RBC count (15 steps) was prepared by six faculty members. The formative practical test was divided into two practical sessions. During the first session, each faculty observed 4 students performing RBC estimation one by one (DOPS) and the details were recorded in the checklist. Similarly in five practical classes 120 participants were evaluated and immediate feedback was given to them for two minutes. In the second session the same procedure was followed and results were compared. Students perception about the assessment process (DOPS) was documented by feedback questionnaire as per Likert scale.

Results: The mean practical marks of the participants before feedback was 8.32 ± 2.25 and after feedback was 10.18 ± 1.81 ($P<0.05$). 92% of the study participants felt DOPS in RBC estimation was useful to them

Conclusion: DOPS assessments worked well in the student's practical laboratory setting by serving as an effective educational tool. Immediate personalized feedback to the students has resulted in reasonable skill development both subjectively and objectively.

Keywords: *DOPS, RBC estimation, Feedback, Hematology practical.*

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Introduction

In India, Physiology is taught in the first year MBBS (Bachelor of Medicine and Bachelor of Surgery) course. The aim of teaching Physiology practical's is to facilitate better understanding of the principles of Physiology and to inculcate the basics of clinical medicine in the future doctors[1].

According to Bloom, psychomotor domain deals with acquisition of physical abilities, motor skills, manipulation of materials or acts requiring neuromuscular coordination. This domain is also referred to as the "domain of practical skills".[2] DOPS (Direct observation of procedural skills) is a preferred assessment tool in a student's skills-lab, which helps to furnish high performance of clinical skills and it works well in the undergraduate setting[3]. DOPS ensures that a particular skill is performed correctly in stepwise manner according to the prescribed guidelines using an agreed checklist. DOPS is useful for ongoing educational and training purposes as it determines the student's level of knowledge, skills and attitude.

A single practical examination at the end of an academic year (summative evaluation) does not fully assess a student and there is no scope for improvement. There arises a need for formative evaluation periodically along with constructive feedback.

While doing estimation of RBC count there are high chances for errors for example, sucking of too much of blood or diluting fluid may lead to abnormal increase or decrease in RBC value respectively. Similarly, undercharged or overcharged chamber may result in erroneous RBC estimation[4]. A Strong mentoring system for practical sessions accompanying comprehensive assessment program is a key to improve the professional competence.

Feedback is considered as a vital approach to facilitate student's development in order to monitor, evaluate and regulate their own learning[5]. Feedback can be considered as constructive in the process of learning if it is delivered immediately and in a sensitive manner[6]. Appropriate feedback during education helps learner to identify the deficiencies in their learning and correct them towards achieving the objectives at the end of the program.

Rationale: There are very few studies in Indian literature about formative assessment, DOPS in improving hematology skills of first year medical students. The present study was done to assess the student's practical skills and to assess the effect of evaluation using DOPS while performing RBC count in Physiology laboratory.

Aims and objective:

1. To analyze the effect of immediate feedback on hematology practical examination.
2. To assess the effect of formative evaluation using DOPS during the first year Physiology practical.

Materials and Methodology

This Single arm interventional study was done at the department of Physiology- after obtaining Institutional Ethical Committee clearance. Participants (n=120) for the study were recruited from first MBBS after their voluntary consent.

Checklist with fifteen questions for estimation of RBC count was prepared with reference from standard Physiology practical manual [7] and validated by all the teaching faculty in the Physiology department. Six faculty members willing to participate were chosen. Faculties discussed among themselves the steps to be demonstrated as per the checklist.

The formative practical test was divided into two practical sessions. During the first practical session, 6 faculties demonstrated the RBC estimation (one faculty for four students). After demonstration, each faculty observed a student performing RBC estimation for half an hour on one to one basis (DOPS) and the details were recorded in the checklist. Students were awarded one mark for each correct step. Similarly in five practical classes 120 participants were evaluated and immediate feedback was given to them . In the second session the same procedure was followed and results were compared.

Feedback questionnaire (using five-point Likert scale) was provided to all the participants to find out their perception regarding the assessment process (DOPS) and the need for feedback in hematology practical's.

Statistical Analysis: Pretest and post test scores of the participants were analyzed by students paired t-test using SPSS 24-0 version. The feedback score was measured using proportion and percentages. The check list had 15 items and the students were assessed on dichotomous scale.

Results

Table 1: Marks of the study participants before and after feedback

	Girls (n= 52)	Boys (n= 68)	Total (n=120)
Pretest marks (Mean ±SD)	10.10 ± 1.68	6.97 ± 1.61	8.32 ± 2.25
Posttest marks (Mean ±SD)	11.44 ± 1.44	9.22 ± 1.43	10.18 ± 1.81
P-Value	<0.001	<0.001	<0.001
Difference of marks	1.34	2.25	1.86
Percentage gained in marks (%)	11.71	24.40	18.27

Table 1 shows that the mean practical marks of the participants before feedback was 8.32 ± 2.25 and after feedback was 10.18 ± 1.81. A statistically significant difference in marks of pretest and posttest were seen in the study participants. Difference between the pretest and posttest marks is 2.25 in boys and 1.34 in girls. Though the pretest and posttest marks were more in girls, improvement ie., percentage gained in marks was more observed in boys (24.40%) than girls (11.71%).

Table 2: Students feedback about the Direct Observation of Procedure Skills (DOPS) assessment method (Likert scale: 1-Strongly agree 2- Agree 3-Neutral 4-Disagree 5-Strongly disagree)

Questionnaire about the process	1	2	3	4	5
I understood what is expected of me in preparation and participation	60(50%)	50(41.67%)	1(0.83%)	7(5.83%)	2(1.67%)
The section assignments (DOPS) in RBC estimation is useful; I understood their purpose.	58(48.3%)	52(43.3%)	1(0.83%)	8(6.67%)	1(0.83%)
I was able to identify my competency gaps during the session	56(46.7%)	53(44.17%)	2(1.67%)	8(6.67%)	1(0.83%)
I got clear responses to what I did in test; I found out how to improve.	61(50.83%)	48(40%)	0	8(6.7%)	3(2.50%)
The process was made clear to me; I know what the task is.	56(46.67%)	57(47.50%)	0	7(5.83%)	0
Instructor treated students with respect.	46(38.33%)	63(52.50%)	1(0.83%)	3(2.80%)	7(5.33%)
The instructor effectively directed and stimulated the student.	40(33.33%)	70(58.33%)	0	1(0.83%)	9(7.40%)
The immediate feedback sessions motivated me.	58(48.33%)	51(42.50%)	2(1.67%)	4(3.33%)	5(4.17%)
The session confined to the allotted time & feedback given for 2 min is adequate	40(33.33%)	70(58.33%)	0	7(5.83%)	3(2.50%)

Table-2, shows that 92% of the study participants felt DOPS in RBC estimation is useful. 94% of the students were of the opinion, that the process was made clear and the task was properly explained. 91% of the students agreed that immediate personalized feedback was more effective and helped them to identify their competency gaps during the session. 92% of them perceived that the feedback sessions after DOPS motivated them for further learning. 92% of them felt that the instructor effectively directed and stimulated the student.

Discussion

The aim of the practical Physiology curriculum is to provide the students with planned educational experience on Physiological principles that will enable them to be a good practicing physicians[1]. According to Millers pyramid of clinical competence, the domains at which a trainee might be assessed are, **knows** (recall the procedure in order), **knows how** (ability to describe the need for the individual steps), shows **how** (demonstration

of skills in a controlled setting), **Does (**performance integrated in to practice**).** For each of the above levels, the student can apply the knowledge and principles to the skill performed[8].

Though formative assessments are popular in medical education, data to establish their educational benefits are lacking[9]. In this study psychomotor objective is supervised by DOPS clinical tests. The process of observing the students during the RBC estimation and awarding marks for the steps involved, renders the gap analysis, ie., what is expected and what has been done. This is the important facet of DOPS which distinguishes it from other forms of assessments, where the results are only scrutinized.

The students' performance in the session 2 showed a greater improvement, which clearly depicts the satisfactory improvement in the student's competency. Our study findings were supported by Wigton and Boehler, who had documented that the immediate feedback has been shown to improve students' performance in medical schools.[10,11] Hattie and Heleb also had proved that immediate feedback is more effective for student learning [12].

As per table 2, DOPS assessments motivated the undergraduates for performing practical indubitably. The present curriculum is not likely to change soon, so there is a need to identify those lacunae in hematological skills and correct them. During OSPE sessions only certain part of the experiment can be assessed, but in DOPS all the individual steps in an experiment are given equal importance.

Strength of our study is that confidentiality and privacy was maintained while giving feedback which may lead to futuristic educational gains. Limitations of this study are[1]. There is no comparison group[2]. There are chances of observer bias as same faculty members are assessing the students[3]. The verbal feedback cannot be always be retained in the listeners memory and sometimes may lead to misunderstanding.

Self-realization and reflection are the two fundamental steps to receive feedback and to work on it[13]. This technique (DOPS) helped the students to fill the competency gap and thereby improve their practical skills**.** This will take Physiology from bench to bedside and truly inculcate the basics of clinical medicine in tomorrow's physicians of first contact.[14]

Conclusion

From this study we infer that structured teaching and DOPS with assessment and feedback provides a better learning environment to the students. It helps to assess the student's skill and helps to identify the competency gap. Therefore, formative evaluation using DOPS with feedback results in better learning of practical skills than routine traditional practical teaching process.

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Perception of M.B.B.S. Students about Different Teaching Aids Used in Physiology Lectures in Karwar Institute of Medical Sciences, Karwar: A Questionnaire Based Study

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Abstract

Introduction: Initially first year course duration was one and half year. It was used to study these subjects for one & half year, but since 2005-2006, first year duration is reduced to one year; but the syllabus for all three subjects is not altered. The first year curriculum starts in the month of August/September in RGUHS while university examination is held in month of June/July. Actually considering government holidays & other things, the actual working days are almost 11 months. The first year MBBS medical students who have admitted in medical college, they have to study three subjects; Anatomy, Physiology & Biochemistry in Ist & IInd Semister. In the present study we focused on finding best teaching aids of class room teaching for making students to understand Physiology better. So if we know learning styles of students, teachers can adopt method of teaching accordingly to improve the academic performance of the students and to make learning more interesting and effective.

Material and Method: The present study was undertaken in the Karwar Institute of Medical sciences, Karwar. 150 Ist year MBBS (IInd Term) students & 150 IInd year (III term) MBBS students were included in the study. A questionnaire was prepared having 21 items, the first part of questionnaire included demographic and educational details, while second part was covering the different aspects of teaching aids in the form of opinion by medical students.

Results: 85% students were felt that PPT should always combined with other teaching aid and 52% students were not affected by transition from PPT to blackboard teaching due to any external cause.

Conclusion: Blackboard + Power point is best teaching aid to understand Physiology better. This result may be due to the fact that deficiency of one teaching aid is compensated by other.

Keywords: *Physiology, medical students, power point, teaching.*

Introduction

The first year MBBS medical students who have admitted in medical college, they have to study three subjects; Anatomy, Physiology & Biochemistry in Ist & IInd Semister. Initially first year course duration was one and half year. It was used to study these subjects for one & half year, but since 2005-2006, first year duration is reduced to one year; but the syllabus for all three subjects is not altered. The first year curriculum starts in the month of August/September in RGUHS while university examination is held in month of June/July. Actually considering government holidays & other things, the actual working days are almost 11 months. Within this duration, all three departments; Anatomy, Physiology, Biochemistry completes their subject wise curriculum effectively with a team of teaching staff

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members using different teaching method. For first year MBBS medical students initial one to two months are required for adjustment as there is drastic change from school environment to professional college, very well supported & pampered circumstances to very independent circumstances. So overall they are getting 10 months for self study, so students are focusing on the easy ways to clear university examination, by accepting the concise books which is dampening the depth of subject knowledge. In the present study we focused on finding best teaching aids of class room teaching for making students to understand Physiology better. So if we know learning styles of students, teachers can adopt method of teaching accordingly to improve the academic performance of the students and to make learning more interesting and effective.

Aim: To find out best teaching aids of class-room teaching for making students to understand Physiology better.

Objectives:

(i) Understanding best teaching aids of Physiology teaching in lecture gallery.

(ii) To find out the best teaching aids considering following aspects; to understand the topic well, best perception of text, diagrams, flow charts, to take down notes, to cope up with speed of teacher, grasping the content of topic, method helpful to stress important points, better summarization, showing different clinical conditions and further stimulation to read from students perspective.

Materials

The present study was undertaken in the Karwar Institute of Medical sciences, Karwar. 150 Ist year MBBS (IInd Term) students & 150 IInd year (III term) MBBS students were included in the study. Questionnaire was administered in the month of March to April 2019 after getting ethical committee approval.

Inclusion criteria: 150 Ist year MBBS (IInd Term) students & 150 IInd year (III term) MBBS students were included in the study.

Exclusion criteria: Students who were absent on particular day, students who did not respond to any question.

Methodology

A questionnaire was prepared having 21 items, the first part of questionnaire included demographic and educational details, while second part was covering the different aspects of teaching aids in the form of opinion by medical students. The questionnaire was closed ended one with a few open ended questions. The same was validated. The ethical principles were also adhered too. Students were summarized about objectives of the present study and assured confidentiality. Students were encouraged to furnish unbiased independent opinion regarding the best teaching aid they preferred irrespective of the teachers and topic. Teaching aids used in the study were blackboard, Microsoft Power Point presentation and blackboard with Power Point presentation. The questionnaire was assimilated and analyzed to derive the results.

Questionnaire asked based on the above teaching aids were:

- to understand the topic well,
- best perception of text, diagrams, flow charts,
- to take down notes,
- to cope up with speed of teacher,
- grasping the content of topic,
- method helpful to stress important points,
- better summarization,
- showing different clinical conditions, and
- Further stimulation to read from student's perspective.

Data Analysis: The response was analyzed using Microsoft Power Point Excel for data entry, calculating frequencies and percentages and making graphs & pie charts.

Result

In the present study, total 297 students participated, out of that 144 (48 %) were females & 153 (52 %) were males. 209(70%) students had schooled in English medium, 84(29%) in Kannada medium & 4(1%) in Hindi medium. 175(59%) students were from private school while 122 (41%) from government school & the teaching aid predominantly used in the school was blackboard 150(51%) followed by multimedia 75(25%), PPT + Blackboard 46 (16%) & PPT 26(9%).

242(81%) Students were preferred Blackboard+ powerpoint presentation as their first choice teaching aid for Physiology Subject, followed by blackboard 40(13%) & power point presentation 15(5%).210(71%) students were preferred blackboard + powerpoint presentation for didactic lectures. Even ability to think with understanding the topic better 128(43%) & well organization of topic 134(45%), to grasp the contents of the topic 128 (48%), for better summarization 112(38%) blackboard + powerpoint presentation, were opted by students respectively.

But for better inclusion of context 110(37%), visual quality of text & figures 172(58%), better perception of diagrams, flow charts 176(59%), for better understanding of clinical conditions (edema, anemia, endocrine disorders…..) 144(48%) students respectively were preferred powerpoint presentation only. 115(39%) students who were not interested in taking notes during class were opted powerpoint presentation best for listening & understanding the topic followed by blackboard teaching 99(33%) students. 172(58%) students who were interested in taking notes during class, were found blackboard as best teaching aid . Blackboard preferred by 169 (57%) students to cope with teaching speed of the teacher, stresses upon the relevant & important information 114 (38%), stimulates further reading 135(45%), for small group discussion (<30) 202 (68%).252(85%) students were felt that PPT should always combined with other teaching aid & 153(52%) students were not affected by transition from PPT to blackboard teaching due to any external cause.

In our study one open ended question was added to the questionnaire:

"Mention **THREE** important ways by which you think the use of blackboard as traditional teaching method can be improved?"

The major points suggested by students were:

1. PPT or other teaching aid should always combine with Blackboard teaching. The reasons mentioned were poor illumination, handwriting, drawings/ diagrams, dirty blackboard, but with PPT visual quality of text, figures, perception of diagrams, flow charts, understanding of clinical conditions were better compared to blackboard.
2. Use of different colored chalks for diagrams & for stressing important points (key words) for particular topic.
3. Only blackboard or only PPT teaching was found monotonous. With only PPT, interaction between student & teacher was less, also to cope up with speed of teacher & taking notes were difficult task for students. But combination of both, increases attention span,
4. Important points should be written on the blackboard so that students will remember key points, will get the flow of topic.

Discussion

Anatomy, Physiology, Biochemistry are three basic subjects for Ist year MBBS course. Physiology is the study of functions, their mechanisms and regulation in all living organisms. Physiology is the mother branch of medicine. Knowledge in Physiology is fundamental in understanding all other subjects in medicine. Medical teachers have conventionally using different teaching aids for teaching different subjects. Lectures can be traced as far back as Greeks of the fifth century BC, up till now lectures are the most common form of teaching[1]. Previously blackboard & slide projector are the main teaching aids. Now a day's different audiovisual aids are introduced as teaching aids among them Power Point presentation, use of animated clips, videos are in use. Attempts had been made previously to search best teaching aids in lecture gallery for teaching medical students. In the present study attempts had been made to find out learning styles of the students, accordingly teachers can adopt changes in method of teaching & able to improve academic performance.

In the present study, 242(81%) Students were preferred blackboard+ powerpoint presentation as their first choice teaching aid for Physiology Subject, followed by blackboard 40(13%) & power point presentation 15(5%).

210(71%) students were preferred blackboard + powerpoint presentation for didactic lectures. Even ability to think with understanding the topic better 128(43%) & well organization of topic 134(45%), to grasp the contents of the topic 128 (48%), for better summarization 112(38%) blackboard +powerpoint presentation, were opted by students respectively.

Rajani Shantthakumari Nagothi, Yogananad Reddy Indla et al found preference for blackboard with PPT for better understanding of Physiology[2]. Study done by Lalit Mohan, Ravi Shankar P, students preferred a

combination of audiovisual aids during didactic lectures. Even perception of diagrams, flow-charts, note taking, listening & understanding a particular topic was best accepted with PPT[3]. The study done by Priyadarshni K.S., H.V. Shetty, Reena R. for Biochemistry theory classes, PPT in combination with blackboard was found most helpful teaching aid to understand, remember & reproduce the subject[4]. Chaudhary R in his study, students pointed out drawback in Black Board teaching, is that it takes time to draw a labeled diagram on the board and during that time teacher's eye contact with the students is interrupted and majority of the students (67.1%) favored the combination of teaching aid[5]. Thirunavukkarasu et al had used two different teaching aids for teaching & observed marks secured by 60 students. They found that medical undergraduates in pathology subject had a more favorable response towards Power Point presentation than blackboard for better inclusion of content & diagrams[6]. S.N. Baxi et al in their study showed that an equal number of students preferred blackboard based and multimedia based lectures[7]. Roopakulakarni et al concluded that audio-visual aids enhance effectiveness of blackboard teaching, 56.1% of students prefer blackboard teaching & 42.2% of students prefer multimedia presentations[8]. Garg et al showed that 81 % of the students wanted teacher to make use of audiovisuals aids during pharmacology lectures[9]. Sujata Biswas et al studied that both Power Point & chalk-boardshould be used simultaneously[10].

Implications of the Study: The present study we focused on finding best teaching aids of class room teaching for making students to understand Physiology better. So if we will know learning styles of students, teachers can adopt method of teaching accordingly to improve the academic performance of the students and to make learning more interesting and effective.

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On Assessment of Teaching Learning Methodology in First Year Medical Students Of Physiology in a Government Medical College

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Abstract

Introduction: The quality of Medical education mediated by many factors like; curriculum, administration, infrastructure, faculty expertise in their knowledge, exposure and training in teaching-learning method.

Material and Method: The study was carried on 150 first-year medical students in the Department of Physiology, Kurnool Medical College, Kurnool. A pre-designed & pre-validated questionnaire regarding open and close-ended questions about student preferences in various teaching-learning method.

Results: The mean age was found to be 20.11 years. In gender distribution, male students (41%) were a little higher than female students (59%). The most likely method of teaching was a small group discussion (62%), 41% is that chalk and Board are most helpful for understanding the topic, 62% of students said quiz programs are the most enjoyable way of learning. The most influencing quality of a teacher was who had the art of teaching (43%).

Conclusion: From our study, we found that students persuaded more towards active learning like Small group discussions practical demos rather than passive theoretical lectures. In addition to that, the attitude of a teaching faculty has got enormous influence on medical students was also perceived.

Keywords: *Teaching Learning Method, Medical Students, Physiology, Questionnaire Based Study.*

Introduction

The quality of Medical education is many factors like curriculum, administration, infrastructure, patient exposure, faculty expertise in the subject and their knowledge, exposure & training in teaching-learning methodology—preference for which may differ from college to college. The lecture is one of the most accepted standard method in medical education for creating interest among students.[1] Several teaching method are employed at the undergraduate level to appeal to students with different learning styles like traditional didactic lectures, group discussions, role-playing, case studies, demonstrations through videotapes, problem-based learning. One of the essential ways to strengthen medical education at the content delivery level is to assess student perception about teaching-learning methodology. One of the challenges in medical education is planning a lesson, which makes the student gain maximum knowledge in a short time. [2]

It is a must to all the medical students to acquire adequate knowledge of professionalism and altruism. Any medical teacher needs to meet the educational need of the students regarding the knowledge, attitude and skill. At the same time, it is essential to remember

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that the students represent the population which differs in age, place, ethnicity,different levels of preparedness, learning styles and preferences.[3]

To this purpose, we have conducted a Questionnaire-based study in first-year medical students to assess the effectiveness of teaching-learning method in physiology.

Material and Method

After obtaining approval from the Institutional ethical committee, the study was conducted in the Department of Physiology. The survey carried out on 150 first-year medical students of Kurnool Medical College, Kurnool. All the students were in the age group of 18-22 years. None of them was suffering from any significant medical or psychiatric illness. A pre-designed and pre-validated questionnaire regarding open and close-ended questions about student preferences in various teaching-learning method: informed consent was obtained. Confidentiality of the students was assured so that they could answer the question without any bias. The students were briefed about the survey & asked to respond freely and fearlessly.

The Data was collected at the end of the second semester with the assumption that students would be better prepared to give informed answers having experienced the different types of teaching and learning environments that are presented to first Year students. The students better prepared to give informed answers, having knowledgeable the different types of teaching and learning environments that presented to first-year students. Moreover, it felt that by this time, students would have received feedback (marks and grades) from different modules that had employed these different teaching and assessment styles. The following criteria structured the sample frame. First-year medical students who are available at the time of the study and willing to participate in the study were included as study population.

Findings: The Data was analyzed in terms of the objectives of the study using descriptive and inferential statistics and presented in tabular and graphical.

The first-year medical students out of 150, the mean age was found to be 20.11 years. In gender distribution, male students (41%) were a little higher than female students (59%).

Table 1: Teaching method preferred by the first-year medical students

Method of teaching	Percentage (%)
Lecture	16 %
Small group discussion	62 %
Practicals	22 %

Table 1 shows that the most likely method of teaching was a small group discussion (62%), followed by Practicals (22%) & Lecture 16%.

Table 2: Teaching aid preferred by the first-year medical students

Teaching aid	Percentage (%)
Chalk and Bord	41 %
OHP	11 %
PPT	23 %
Demonstration	25 %

Table 2 shows regarding the teaching aid, 41% felt that chalk and Board are most helpful for understanding the topic, followed by Demonstration (25%), Powerpoint presentations (23%), overhead projector sheets (11%).

Table 3: Teaching-learning methodologies by first-year medical students

Teaching-learning method	Percentage (%)
Student seminar	12 %
Quiz	62 %
Tutorials	26 %

Table 3 shows various teaching-learning methodologies in Physiology. 62 % of students said quiz programs are the most enjoyable way of learning, followed by tutorials (26%) where student's seminar (12%) was the least likely method of learning.

Table 4: Qualities of a teacher which influence by the first-year medical students

Qualities of a teacher	Percentage (%)
Personality	7 %
Enthusiasm	18 %
Ability to teach	43 %
Knowledge	32 %

Table 4 shows that students were asked to give an opinion about the qualities of a teacher that influence

them. The most influencing quality of a teacher was who had the art of teaching (43%) and good knowledge (32%). Fallowed by enthusiasm (18%) and rapport and personality (7%) had the lowest ranks in the most preferred qualities of a teacher.

Discussion

This study showed the most probable method of teaching was small group discussion, regarding the teaching aids felt that chalk and Board is most helpful for understanding, About various teaching-learning methodologies in Physiology students said quiz programs are most enjoyable way of learning, The most influencing quality of a teacher was a teacher who had art of teaching. This study supported by Dr.R.S.Khane et al.[4]concluded that students were more interested in active learning. The students were also strongly preferred a knowledgeable teacher having excellent skills in teaching and Most of the students liked chalk and talk and small group discussion instead of other method. Shilpa S. Gupta[5] in their study, found that students were more interested in a conventional mode of learning through. MadhavuluBuchineni et al.[6] also in their study, observed that the Overall the effectiveness of any lecture mainly depends on the orator's attitude and the tool used for the teaching purpose. Costa et al. [7] also showed student preference for interactive teaching as the mode of learning.

Conclusion

From our study, we found that students persuaded more towards active learning like Small group discussions and practical demos rather than passive theoretical lectures. In addition to that, the attitude of a teaching faculty has got enormous influence on medical students was also perceived.

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Study of Prevalence of Metabolic Syndrome in Offspring of Type 2 Diabetic Population

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Abstract

Metabolic Syndrome is defined as Syndrome X is a cluster of co-existing metabolic abnormalities like obesity, hypertension and dyslipidemia leading to a marked increase in

Diabetes mellitus and a five fold increase in CVD thereby imposing a great burden on public health and clinical practice. Metabolic syndrome encompasses a set of conditions of which obesity in particular visceral obesity, is an important component. Obesity has a positive correlation with incidence and severity of diabetes. Aim of the study is to estimate the prevalence of Metabolic syndrome in offspring of Type 2 diabetic population. This study was conducted to estimate the prevalence of metabolic syndrome and its components in offsprings of type 2 diabetes Mellitus population and it includes 100 subjects who were diabetic and presenting to Osmania General Hospital, Hyderabad. Offspring of type II diabetes parents exhibits higher prevalence of metabolic syndrome . Normoglycemic offspring exhibits higher prevalence of hypertriglyceridemia indicating precedence of lipid abnormalities to glucose intolerance. Diabetic offspring have a statistically significant prevalence of metabolic syndrome than the non diabetic offspring.

Keywords: *Metabolic syndrome, Offspring, Diabetes.*

Introduction

Metabolic Syndrome,originally defined as Syndrome X in 1988 by Gerald Reaven, is a cluster of co-existing metabolic abnormalities like obesity, hypertension and dyslipidemia leading to a marked increase in Diabetes mellitus and a five fold increase in CVD thereby imposing a great burden on public health and clinical practice. Metabolic syndrome encompasses a set of conditions of which obesity in particular visceral obesity, is an important component. Obesity has a positive correlation with incidence and severity of diabetes. Diabetes mellitus is a syndrome characterized by chronic hyperglycemia and disturbances of carbohydrate, fat and protein metabolism associated with absolute or relative deficiencies in insulin secretion and/or insulin action. The clinical class of diabetes mellitus is divided mainly into 2 groups, IDDM - TYPE 1 DIABETES and NIDDM-TYPE 2 DIABETES. Type-2 diabetes accounts for over (90%) of diabetes worldwide and is associated with enormous amount of morbidity and mortality resulting from its microvascular, macrovascular and neuropathic complications[1]. Components of metabolic syndrome constitute a particular combination of what ATPIII terms underlying, major and emerging risk factors. According to ATPIII, underlying risk factors for CVD are obesity (especially abdominal obesity), physical inactivity, and atherogenic diet. Type 2 diabetes is a heterogeneous disorder associated with absolute or relative deficiencies in insulin Secretion and/or insulin action. Both genetic as well as environmental factors contribute to its development. There are multiple sites for insulin resistance[2] . The most important site of insulin resistance in Type 2 diabetes is in the

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muscle followed by liver. Insulin resistance and β–cell dysfunction are necessary for the development of frank diabetes although the relative contribution may vary in different individuals and that mild hyperglycemia once developed, has deleterious effect upon both insulin secretion and insulin sensitivity[3]. *Steven M. Haffneret al*, demonstrated increased insulin concentrations (both in fasting state and after OGTT) in the non-diabetic offspring of diabetic parents, when compared with non-diabetic offspring of nondiabetic parents and supported the insulin resistance hypothesis[4]. *Johan Eriksson et al* concluded in their study that both insulin resistance and impaired insulin secretion are necessary for the development of impaired glucose tolerance[5]. (Insulin resistance with respect to lipolysis in the offspring of diabetic parents has been studied in a limited number of published studies).Aim of the study is to estimate the prevalence of Metabolic syndrome in offspring of Type 2 diabetic population.

Materials and Method

The study population compromised the children of diabetic population, who have been attending diabetic Clinic of Osmania General Hospital, Hyderabad, Most of them belongs to middle socioeconomic group.

The Data for this study was collected from 100 normoglycemic individuals of diabetic parents.

Sample Size : 100

Study Design : Non Randomized study

Duration of study : 2 years

The subjects were selected randomly after fulfilling the following

Inclusion Criteria:

1. Age of the subject to be tested should be more than 30 years.
2. Mother or father or both of the subjects parent should be a diabetic patient. (The duration of the illness or the nature of therapy being received, by the patient is not taken into account).
3. Subject should not be a known diabetic.

Exclusion Criteria:

1. Patient with type 2 diabetes
2. Age<30yrs.
3. Pregnant women
4. Patients diagnosed as hypothyroid, hyperthyroid, nephritic syndrome, liver diseases, on OCP's
5. Patients with gestational diabetes patients and familialdyslipidemia.

After explaining the purpose of the study, the subject came forward voluntarily for undergoing the tests. A total 100 eligible subjects were enrolled in the study. The subjects were instructed to have their usual diet with avoidance of high calorie and high fat diet for the 3 days preceding the study.

Investigation:

Glucose Tolerance Test

Fasting Lipid Profile: On the day of the test, subjects were advised to attend the Dept. of Endocrinology at 8 A.M. after an overnight fast (10-12 hours). A fasting sample of venous blood was taken for estimation of plasma glucose and lipid profile. Then 75gm. of glucose was given orally in 200-300ml of water and venous blood samples were collected after one hour and two hours . During the time between sampling the subjects were advised to rest and not to smoke. During this time height, weight, waist & hip circumference, Blood pressure were recorded. Height, weight, BMI, waist and hip circumference was taken.

Analysis of Data: The data thus obtained was tabulated and represented in figures. Subjects were studied after sub-classifying them into different groups for comparison of important variables. Data collected for the study was analysed statistically. Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented as Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. Z test for proportion has been used to find the significant incidence of metabolic syndrome with study characteristics. Student test has been used to find the significance of parameterson continuous scale between controls and cases.

Significant figures:

+ Suggestive significance P<0.10

* Moderately significant P<0.05.

** Strongly significant P<0.01.

Results

Out of 100 subjects 54% were males and 46% were females.

Maximum number of subjects was in the age group of 33 to 39 years and minimum were in the age group of 35-40 years.

Out of 100 subjects, 79% of the study subjects were normoglycemic, 12% were having impaired Glucose levels and 9% were denovo diabetic

Table 1: Prevalence of Hypertension in Study Population

Category	NGT	IGT	Diabetic
Number of individuals	2	10	20

Table 1 shows prevalence of Hypertension was found to be more in diabetic offspring.

Table 2: Components of Metabolic Syndrome in NGT Subjects

Components	Number of Subjects	Percentage
Hypertriglyceridaemia (≥ 200mg/dl)	18	22.66%
Low HDL – Cholesterol (≤ 35mg/dl)	7	6.32%
High Cholesterol (≥ 240mg/dl)	15	18.9%
High LDL- Cholesterol (≥ 160mg/dl)	13	16.45%

Table 3 : Components of Metabolic Syndrome in IGT Population

Components	Number	Percentage
Hypertriglyceridemia	2	16.66%
Low HDL	2	16.66%
High Cholesterol	3	25%
High Ldl	4	33.3%

Table 4 : Components of Metabolic Syndrome in Diabetic Offspring

Components	Number	Percentage
Hypertriglyceridemia	4	44.4%
Low HDL	1	11.1%
High Cholesterol	3	33.3%
High LDL	2	28.2%

Table number 2,3,4 shows the components of metabolic syndrome in normoglycemic, impaired Glucose tolerant and diabetic subjects .

Table 5: Prevalence of Metabolic Syndrome in Study Population

Group	Metabolic Syndrome (Present)	Metabolic Syndrome (Absent)
Non Diabetic	26%	74%
Offsprings		
Diabetic Offspring	70%	30%

Table 5 shows that 70% diabetic offspring subjects had metabolic syndrome .

Table 6: Association of risk factors in study population

Risk Factor	Total Number of subjects	Subjects with metabolic syndrome	%	P value
Number of patients studied	100	26	26	-
Age>50yrs	32	12	37.5	0.138
Male	54	14	26	0.917
Female	46	11	25	0.911
Dyslipidemia	74	74	100	<0.001**
BMI>25kg/m2	58	16	27	0.844
Waist	30	26	86.7	<0.001**
Circumference				
Triglycerides	35	35	100	<0.001**
>150mg/dl				
HDL<40mg/dl	27	18	66.7	<0.01*
LDL>100mg/dl	24	24	100	<0.001**
BP>130/85mmHg	32	26	81	<0.001**
OGTT	21	21	100	<0.001**

*Moderately significant P<0.05., **Strongly significant P<0.01.

Discussion

Type 2 diabetes results from environmental and genetic factors. The Concordance rate for Type 2 diabetes between identical twins is 60-90%. Further, type 2 develops as a result of both β-Cell defect and insulin resistance. This is more often associated with other components of "metabolic syndrome" (the so-called SYNDROME-X). Thus, hypertension, dyslipidaemia, central obesity, are often seen in type-II diabetic patients. Thus type 2 diabetes may be viewed as one of the components of "metabolic syndrome". Maximum number of subjects were in the Age group of 35-45 years. There was 54% males and 46% females 79% of the study subjects were normoglycemic, 12% were having impaired glucose tolerance and 9% were detected Denovo Type 2 Diabetic. The study done by Earl S. Ford et al and Louis Guize et al also shows the increasing prevalence of metabolic syndrome with age and it also shows that the prevalence was found more in males than in females. In this Study, the prevalence of IGT and diabetes in offsprings of type 2 diabetic population was found to be 12% and 9%respectively. In India, there are about 69.2 million people with diabetes and are expected to cross 123.5 million by 2040[6]. A prevalence of 9% in the study is much higher than the overall prevalence, for the simple reason that the study population belongs to high risk category in the sense that they are all children of diabetic parents. Although intensive glycemic control lowers the incidence and progression of microvascular complications, the morbidity associated with these complications is still increasing.[7]. In this study, the prevalence of Metabolic Syndrome in diabetic subjects was found to be high i.e, 70%, which is statistically significant (P <0.001) and 6.64 times more when compared to non-diabetic subjects . The study done by Peter. W.F etal showed that in men, with the metabolic syndrome the relative risk(RR) were RR=2.88 for CVD, RR=2.54 for CHD and RR=6.92 for T2DM and RR's were lower in women for CVD (RR=2.25) and CHD (RR=1.54) but they were similar for T2DM (RR=6.90) [8]. When the risk for new onset diabetes was examined for the Framingham cohort in both men and women, the presence of metabolic syndrome was highly predictive of new-onset diabetes. The study done by Patricia Blackburn et al in 2007 shows that the prevalence of CAD reached 43% in type 2 diabetic women and 31% in non-diabetic women. Thus it provides the evidence that diabetes is a heterogeneous condition and diabetic subjects characterised by the metabolic syndrome were at substantially higher risk for coronary heart disease (CHD). Hypertension was found to be more prevalent

in diabetic subjects with metabolic syndrome i.e, 70%, whereas in non-diabetic subjects with metabolic syndrome, it was found to be less prevalent i.e, only 26%. History of dyslipidemia was found to be 100% in non-diabetic offsprings. The raised triglyceride levels in subjects with metabolic syndrome was found to have in all 100% subjects, indicating that highertriglyceride levels in diabetic subjects with metabolic syndrome was statistically significant and positively associated with incidence of metabolic syndrome. Individuals with metabolic syndrome are at increased risk for CHD. The study done by Hanna-Maaria Lakka et al in Finland shows that the highest risk (3.0-4.3- fold) associated with metabolic syndrome was forCHD mortality. Risk attenuated progressively for cardiovascular and overall mortality, indicating that the impact on overall mortality was mediated mainly by CVD mortality CHD[9]. The study done by Jianjun Wang et al Finland shows that the metabolic syndrome was associated with a statistically significant risk for CVD mortality (Hazard Ratios, HR‘s from 1.31 to 1.51) and CHD mortality (HR‘s from 1.42 to 1.58).41. When the data regarding the lipid levels is analysed, it has been found that all the three categories (NGI, IGT and Diabetes) showed various lipid abnormalities. The BMI of ≥25 kg/m2 was found in 27% of non-diabetic offsprings with metabolic syndrome. It indicates that higher BMI is positively associated with metabolic syndrome in subjects. Metabolic Syndrome in our population is quite prevalent in both diabetic and non-diabetic groups. A simple measurement of waist circumference & or BMI which can be done at any clinic or peripheral health care level can identify a patient at risk for metabolic syndrome. In this study, a strong parent–offspring association for MetS between Indian adolescents and their parents were found. Asians develop the adverse consequences of obesity at lower BMIs and lower cutoffs are used to define obesity in Asian adults[10]. The Bogalusa Heart Study identified that childhood parental history of type 2 diabetes, along with adiposity, glucose and lipoprotein variables, were associated with an increased risk of diabetes in adulthood[11]. The strong parent–offspring association could be due to hereditary or environmental factors. It is widely recognized that genetic and environmental factors both contribute to the development of MetS[12].

Conclusion

Offspring of type II diabetes parents exhibits higher prevalence of metabolic syndrome. Normoglycemic offspring exhibits higher prevalence of hypertriglyceridemia indicating precedence of lipid abnormalities to glucose intolerance. Diabetic offspring have a statistically significant prevalence of metabolic syndrome than the non diabetic offspring. Prevalence of metabolic syndrome increases with worsening glucose tolerance, as reflected by high OGTT levels. Hypertension was found to be more prevalent in diabetic offspring with metabolic syndrome. In the diabetic offspring with metabolic syndrome all had raised triglyceride & LDL levels which was statistically significant and positively associated with the prevalence of metabolic syndrome. In the non-diabetic offspring with metabolic syndrome, raised LDL & low HDL was present in all subjects. Higher BMI is positively associated with metabolic syndrome in subjects with diabetes but not in non-diabetics. All findings reveal the offsprings of diabetic population is at a high risk for metabolic syndrome. Intensive life style modifications along with therapies for different risk factors can prevent the progression to diabetes and atherosclerotic cardiovascular disease in high risk population.

Ethical Clearance: Taken from Institutional ethical committee.

Source of Funding: Self .

Conflict of Interest: None.

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A Comparative Study on Students' Performance Using Two Teaching Methodologies in Practical Classes

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Abstract

The practical demonstration classes are becoming more challenging for the faculty to captivate the attention of all the students. To engage the students in the post lunch session of Physiology practical was felt necessary and also to increase the students attention span and improve their concentration in the post lunch session of Physiology practical classes. The need to sensitize the students to listen to these didactic lectures in the form of introducing Problem based case scenarios (PBL) was felt important. The students were divided into two groups, namely control (traditional teaching) and interactive (PBL) groups. The examinations of cranial nerves were divided into two sessions (Cranial nerve 1-6 and 7-12) as PBL I and PBL II and there was crossing over of groups for the second session in order to avoid selection bias and also that both the groups are exposed to PBL. After each session evaluation was done by OSPE. Feedback was obtained to know about student's perception. Difference in mean score were analysed by paired t test and compared within two groups. The interactive group performed better in the OSPE in the PBL I and PBL II sessions with the mean of 28.8 (SD = 8.4, N=50) and 34.6 (SD = 4.6, N=48)respectively. The two-tailed P value was also significant (.019932) and (<.00001) in both groups respectively. The student feedback on analysis revealed that above 80% of students preferred PBL and motivated towards self-directed learning. Above 90% found it to be interesting.

Keywords: *Practical classes, PBL, Cranial Nerves.*

Introduction

Teaching and learning are two sides of a coin and both goes in hand[(1)]. The traditional way of teaching in medical education has got less relevance towards practical as well as clinical based medicine[(2)]. The physiology practical classes are routinely scheduled in the afternoon where the teacher finds difficulty in captivating the attention of students in post lunch sessions. The demonstration is the usually adopted method in physiology practical classes which is teacher centred and the students listen,observe and do their practicals.

To engage the students in the post lunch session of Physiology practicals we introduced interactive teaching in the form of Problem based learning (PBL). PBL is been pioneered by Mcmaster university in Canada where the students are given open ended questions to solve[(3)]. PBL is a process where already existing problem is projected to the students with the help of case scenarios to increase their knowledge and understanding[(4)]. PBL is useful in promoting self-directed learning and problem solving skills [(5)].PBL encourages the students to be exposed to variety of learning outcomes[(6)] where they are independent and do small group discussion before been to the large group and the tutor does the role of facilitator only. It also enhances the communication skills, team work and every student has a role to play[(7)]. PBL is an effective method which enhances the students learning abilities[(8,9)].

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Every teaching should be followed by an assessment which reflects aim for teaching[10] and also assess the students' knowledge. So post PBL sessions were assessed by conducting OSPE. OSPE and OSCE are the gold standard assessment tool[11] where we can assess the specific competency by conducting a structured examination in a planned way to achieve our objectives[12]. OSPE is one of the most common method used to assess practical skills where the main objective is to avoid examiners bias and also to assess the students skill[13]. There are studies showing that multiple sources of feedback (MSF) that is 360º feedback is useful and effective in evaluating our teaching and professionalism[14]. The successful of a program depends on the evaluation of the feedback given by the students as well as faculties involved in it which helps to further improve the existing program. So we prepared a feedback questionnaire and rated with the five point Likerts scale and they were analysed in the end.

Materials and Method

This study is done as a part of advance course in medical education (ACME) project in Christian Medical College, Vellore but was conducted in the department of Physiology in Government Vellore Medical college for a period of two weeks. Approval from Institutional Ethical Committee was obtained and the study was preceded after getting the consent from the students. All the first MBBS students were included in the study and the students absent during the study were excluded.

A batch of 100 students divided according to roll numbers into two groups of 50 each, as control and interactive groups, who were exposed to traditional teaching and PBL respectively. The examination of cranial nerves were divided into two PBL sessions with 1-6 and 7 -12 cranial nerves. Crossing over of groups was done in order to reduce selection bias for PBL II session, for the crossed over group the PBL was taken by another faculty not by the principal investigator to avoid bias.

PBL: This study has been carried in the routine practical classes which are scheduled twice weekly. In the first week the first group is the control group underwent routine demonstration for the cranial nerves 1-6 by one of our faculty. The next day students are called half an hour earlier to the practical class and 50 of them were divided into 10 groups of 5 each. Each group selected one student as leader who will get the case scenario questions on lots basis. About 10 different case scenarios for the cranial nerves 1-6 were given to the students, they were asked to find out which cranial nerve was affected and have to study the nerve course, its examination and applied aspects. The students were given a list of practical and clinical books with authors name and were asked to go the library to do their group task. The librarian was sensitized priorly about the program. One of the faculties accompanied the students to library as facilitator. The role of a leader is to divide the responsibilities to the group members to find out the diagnosis and to bring them back on time for discussion. The students were allotted one hour and thirty minutes, where the first one hour is to search the answers and next thirty minutes is to discuss among themselves about their findings and presentation in large group. After that they were asked to assemble in the demonstration room in the department of physiology and the students according to their lots number were asked to present their case with clinical examination to the large group in front of the principal investigator/Facilitator. If there is any deviation from the topic or they went wrong in their presentation it was corrected there itself.

The next week PBL session II was conducted for the cranial nerves 7-12 where there was crossing over the groups by exposing the first group to the PBL and the whole process was repeated with the other faculty who is neither the principal investigator nor the faculty taken the usual demonstration classes for 1-6 and 7-12 cranial nerves .

Assessment: After each session, the very next day OSPE were kept for both the groups which was informed to the students so that they come prepared for the test. OSPE questions were validated by two faculties from Department of Physiology, Christian medical college, Vellore. Piloting of OSPE stations were done with the help of our faculties of Physiology, Govt. Vellore medical college by running a monk OSPE examination. A total of 7 stations (5OSPE with 2 Rest stations in between) were kept. Each OSPE stations contained both observation and written part testing all the three domains like cognitive, affective and psychomotor. Each station is for three minutes and carries 10 marks with distribution of marks as (1 mark –affective domain,4 marks-cognitive domain,5 marks–psychomotor domain). OSPE test were evaluated by other faculties in the department who were never involved in any of the sessions either for the control group or interactive group.

Fig. 1: Showing the OSPE questions (sample) with mark allotment to different domains

OSPE Questions	Domain Assessed	Marks Allotted
Ayoung patient C/o 1 week of fever, nasal block and unable to perceive any kind of smell		
1. Which cranial nerve is affected?	Cognitive	1
2. Examine the affected cranial nerve.	Affective Psychomotor	1 5
3. Whythis patient is unable to perceive any kind of smell ?What could be your diagnosis.	Cognitive	1
4. What is cacosmia?	Cognitive	2
A patient underwent surgery for a swelling in the posterior triangle of neck and was found to have difficulty in shrugging the shoulders and also in head rotation during post operative period		
1. Which cranial nerve is affected?	Cognitive	1
2. Examine the affected cranial nerve.	Affective Psychomotor	1 5
3. Patient had difficulty in shrugging the shoulders and also in head rotation in the post operative period .Why?	Cognitive	3

Feedback: Feedback obtained from both the groups were analyzed to know about student's perception. About eleven questions were evaluated based on 5 point Likerts scale from the participated students, where 1 is strongly disagree and 5 is strongly agree. Quantitative feedback also obtained from the faculties to know positive and negative aspects of the session to improve it further.

Results

The data were analyzed in Microsoft excel. Difference in mean score were analyzed by paired t test and compared with in the Interactive and control groups. The website we used for the T test analysis is http://www.socscistatistics.com/tests/studentttest/Default2.aspx. The Interactive group in both the sessions showed better performance than the control group in OSPE as shown in Fig. 2.

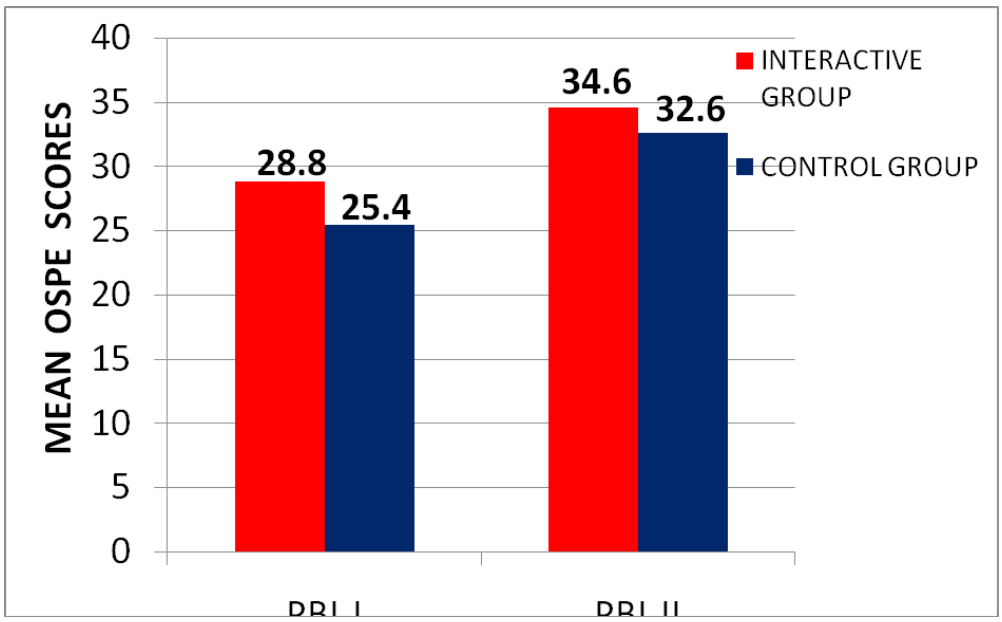

Fig. 2: Showing comparison of mean scores in both groups in both PBL sessions

The interactive group performed better in the OSPE in the PBL I and also in PBL II with significant P value 0.019932 and <.00001 respectively as shown in Table 1.

Table 1: Shows the comparison of mean scores with P value between both groups in both PBL sessions.

	PBL I		PBL II	
	Control	Interactive	Control	Interactive
Mean	25.4±5.8 (N=49)	28.8±8.4 (N=50)	32.6±3.7 (N=48)	34.6±4.6 (N=48)
P value	0.019932		<.00001	

(N = Number of Students participated)

In Fig:3 shows the comparison between the mean scores obtained in cognitive and psychomotor domain in the control and interactive groups of both PBL sessions. The mean scores were quiet high in psychomotor domain when compared to the cognitive part in both the groups and when compared within the sessions the interactive group had scored more than the control in both cognitive as well as the psychomotor part.

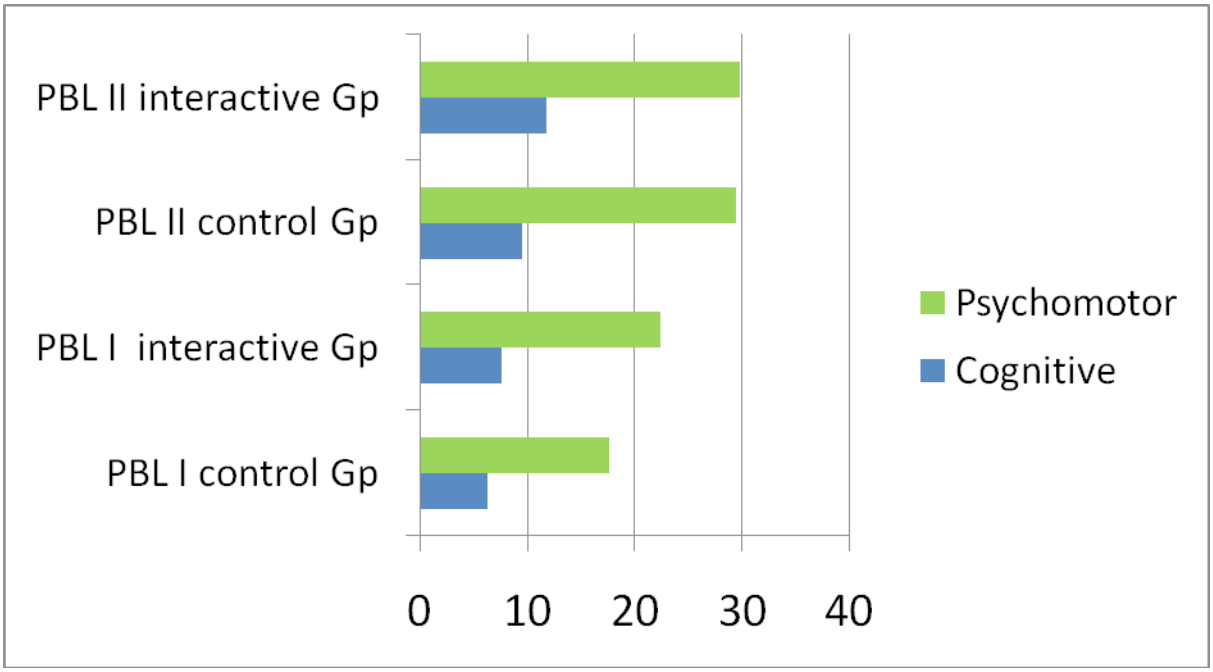

Fig. 3: Showing the comparison between cognitive and psychomotor domain in both the groups and sessions using bar chart.

Fig:4 below shows that the feedback forms obtained from the students which revealed that more than 90%found the PBL sessions to be interesting and most of them preferred it for further classes and also above 80% of the students felt the importance and use of self-directed learning.

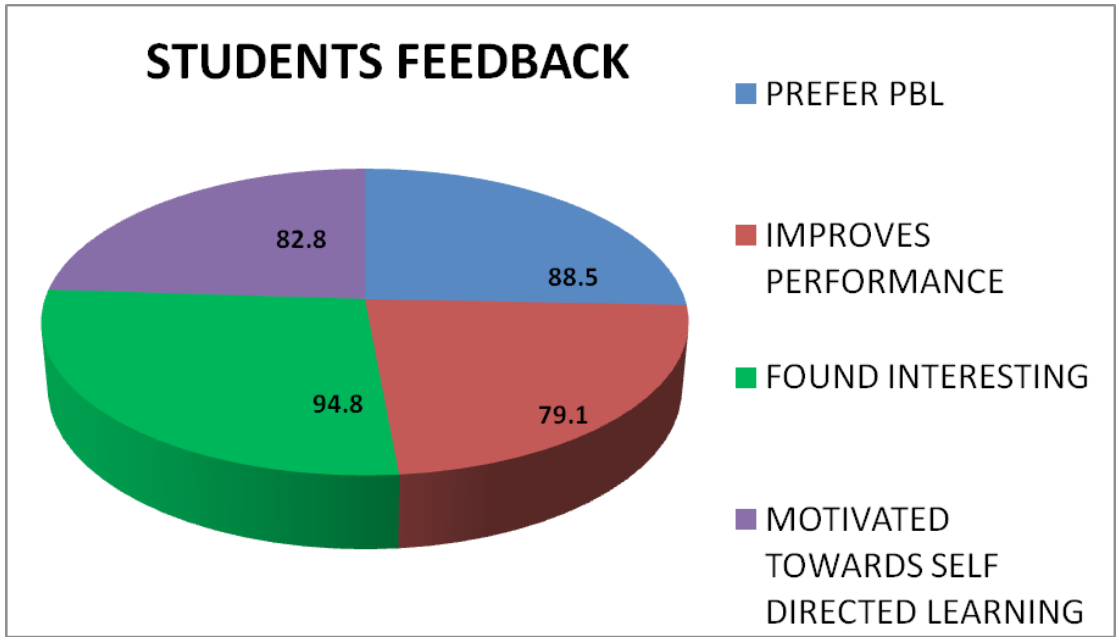

Fig. 4: Showing the analysis of students feedback in a pie chart

Discussion

The PBL is one among the interactive teaching which is useful to engage the students actively in the post lunch session of physiology practical classes. It facilitates the learning through small group discussion and team work by the students.[7] PBL is an alternative mode of teaching which helps in developing different range of skills in the students especially self-directed learning.[10,15]

The students were assessed by OSPE, which is found to be the most effective assessment tool than the traditional one. OSPE when used as formative assessment tool has modified teaching and learning strategies where both the teacher and the student both gets the maximum benefit[13]. The mean score obtained in OSPE when compared among the two groups were found to be high in the interactive group with a significant p value showing that the PBL is useful to students in understanding the depth of concepts to perform better in the examination.

The mean scores when compared between the two PBL sessions or with in the same PBL sessions were high for the Psychomotor part than the cognitive part. The cognitive mean scores were quiet high in the interactive groups probably because of the PBL where the students are made to learn by themselves (Self-directed study) in detail about the cranial nerves from anatomy to the applied aspects. In the PBL II there was not much difference in the mean scores in the Psychomotor part because the students in the control group were already sensitised to PBL in the session I.

Objectives of Feedback should be SMART (Specific, Measurable/Meaningful, Actionable/ Accurate, Respectful, Timely) enough to achieve our goals.[16] Feedback is one of the course assessment tool which helps the faculty to get the positive and negative aspects of their teaching and evaluation method [17,18]. The PBL motivates self-directed learning and more over students develop learning skills only when they do the self-learning [15]. More than 75% of the students felt the importance of self-directed study which was emphasised by PBL. About more than 80% of the students found it to be interesting, interactive and preferred for the rest of the practical classes. Though the PBL session enhanced the team work, communications kills, leadership qualities but most of the students found it to be time consuming as already mentioned in previous study.[19] In general the students felt PBL to be useful and more relevant to their future clinical postings. The feedback from the faculties revealed that though its time consuming but they used this opportunity to bring out their innovative hidden skills.

Conclusions

Though the practical demo classes are the most widely used method of large group teaching especially in Medical Colleges, Problem based learning when included in the routine practical classes had increased the learning abilities of the students and motivated the students for self-directed learning.

In spite of time constraints and added burden to the faculty members, this method will be useful to capture the attention of students in post lunch practical classes of physiology and will definitely play a role in improving their learning abilities.

The feedback from most of the students showed that they liked and preferred it for the next practical classes too.

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Conflict of Interest: No conflict of interest applicable for this study.

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Comparison between Jigsaw and Snowball Method of Active Learning among First Year Medical Undergraduates: An Interventional Study

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Abstract

Present study focuses on comparison between the efficacies of jigsaw and snowball methods active learning. An interventional study was conducted among first year medical undergraduates. Overall, 167 students studied by jigsaw method and 173 students studied by Snowball method. To study the preferences of students between Jigsaw and Snowball method a structured questionnaire using five point likert scale was used. Both the method significantly improved the knowledge of students. Overall response based on the questionnaire about jigsaw method was positive. Students found it to be simple, enjoyable and effective means of learning.

Keywords: *Self-directed learning, Jigsaw method, Snowball method, Physiology.*

Introduction

Self- directed learning is defined as "a process in which individuals take the initiative without the help of others in diagnosing their learning needs, formulating goals, identifying human and material resources and evaluating learning outcomes"[1]. Freeman et al. (2014) described active learning where students use higher order thinking to complete activities or participate in discussion in class. There is a frequent link between active learning and working in groups.[2]

There is a paradigm shift in medical education due to implementation of new MCI curriculum[3]. This is a welcome change wherein teaching and learning has been shifted to student centred approach.

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There are various method of active learning like Jigsaw method, snowball method, role playing, problem based learning. They too have some drawbacks like it needs active involvement of students, more faculty members are required.

Many studies have been conducted to compare the efficacy of didactic lectures and one of the active learning method. But there is lack of knowledge about comparison between two active learning method. Therefore present study focuses on comparison between the efficacies of the most commonly used active learning method i.e. jigsaw and snowball method. Present study also intends to have insight about the students' preferences among two method.

Material and Method

An interventional study was conducted among first year medical undergraduates at SVNGMC, Yavatmal. Approval from the institutional ethics committee was sought.

For feasibility purpose, all the consenting first year students were included in the study. A sensitization session for faculty and students was taken about Jigsaw

method and Snowball method. Two different topics were selected for active learning and two sessions of active self-directed learning were taken. The strength of First year MBBS students at our institution is 200. They were divided into two batches A (Roll no 1-100) and B (Roll no 101 -200). In first session, Batch A (88 students were present out of 100) was randomly selected for Jigsaw method and batch B (83 students were present out of 100) was selected for Snowball method. Physiology of Cell was taught to both the batches. An objective questionnaire containing ten questions was prepared and validated by assistance of other faculty members. Both the groups were given pre test and post test and same duration was given to answer the test. After the post test the topic was revised for entire batch together.

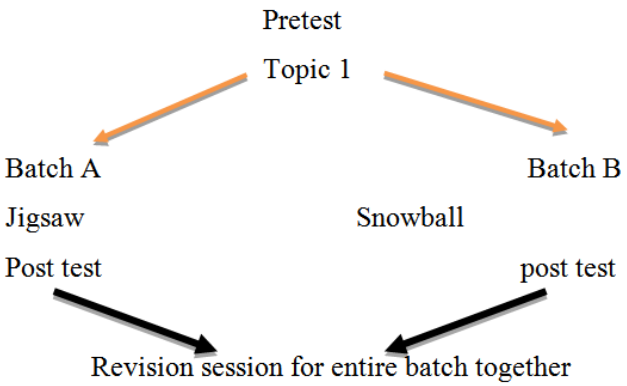
In second session Immunity was taught and the batches were exchanged, Batch A (90 students were present out of 100) was taught by Snowball method and batch B (79 students were present out of 100) was taught by Jigsaw method.

Same procedure was followed as the first session.

Overall including both the sessions 167 (88+79) students studied by jigsaw method and 173 (83+90) students studied by Snowball method.

To study the preferences of students between Jigsaw and Snowball method a structured questionnaire using five point likert scale was used.

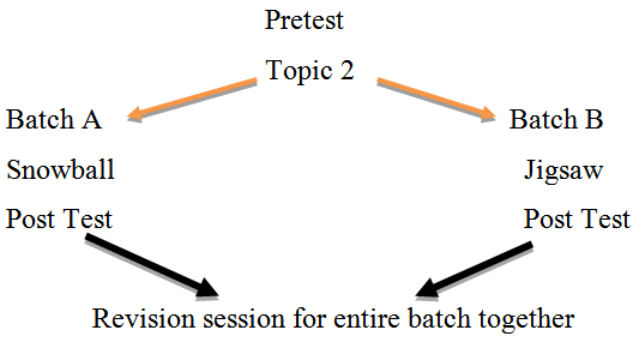
Session 1–Topic: Physiology of Cell



Feedback about jigsaw and snowball method regarding preference among the two method.

Crossover

Session 2 - Immunity



Feedback about jigsaw and snowball method regarding preference among the two method

Study Statistics: Data was entered in Excel and analysed using statistical software Epi Info 7. Qualitative data was presented as numbers and percentages. Mean score with standard deviation of pre and post test was calculated. Student's t test was used as test of significance for mean score of two groups. P value less than 0.05 was considered to be statistically significant.

Operational Definitions: Jigsaw method: Students are divided into subgroups that are subsequently split up to form new groups. The second groups are so formed that each group in the second configuration having one member from each of the first group. This helps to make the most of the crossing over of information.

Snowball method: First students are divided into pairs and one subtopic is given to them for discussion. Pairs join up to form fours and then next subtopic is given. Fours join to form eights and they together discuss next subtopic. Eights join to form sixteen and discuss next subtopic. Gradually more complicated topics are given as the groups gets larger.

Observation and Results

Table 1: Comparison between pre and post test mean score of Jigsaw method

(n = 167)	Pre test	Post test	P value for t test
Jigsaw Mean score±SD	3.78 ±1.20	8.37±1.06	<0.001

Table 1 shows comparison between pre and post test mean score of Jigsaw method. Pre test mean score + SD was 3.78 +1.20 which improved to 8.37 + 1.06 after the jigsaw session. There was a statistically significant difference in the mean scores (P <0.001).

Table 2: Comparison between pre test and post test mean score of snowball method

(n = 173)	Pre test	Post test	P value for t test
Snowball mean score ± SD	3.51 ± 1.24	8.45± 1.04	<0.001

Table 2 depicts comparison between pre test and post test mean score of snowball method. Pre test mean score + SD was 3.51 + 1.24 whereas pot test score was 8.45+ 1.04. There was a statistically significant difference in the mean scores (P <0.001)

Table 3: Comparison between Pre test mean scores of jigsaw and snowball method

Method	Jigsaw (n = 167)	Snowball (n = 173)	P value for t test
Pre test mean score ± SD	3.78 ±1.20	3.51 ± 1.24	0.67

Table 3 shows difference between pre test mean scores of both the method. There was no statistically significant difference in the score (P=0.67); thus both the groups were comparable at the start and had similar level of knowledge for the allotted topics.

Table 4: Comparison between Post test mean scores of jigsaw and snowball method

Method	Jigsaw (n = 167)	Snowball (n = 173)	P value for t test
Post test mean score ± SD	8.37 ± 1.06	8.45± 1.04	0.80

Table 4 shows difference between post test mean scores of both the method. There was no statistically significant difference in the score (P= 0.80); thus both the method were equally effective in covering the given topic and improving the knowledge of the students.

Table 5: Response of students for Jigsaw method using likert scale

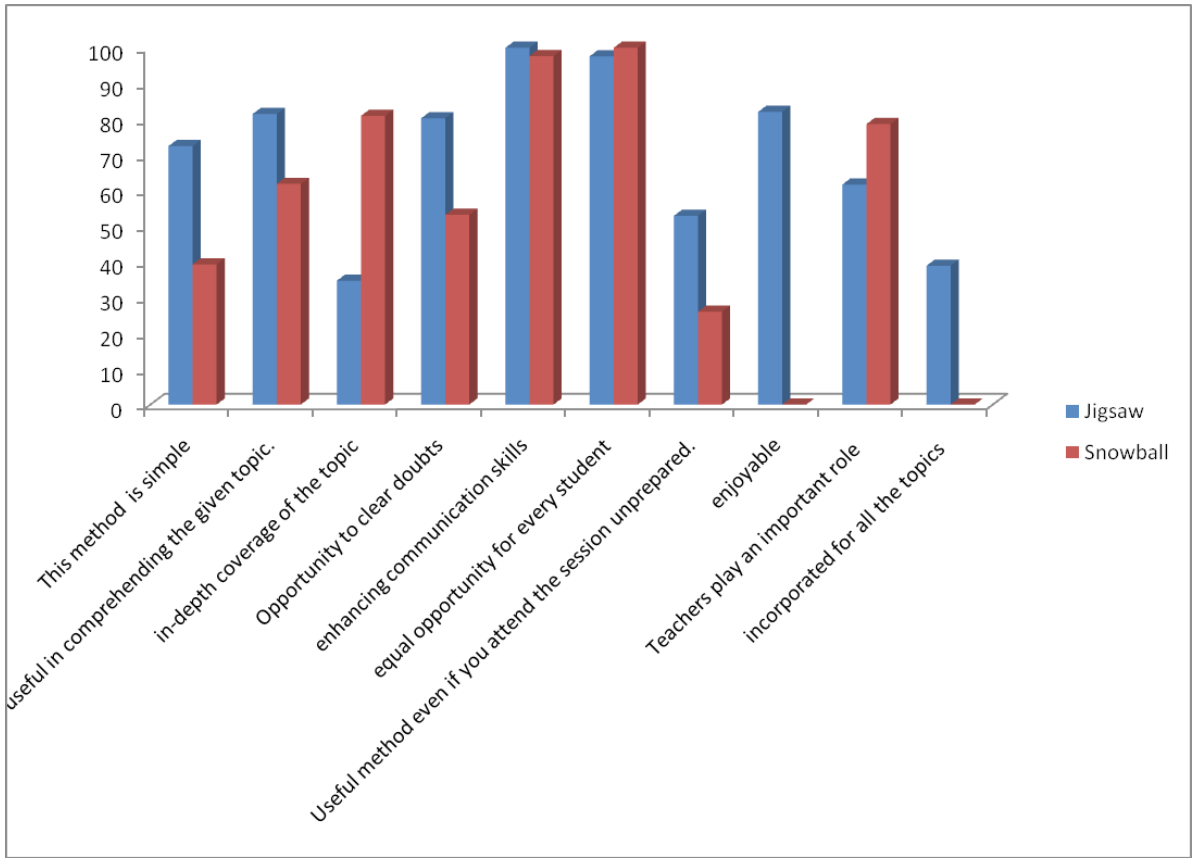
Sr. No.	Question	Strongly Disagree n (%)	Disagree n (%)	Can't Say n (%)	Agree n (%)	Strongly Agree n (%)
1	This method of teaching and learning is simple	10(5.99%)	15(8.98)	21(12.57)	98(58.68)	23(13.77)
2	This method is useful in comprehending the given topic.	2(1.20)	14(8.38)	18(10.78)	110(65.87)	21(12.57)
3	This method enabled in-depth coverage of the topic	18(10.78)	54(32.34)	36(21.56)	41(24.55)	17(10.18)
4	This method gives opportunity to clear doubts	0	11(6.59)	22(13.17)	110(65.87)	24(14.37)
5	This method helped in enhancing communication skills	0	0	0	80(47.90)	87(52.10)
6	There is equal opportunity for every student for discussion in this method	0	0	4(2.40)	93(55.69)	70(41.92)
7	Useful method even if you attend the session unprepared.	14(8.38)	37(22.16)	29(17.37)	64(38.32)	23(13.77)
8	This method of teaching and learning is enjoyable	11(6.59)	7(4.19)	12(7.19)	99(59.28)	38(22.75)
9	Teachers play an important role in this method of teaching and learning	1(0.60)	35(20.96)	28(16.77)	66(39.52)	37(22.16)
10	This method should be incorporated for all the topics in physiology.	18(10.78)	41(24.55)	4(25.15)	47(28.14)	18(10.78)

Table 5 shows response of students for Jigsaw method using likert scale. About three fourth of the students agreed and strongly agreed (72.45%) that this method is simple. Most of the students (81.44%) had opinion that method is useful in comprehending the given topic. There was mixed response about in-depth coverage of the topic. About one third students (34.73%) responded agree and strongly agreed. Whereas 43.12% students disagreed about in-depth coverage. Majority of the students (80.24%) agreed that method gives opportunity to clear doubts. All of them agreed that this method is useful in enhancing communication skills. Almost all (97.61%) agreed that there is equal opportunity for every student for discussion in this method. About one third of the students disagreed that the method is useful if you attend unprepared for the topic, whereas more than half (52.90%) agreed that the method is useful if you attend unprepared for the topic. Majority of the students (82.03%) agreed that the method is enjoyable. More than half (61.68%) agreed that teachers play an important role. Only 38.92% agreed that this method should be incorporated for all the topics in physiology and similar proportion (35.33%) disagreed about it.

Table 6: Response of students for snowball method using likert scale

Sr. No.	Question	Strongly disagree n (%)	Disagree n (%)	Can't Say n (%)	Agree n n (%)	Strongly Agree n (%)
1	This method of teaching and learning is simple	19(10.98)	43(24.48)	43(24.48)	50(28.90)	18(10.40)
2	This method is useful in comprehending the given topic.	2(1.16)	36(20.81)	28(16.18)	69(39.88)	38(21.97)
3	This method enabled in-depth coverage of the topic	11(6.36)	10(5.78)	12(6.94)	102(58.96)	38(21.97)
4	This method gives opportunity to clear doubts	14(8.09)	38(21.97)	29(16.76)	68(39.31)	24(13.87)
5	This method helped in enhancing communication skills	0	0	4(2.31)	97(56.07)	72(41.62)
6	There is equal opportunity for every student for discussion in this method	0	0	0	84(48.55)	89(51.45)
7	Useful method even if you attend the session unprepared.	3(1.73)	113(65.32)	12(6.94)	22(12.72)	23(13.29)
8	This method of teaching and learning is enjoyable	81(46.82)	55(31.79)	37(21.39)	0	0
9	Teachers play an important role in this method of teaching and learning	3(1.73)	15(8.67)	19(10.98)	115(66.47)	21(12.14)
10	This method should be incorporated for all the topics in physiology.	34(19.65)	118(68.21)	21(12.14)	0	0

Table 6 describes the responses of students about snowball method on five point likert scale. About equal proportion of students disagreed (35.56%) and agreed (39.30%) that the method is simple, whereas 24.48% responded can't say. Majority of the students (61.85%) felt it to be useful in comprehending the given topic. Most of the students (80.93%) agreed and strongly agreed that snowball method enabled in depth coverage of the topic. More than half (53.13%) responded agree and strongly agree that this method gives opportunity to clear doubts. Almost all the students (97.69%) agreed and strongly agreed that method helped in enhancing communication skills. All of the students either agreed or strongly agreed that there is equal opportunity for every student for discussion in this method. Majority (67.05%) either disagreed or strongly disagreed that it is useful method even if you attend the session unprepared. None of the students agreed or strongly agreed that this method is enjoyable. More than three fourth (78.61%) either agreed or strongly agreed that teachers play an important role in this method of teaching and learning. None of the students agreed or strongly agreed that this method should be incorporated for all the topics in physiology.



Graph 1: Comparison between jigsaw and snowball method

Graph 1 shows comparison between jigsaw and snowball method for either agree or strongly agree responses. Higher proportion of students either agreed or strongly agreed for jigsaw method being simple, useful in comprehending the given topic, gave opportunity to clear doubts, useful method even if you attend session unprepared. None of the students responded either agree or strongly agree for snowball method to be enjoyable and should be incorporated for all the topics. There were almost similar responses for both the method in enhancing communication skills and equal opportunity for all the students. Whereas higher proportion of students either agreed or strongly agreed that in snowball method teachers play an important role as compared to jigsaw method.

Discussion

Present study found statistically significant difference in the mean scores of pre and post test (P <0.001) after jigsaw as well as snowball method. Thus, both the method significantly improved the knowledge of students. Studies by Nusrath A.[4] and Swathi A[5] studied pre and post test scores by jigsaw method and found statistically significant difference.

Both the groups were comparable at the start and had similar level of knowledge for the allotted topics as depicted by pre test mean scores. Present study, did not find any difference in post test mean scores by using both the method. Thus, both the method were equally effective in covering the given topic and improving the knowledge of the students. Various other studies compared the scores of didactic lectures and small group teaching and found that there was better score using small group teaching.[6,7,8] But there is lack of literature comparing jigsaw and snowball method.

Overall response based on the questionnaire about jigsaw method was positive. Students found it to be simple, enjoyable and effective means of learning. All the students responded the method being useful tool in enhancing communication skills. It is one of the basic aspects in self-directed learning. Similar findings were noted by various other studies.[6,7,8]

In the present study, overall students found snowball method had in depth coverage of the topics. It improved communication skills. But less proportion of students found it to be simple. Majority of them responded that it is not useful if you attend session unprepared.

Present study compared jigsaw and snowball method. Higher proportion of students found jigsaw method to be simple, useful in comprehending the given topic, gave opportunity to clear doubts, useful method even if you attend session unprepared. There were almost similar responses for both the method in enhancing communication skills and equal opportunity for all the students. Whereas higher proportion of students found that in snowball method teachers play an important role as compared to jigsaw method.

None of the students responded either agree or strongly agree for snowball method to be enjoyable and should be incorporated for all the topics. Androgogy is the term used for adult learning[9]. In this type of teaching and learning students should actively and voluntarily participate in the process. Kar SS[10] studied self-directed learning (SDL) readiness by calculating SDL scores among MBBS students. And they found a lower score among south Indian students. Study pointed out the need to address students' SDL skills and need for ways to build SDL skills . The curriculum system, teacher's experiences, student's background and cultural factors might contribute to the difficulties for the student's in conducting self-directed learning.[11]

Conclusion

Jigsaw method of active learning is simple and enjoyable method of learning. Snowball method needs pre-preparation, covers topic in depth. Jigsaw as well as snowball method are equally effective in improving knowledge of the students. Both the method are highly useful in improving communication skills. Jigsaw method is preferred over snowball method by students for wide use.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: Taken from institutional ethics committee.

Acknowledgement: We would like thank our students, who were backbone of our study.

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Effect of Partial Sleep Deprivation on Cognition in Young Adults

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Abstract

Background: Sleep deprivation (SD) is an emerging pandemic. Young adults voluntarily sleep deprive due to increased social demands and to achieve better in academics. The present study is therefore intended to observe if partial sleep deprivation improves performance of cognitive functions.

Objective: To compare cognitive performance in partially sleep deprived young adults and subjects with adequate sleep duration.

Materials and Method: A total of 56 young adults 18-25 years of age were recruited based on inclusion and exclusion criteria. By recall method they were allotted into partially sleep deprived group (n=30) (<6 hr/day for 5 consecutive days) and group with normal sleep duration (7-9 hours/day) (n=26). Epworthsleepscale (ESS) was used to measure day time sleepiness. Cognitive domain like sustained attention, executive function, learning and memory were tested for all subjects in both the groups by neuropsychological battery from "A compendium of neuropsychological test" by Strauss and Spreen. Descriptive statistics and Independent "t" test were used for statistical analysis.

Results: Daytime sleepiness was significantly higher in partially sleep deprived group (P=0.0235).Sustained attention score was significantly lower (p=0.026) in partially sleep deprivation group than the other group. There was no significant difference between the groups in parameters like executive functions, learning and memory.

Conclusion: Partially sleep deprived group showed impaired attention as attention being associated with frontal regions of the brain that are the first to be affected by sleep deprivation. Executive functions, learning and memory were not statistically different between the 2 groups as other regions of brain involved would remain active until the sleep deprivation becomes more severe.

Keywords: *Sleep deprivation, cognition, attention, executive function.*

Introduction

Sleep is a biologic process that is essential for life and optimal health. Sleep plays an important role in maintaining brain function and systemic physiology including metabolic functions, appetite regulation and the functioning of immune, hormonal and cardiovascular system[1].

National Sleep Foundation suggests that young adults between 18-25 years of agere quire sleep duration of 7-9 hours[1]. Average sleep duration in adults has declined from 8.5 hours per night to <7 hours per night over last 40 years[2]. Sleep-deprivation is prevalent across various age groups and is considered to be an

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emerging public health epidemic.[3] Sleep deprivation leads to various deleterious long term effects in healthy individuals including hypertension, dyslipidemia, cardiovascular disease, obesity, metabolic syndrome, type 2 diabetes mellitus and it has immediate outcomes adversely affecting brain functions and cognition[4.] Sleep duration in young adults is changed due to increased social, educational and professional demands[2.]

Overzealous college and school students voluntarily sleep deprive to achieve better in academics and to meet professional targets[5]. The present study is therefore done to compare cognitive performance in partially sleep deprived young adults and young adults with adequate sleep duration.

Objective: To compare cognitive performance in partially sleep deprived young adults and subjects with adequate sleep duration.

Materials and Method

The study was done in 56 young healthy adults between age group of 18-25 years. The study and the control groups were age and gender matched. The study was done in department of physiology, Bangalore medical college and research institute in the period of March 2019 to June 2019. Written informed consent from subjects was taken after explaining the study protocol. Individuals with acute or chronic illnessor, those suffering from family bereavement while collecting data were excluded from the study. Subjects with sleep duration more than 9 hours/day and showing moderate or severe stress on the perceived stress scale questionnaire, subjects on sedatives, hypnotics or taking energy drink or nicotine to keep them awake were also excluded.

Based on duration of sleep in the last one week by recall method, they were classified into two groups, group 1 consisted of 30 subjects who were partially sleep deprived (with sleep duration less than 6 hours per day for 5 consecutive days) and group- 2 consisted of 26 subjects with normal sleep duration for the given age. Demographic details were taken. Daytime sleepiness was assessed by Epworth sleep scale. The ESS questionnaire consisted of 8 questions. Respondents were asked to rate on a 4-point scale (0-3), about the usual chances of dozing off or falling asleep while engaging in eight different activities. Higher the ESS score indicated higher daytime sleepiness.

Cognitive functions were assessed in a quiet room by neuropsychological battery from "Compendium of neuro psychological test" by Strauss and Spreen through series of test which measured domains such as attention, executive functions, learning and memory. Sustained attention was measured by digit vigilance test. The test sheet consisted of 30 rows and 50 columns with numbers 1 to 9 randomly placed. Subjects were asked to cancel 6 and 9 as fast as possible without missing the targets or canceling the wrong numbers in given duration of time. Scoring was given based on the correct cancellation and time taken to finish the task[11].

Response inhibition was tested by stoop tasking. Stimulus sheet had 16 rows and 11 columns containing words "RED" "GREEN", "BLUE" & "YELLOW" printedin capital letters. The scoring was done by the time taken to read words minusthe time taken to read color in which word was printed.[11.]

Learning and memory was measured by Complex figure test by visuospatial construction using Ray-Osterrieth complex figure test. The complex figure image was placed in front of the subject and was asked to observe. Later the subject had to recreate the complex figure first at three minutes and later after 30 minutes. Scoringwas given based on accuracy and placement of lines.[11]

Statistical Analysis: Descriptive statistics were done. Data were expressed as mean ± SD. Independent "t" test was done to compare the means of two groups. P value less than 0.05 was considered statistically significant.

Results

A total of 56 young adults were enrolled in study. The baseline characteristic like age and gender were measured. The subjects were aged between the age group 18-25 years. There were 27 men and 29 women in the study. There was no significant difference in the age and gender between both the age groups.

Table 2 shows that the sleep deprived group had significant Epworth sleep score than the group with normal sleep duration indicating higher daytime sleepiness in the sleep deprived group.

In table 3 mean±SD for cognitive parameter of digit vigilance test scoring was significantly lower in the partially sleep deprived group than subjects with normal

sleep duration. Time taken for completion of Stroop tasking was higher in partially sleep deprived group than the group with normal sleep duration but not statistically significant. Scoring of learning and memory was lower in partially sleep deprived group than the subjects with normal sleep duration.

Table 1: Age and gender distribution in sleep deprived group and group with normal sleep duration.

	Sleep Deprived Group (n=30). [Study group] Mean ±SD. n=30	Normal Sleep Duration (n=26). [Control Group] Mean ±SD. n=26	P – Value
Age	18.48±0.82	18.48±0.71	0.56
Male: Female	15:15	12:14	0.95

Table 2: Comparison of Epworth sleep scale between the partially sleep deprived group and those with normal sleep duration.

Epworth Sleep Scale	Sleep Deprived Group (n=30). [Study Group] Mean ±SD.	Normal Sleep Duration (n=26). [Control group] Mean ±SD.	P-Value*
Score	11.41±1.78	9.8±3.17	0.0391*

*P value less than 0.05 is considered statistically significant.

Table 3: Comparison of digit vigilance, Stroop task and complex figure test between study group and control group.

Domains	Test	Sleep Deprived Group (n=30). [Study group]. Mean ±SD.	Normal Sleep Duration (n=26) [Control group] Mean ±SD.	P - Value*
Sustained Attention [Score]	Digit vigilance test.	49.93±10.90	58.6±15.95	0.0268*
Executive Functions [in seconds]	Stroop task.	19.27±5.35	18.92±3.06	0.7621
Learning and Memory [Score]	Complex figure test.	49.93±10.90	56.96±16.73	0.7985

*P value less than 0.05 is considered statistically significant.

Discussion

Sleep deprivation is an emerging pandemic. Numerous health risks have been associated with sleep deprivation. Partial sleep deprivation can be a potential cause for various metabolic disorders. Obesity has strong association with sleep deprivation which in turn can lead to various metabolic disorders like diabetes mellitus and metabolic syndrome. This study was done to assess the immediate effects of partial sleep deprivation on cognition in young adults.

Sustained attention was measured by digit vigilance test which is based on the activity of the prefrontal cortex. Table 3 showed that the scores of the partially sleep deprived group were significantly lesser in the study group than the control group. This is in agreement with study done by BP. Alhola et al. that partial sleep deprivation affects cognitive performances that depend on the prefrontal cortex[12]. Attention and working memory being linked to frontal lobe of the brain and this regions of brain areas is greatly vulnerable to partial sleep deprivation therefore it can be hypothesized that both attention and working memory are impaired during prolonged wakefulness. Functional-MRI showed increased activity and blood flow in associated regions of brain in sleep deprived subjects indicating that sleep deprived subjects had to work harder to accomplish the task[12].

Brain imaging techniques including magnetic resonance imaging (MRI) imaging, functional magnetic

resonance imaging (fMRI) and positron emission tomography (PET) have shown that there are two main areas in the brain that are involved in the processing of the Stroop task is 1) Cingulategyrus-The posterior part of anterior cingulate cortex is responsible for what decision is made (i.e. whether you will say the incorrect answer [written word] or the `correct answer [ink color] and anterior part of cingulate cortex is involved in response evaluation—deciding whether the answer is correct or incorrect[13] 2) Dorsolateral prefrontal cortex is also involved in Stroop tasking. The color perception and not those involved in word encoding is controlled by left dorsolateral prefrontal cortex and right dorsolateral prefrontal cortex aims to reduce the attentional conflict and is activated after the conflict is over[13]. Stroop tasking in this study shows time taken for sleep deprived group was slightly longer than non-sleep deprived group. According to Yusuf Patrick et al young student population may be more effective at dealing with acute sleep deprivation[7]. The time taken to complete the task was slightly longer but not significant due to better tolerance to lack of sleep in young adults.

Complex figure test involves visual perception. It has been found that there are a series of alterations in the visual perception that might have contributed for damages in the visuospatial skills, such as failures in the discrimination between close or similar visual stipulations, identification of visual information and mistakes in detection or omission of present visual stimulation in the sleep deprived population. From Table 3. Learning and memory is lesser in subjects with partial sleep deprivation duration but not statistically significant. Among compensatory mechanisms adults have more developed cognitive skills due to their age, which allows them to acquire the capability to search other resources more efficiently and perform better[14.]

Limitations: A computerized cognitive function test would have been better at eliciting the defects in cognitive performance in the sleep deprived. The study would have been better if the sample size had been more. Epworth sleep scale is a self-administered questionnaire which leads to increased subjective error. In order to demonstrate effect of sleep deprivation the task should be complex, new and interesting.

Conclusion

The study shows that partial sleep deprivation in young adults showed significant decrease in attention. Attention being linked to the frontal regions of the brain are first to be affected, whereas the other regions remain active until the effects of sleep deprivation become more severe. This cognitive decline increases the chances of error at workplace or and risk of losing at academics. Hence, it is important to incorporate sleep hygiene measures to have adequate sleep duration like turning off mobile phone few hours before sleep, having a regular sleep pattern, actively involving in lifestyle modification like walking and exercise which further decrease the intensity of diseases like DM, HTN.

Ethical Clearance: Taken

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Conflict of Interest: Nil.

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A Comparative Study of Sleep Quality in Athletes & Non Athletes

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Abstract

Background: As we know that sleep is important factor for all of us, but little is known regarding athlete sleep quality. It has been reported that sleep may be compromised in athletes by many factors, like increase in core temperature following exercise, increase in muscle tension, fatigue and pain following training and competition.

Objective: The objective of present study was to assess normative sleep quality among highly trained athletes.

Method: 50 athletes (short distance runners) & 50 non athletes were taken who were of 18 to 25 years. They were given Pittsburgh Sleep Quality Index (PSQI) questionnaire to assess their sleep quality. Results were statistically analysed using student 't' test.

Results: Different components of PSQI questionnaire were assessed in both case & control group. Component 1- subjective sleep quality, component 2- sleep latency, component 3- sleep duration, component 4- sleep efficiency were better in controls than athletes with a $p<0.05$. Component 5- sleep disturbance & component 7- daytime dysfunction scores were higher in athletes than controls ($p<0.05$). Component 6- use of sleep medication was not statistically significant. So, the overall global score was higher in athletes indicating better sleep quality in controls.

Conclusion: We conclude that controls have better sleep quality than athletes.

Keywords: *Athletes, sleep quality, PSQI.*

Introduction

An athlete is one who is involved for 3 hours daily training for 6 days per week.[1] Track-and-field athletics are the oldest forms of organized sport, it includes the most basic human activities—running, walking, jumping and throwing.[2] An athlete has to maintain high levels of performance. To achieve this, they must have an appropriate balance between training and Recovery.[3]

Sleep is a biological process that facilitates recovery from mental and physical demands of high-performance sport. Recently, there has been a proliferation of research exploring how sleep impacts recovery, training and performance in elite athletes. Previous research has indicated elite athletes have a high prevalence of poor sleep quality and insufficient sleep quantity.[4]

Also sleep has its role in various physiological processes, learning, memory and cognition. Habitual

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sleep duration varies in different individuals but there is still debate regarding the optimal amount of sleep a healthy adult need to maintain daytime function and performance. The National Sleep Foundation recommends that healthy adults should sleep for 7–9 hours per night and at least 8 h of sleep per night is required to prevent neurobehavioural deficits in daytime performance. Many studies say that when compared with healthy controls, the athletes took longer time to fall asleep, spent more time awake in bed, had lower sleep efficiency and higher sleep fragmentation.[3]

Sleep is one of the best forms of recovery available to an athlete, but there is evidence which suggest that athletes do not obtain sufficient sleep. The amount, quality and timing of sleep in elite athletes may be affected by many factors, such as training-practice schedules, training or exercise volumes, match schedules, nervousness due to competitions and sleep disorders. So, this study was taken to assess normative sleep quality among highly trained athlete.[5]

Objective: The objective of present study was to assess normative sleep quality among highly trained athletes.

Method

A total of 50 athletes (short distance runners) & 50 non athletes were taken who were of 18 to 25 years. The subjects where 50 athletes (short distance runners) & 50 non athletes with age group 18 to 25 years & where excluded by taking history of any Medical illness, any Psychiatric illness or any medications. They were given Pittsburgh Sleep Quality Index (PSQI) questionnaire to assess their sleep quality. The study protocol was fully explained to the subjects. Informed consent was taken by all subjects. Ethical clearance was taken from the institution. Results were statistically analysed using student 't' test.

Pittsburgh Sleep Quality Index (PSQI), a 19-item scale which assesses seven 'components' of sleep (sleep quality, sleep efficiency, sleep onset latency, sleep duration, sleep disturbance, daytime dysfunction and sleep medication use), summing the 'component scores' to deliver an overall 'global' score; global scores >5 indicate 'poor sleepers.[6]

The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

During the past month:

1. When have you usually gone to bed?
2. How long (in minutes) has it taken you to fall asleep each night?
3. What time have you usually gotten up in the morning?
4. A. How many hours of actual sleep did you get at night?

   B. How many hours were you in bed?

During the past month, how often have you had trouble sleeping because you	Not during the past month (0)	Less than once a week (1)	Once or twice a week (2)	Three or more times a week (3)
A. Cannot get to sleep within 30 minutes				
B. Wake up in the middle of the night or early morning				
C. Have to get up to use the bathroom				
D. Cannot breathe comfortably				
E. Cough or snore loudly				
F. Feel too cold				
G. Feel too hot				
H. Have bad dreams				
I. Have pain				
J. Other reason (s), please describe, including how often you have had trouble sleeping because of this reason (s):				

During the past month, how often have you had trouble sleeping because you	**Not during the past month (0)**	**Less than once a week (1)**	**Once or twice a week (2)**	**Three or more times a week (3)**
During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?				
During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?				
During the past month, how would you rate your sleep quality overall?	**Very good (0)**	**Fairly good (1)**	**Fairly bad (2)**	**Very bad (3)**

Scoring of PSQI:

Component 1	#9 Score	C1
Component 2	#2 Score (<15min (0), 16-30min (1), 31-60 min (2), >60min (3)) + #5a Score (if sum is equal 0=0; 1-2=1; 3-4=2; 5-6=3)	C2
Component 3	#4 Score (>7(0), 6-7 (1), 5-6 (2), <5 (3)	C3
Component 4	(total # of hours asleep)/(total # of hours in bed) x 100>85%=0, 75%-84%=!, 65%-74%=2, <65%=3	C4
Component 5	# sum of scores 5b to 5j (0=0; 1-9=1; 10-18=2; 19-27=3)	C5
Component 6	#6 Score	C6
Component 7	#7 Score + #8 score (0=0; 1-2=1; 3-4=2; 5-6=3)	C7

Add the seven components cores together = Global PSQI=

Results

Table 1: Comparison between athletes & non athletes

Components	**Case**	**Control**	**P value**
subjective sleep quality	0.5±0.505	0.28±0.45	<0.05*
sleep latency	0.3±0.46	0.12±0.32	<0.05*
sleep duration	0.16±0.37	0	<0.05*
sleep efficiency	0.14±0.35	0	<0.05*
sleep disturbance	0.18±0.38	0.04±0.19	<0.05*
use of sleep medication	0.04±0.19	0	0.15
daytime dysfunction	0.12±0.32	0.02±0.14	<0.05*
Global score	1.7±0.73	1.26±0.59	<0.05*

Data are presented as the mean ± standard deviation* p value significant, ** p value highly significant

Different components of PSQI questionnaire were assessed in both case & control group. Component 1- subjective sleep quality, component 2- sleep latency, component 3- sleep duration, component 4- sleep efficiency was better in controls than athletes with a $p<0.05$.

Component 5- sleep disturbance & component 7- daytime dysfunction scores were higher in athletes than controls ($p<0.05$).

Component 6- use of sleep medication was not statistically significant.

So, the overall global score was higher in athletes indicating better sleep quality in controls.

Discussion

In PSQI questionnaire, Component 1- subjective sleep quality, component 2- sleep latency, component 3- sleep duration, component 4- sleep efficiency was better in controls than athletes with a $p<0.05$.

Component 5- sleep disturbance & component 7- daytime dysfunction scores were higher in athletes than controls ($p<0.05$).

There are a number of factors that influence amount and quality of sleep obtained by athletes. For example, travel, competition and intense training are all known to disrupt or reduce the amount and/or quality of sleep obtained by athletes. Among these, the timing of an athlete's training schedule may also be of importance.

The nights before training days, the athletes obtained less sleep compared with nights prior to rest days. The primary cause of this difference in sleep appears to be the fact that, on average, the athletes woke earlier on training days than on rest days. The athletes tried to wake up earlier on training days by going to bed earlier, but the difference in sleep onset times on nights before training days and rest days was only 1 hour. Some athletes used to take a short daytime naps on training days, they still obtained less sleep total on training days than on rest days. As a consequence of getting up early in the morning, there is reduction in sleep duration.[3]

In terms of cognitive performance, sleep supplementation in the form of napping has been shown to have a positive influence on cognitive tasks following a night of sleep deprivation. Naps can markedly reduce sleepiness and can be beneficial when learning skills, strategy ortactics. Napping may also be beneficial for athletes who have to wake early routinely for training or competition and those who are experiencing sleep deprivation.[7]

People who to get up early should be able to obtain a reasonable amount of sleep by going to bed earlier. However, there are two reasons why it is difficult to substantially advance one's bedtime. First reason can be from a lifestyle perspective, many people have social and family commitments in the evening which limits the extent to which they can advance their bedtime. Second reason is, physiologically, there is a period in the early evening when it can be difficult to initiate or maintain sleep even if one is in bed. The variation in sleep cycle is determined by a circadian process generated by an endogenous pacemaker that reflects the pressure for sleep that builds up during sustained wakefulness and dissipates during sleep periods. Sleep propensity is highest from 00:00 to 07:00 hours, then a secondary peak in the mid-afternoon can be seen, which is followed by a period of low sleep propensity in the early evening, when people can obtain very little sleep. This period of low sleep propensity has been termed the ''forbidden zone for sleep''. Consequently, going to bed earlier in preparation for an early morning training session does not necessarily guarantee that sleep duration is preserved–indeed, some individuals may not be able to initiate sleep at all because of this forbidden zone for sleep.[3]

Conclusion

Hence, we can conclude that controls have better sleep quality than athletes.

As we know very little about the sleep needs of athletes, particularly in terms of the amount required to reach and/or maintain optimal levels of performance. The results of the current study indicate that athletes obtain 7–9 hours per night and at least 8 h of sleep per night is required to prevent neurobehavioural deficits in daytime performance. One factor that affects amount of sleep an athlete obtains is the timing oft heir training. When designing schedules, coaches should be aware of the implications of the timing of training sessions for sleep and fatigue. In particular, schedules that require athletes to train early in the morning reduce sleep duration and increase pre-training fatigue levels. In future, it will be important to identify strategies for minimizing sleep loss in sports.

Ethical Clearance: Taken from institutional committee

Source of Funding: Self

Conflict of Interest: Nil

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Visual or Auditory: The Effective Learning Modality in Multimodal Learners

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Abstract

Background: One of the principle debates in the field of individual differences in 'learning style' has centred around the proliferation of constructs and measures irrespective of extensive theories and instruments. In the current digital world, audio-visual aids have grown exponentially with several multimedia such as educational DVDs, Power Point, YouTube and other online portals. With recent advances in Kinaesthetic/ tactile learning styles that help the students to have hands on experience, it is easier to understand, analyse & reproduce the concept. This research intends to use VARK Questionnaire to study the learning styles and their preferences and determine the effective learning modality.

Objective: To study the effective sensory modality of learning using cognitive learning tests in multimodal learners.

Materials and Method: Study was conducted on 250 undergraduate medical students of BMCRI, Bengaluru. Informed written consent was taken. Subjects with visual and auditory abnormalities, motor disorders,diseases of upper limb were excluded. Using VARK questionnaire, Version 7.0, students were grouped into unimodal and multimodal learners based on the VARK scores. Design Learning test and Auditory Verbal Learning tests were used to assess learning ability. Statistical analysis was done with descriptive statistics and Student's t-test, p value <0.05 statistically significant.

Results: Majority of students were unimodal learners. Design learning test scores were significantly higher in multimodal learning group, with statistically significant p value of 0.032.

Conclusion: Among multimodal learners, visual modality of learning is found to be the best sensory mode of learning. This may help the educators to effectively design and tailor the teaching strategies, as per the learning needs of students.

Keywords: *Learning styles, VARK,learning tests.*

Introduction

Whereas modern medicine owes much of its success to its reliance upon evidence-based treatments, most popular techniques of instruction have not been subjected to thorough empirical scrutiny.[1] Learning style based instruction have proven the fact that the idea of customized instruction produces better learning than using the same kind of instruction for everyone.[2-4] The learning-styles concept appears to have wide acceptance not only among educators but also among parents and the generalpublic.[2] In the current digital world, audio-visual aids have grown exponentially with several multimedia such as educational DVDs, Power Point, YouTube and other online portals. Kinesthetic/tactile learning can help the educators with finding new ways to engage students, stimulate critical thinking and improve clinical application in a rapidly changing and complex

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health care system.[5] While there are several tools to study learning styles of students, the visual, aural, read/write and kinesthetic (VARK) questionnaire is a simple, freely available, easy to administer tool that encourages students to describe their behaviour in a manner they can identify with and accept.[6] The questionnaire is designed to identify the following four sensory modalities: visual, aural, read/write, and kinesthetic[6] (hence the acronym VARK). Teachers can use this knowledge to facilitate student learning. Moreover, students themselves can use this knowledge to change their learning habits.[7] This research intends to use VARK Questionnaire to study the learning styles and their preferences and determine the effective sensory modality of learning using cognitive learning tests in multimodal learners.

Materials and Method

Study Design: Cross-sectional study

Study Place: Bangalore Medical College & Research Institute, Bengluru.

Study Population: 250 Undergraduate Medical students of BMCRI in the age group of 19-20 yrs

Study Period: April–May 2019

Ethical Clearance and Informed Consent: Taken

Inclusion Criteria:

1. Healthy Men and Women
2. Age group of 19-20 yrs.

Exclusion Criteria:

1. Subjects with visual and auditory abnormalities
2. Subjects with motor disorders.
3. Subjects with disorders of upper limb.

The study was started after the subjects fulfilled the inclusion criteria and were enrolled after obtaining consent . The study group includes a total of 250 participants in the age group of 19-20 years. Version 7.0 of the VARK questionnaire in a printed form was administered to the students.[6] It consisted of 16 questions with 4 options for each. Each option correlates to a particular sensory modality preference. Hence, the modality that received the highest marks was the preferred sensory modality. Since students were free to select more than one option, multiple modalities of varying combinations could be obtained. The questions describe situations of common occurrence in daily life, thereby relating to an individual's learning experience. Students were instructed to choose the answer that best explained their preference and circle the letter (s) next to it. They could choose more than one option or leave blank any question that they felt was not applicable to them. Questionnaires were evaluated on the basis of previously validated scoring instructions and a chart.[6] Based on VARK scores the students were categorized into two groups of unimodal & multimodal learners .Design Learning Test (DLT) & Auditory Verbal Learning Test (AVLT)[7] were used to assess learning ability of the students.

Statistical Analysis: The data was analysed using descriptive statistics to match the subjects based on Age and Gender. Students 't' test was done to compare the differences of the learning test scores between the unimodal learning group and the multimodal learning group. analysis was done in Microsoft Excel version 2010. Data is expressed as mean ± SD. P value <0.05 is considered significant.

Results

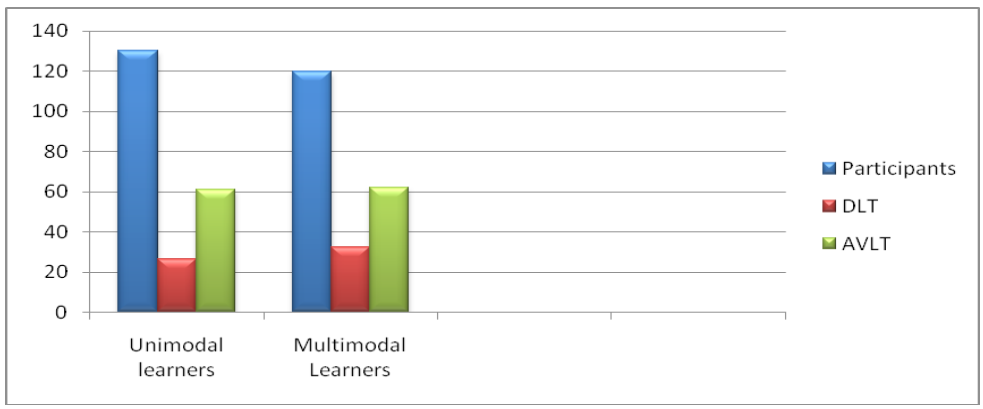

Figure 1

Figure 1 shows the distribution of participants in two groups. Out of 250 students 130 students preferred unimodal learning styles and 120 students preferred multimodal type of learning based on the VARK Questionnaire.

Table 1

	Unimodal Learners	Multimodal Learners	P Value
Participants	130	120	
Males	63	55	
Females	67	65	
DLT	26.43 + 8.9	32.54 + 7.3	0.032*
AVLT	60.9 + 5.94	62.16 + 3.59	0.186

Table 1 shows the distribution of participants in the unimodal learning group and the multimodal learning group. It also shows the gender distribution in the two groups. The design learning test score which assesses the visual learning ability was found to be higher in the multimodal learning group which was statistically significant with p value of 0.032. The Auditory-Verbal learning test scores with assesses the auditory learning were higher in the multimodal learning but it was not found statistically significant.

Discussion

Majority of the students in this study, 130 out of 250 belonged to the unimodal learning group, indicating most of the students preferring one type of sensory mode of learning (i.e Visual, Aural, Reade/Write or Kinesthetic) whereas the rest of the 120 students belonged to the multimodal learning group similar to results reported by authors from different geographic locations.[8-9-10] Therefore this VARK tool not only helps in identifying the majorly utilized learning style for modulating the preferred instructional technique but also helps the students in understanding their own learning preferences thus improving their academic performance and clinical skills. The Design learning test and the Auditory-Verbal Learning tests which are effective cognitive learning tests showed higher value of these test scores in the multimodal learning group.[7] The DVT test scores were statistically higher in the multimodal learners indicating visual modality of learning as an effective sensory mode of learning among the multimodal learners. Teaching in most of the institutions predominantly include lecture classes using Power Point presentations and, to some extent, chalkboard teaching. Practical classes are predominantly small-group teaching/demonstrations.[11] This type of teaching strategy can stimulate group of students with predominant visual and auditory learning style. Those who predominate with kinesthetic learning are least targeted in the current teaching method. The same is true for the other sensory modalities. The deficiencies in this type of teaching strategies is overcome by Multimodal learning up to some extent. Therefore the newer teaching strategies are required which need to stimulate the visual, aural, read-write and the kinaesthetic sensory modalities to encourage the critical thinking, problem solving and the decision making skills among students.

Conclusion

Among multimodal learners, visual modality of learning is found to be the best sensory mode of learning. This may help the educators to effectively design and tailor the teaching strategies, as per the learning needs of students.

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Conflict of Interest: Nil conflict.

Source of Funding: Self.

Ethical Clearance: Taken.

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Etiology of Anemia, Iron Deficiency among Young Children and Strategies to Overcome

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Abstract

Background: Anemia, iron deficiency, worm infestation and *Helicobacter pylori* infection is highly prevalent among young children population in India.

Objectives: To understand the aetiology of anaemia, iron deficiency, role of worm infestation and presence of *Helicobacter pylori* among young children population and to assess the impact of intervention

Method: 484 children of age 5-12 years from rural schools were enrolled for the study. Blood haemoglobin and serum ferritin were measured. *H.pylori* status was investigated with the 13C- Urea Breath Test. Stool specimen was assessed for the presence of parasites. 140 anemic children were selected for the intervention. They were randomly divided into seven groups of 20 children in each and named as group 1 to 7. 1 as control, 2 iron supplementation, 3 treated for *H. pylori* alone, 4 treated for worms, 5 treated for *H. pylori* infection along with iron supplementation, 6 treated for worms along with iron supplementation & 7 supplemented with iron along with treatment for *H. pylori* and deworming (for duration and dose refer Methodology in the text).

Results: Of the 484 children, 30.4% were anemic. 18.8% children were iron deficient, of which, 50.3% were anemic. 13.2% children were positive for *H.pylori* and 50.0% children are infested with potentially pathogenic parasites. Intervention studies showed that the Group 7 children showed significant rise in hemoglobin and serum ferritin in comparison.

Conclusion: Childhood anemia continues to be a significant public health problem in school children and targeted intervention to iron deficiency either alone or in combination (Iron deficiency, worm infestation and H. pylori infection) can reduce the burden.

Keywords: *Anemia, iron deficiency, H.pylori, Worm infestation, Intervention.*

Introduction

Anemia is a leading public health issue in developing countries. An estimated 30% of the world's population is anemic[1]. The global prevalence of anemia among 6-12y old children in developing countries ranges from 36-77%[2-4]. In India the prevalence of anemia among 5-14y old urban and rural is found to be in the range of 66.7 to 77%[5].

Iron Deficiency Anemia (IDA) can range from mild to severe health issues such as delayed growth and development and behavior problems among young children[6-8]. Infection with *H. pylori* infection has an effect on iron absorption [9]. It is reported that *H. pylori*

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infection is observed in over 50-70% people in the world [9,10]. Moreover, IDA affects two billion people in the world. When two diseases have such a high prevalence in the population, definitely they may appear to be associated with each other. However, knowledge regarding any relation between *H.pylori* infection and IDA is limited[10,11]. Parasitic infestations caused by protozoa and helminthes continue to take their toll on mankind. The misery these parasites inflict on humans remains a major health problem worldwide[9,12]. Anemia, which can be mild to severe, acute or chronic, is commonly associated with parasitic infestations [13,14]. In view of the deleterious effects of iron deficiency anemia on overall development of children, present study was designed to assess the prevalence of anemia and iron deficiency among apparently healthy children of rural background and also to establish the impact of worm infestation on anemia and to evaluate the association between H. pylori infection and IDA. The study also aimed to investigate the related changes before and after the treatment for *H. pylori* and deworming along with and without iron supplementation and the relationship of these changes among iron deficiency anemia in children.

Methodology

Three rural schools from Uddaghatta, Baramasamundra and Horkeravillages were selected from Jagalur taluk, Davangere district, Karnataka. Each school was named as Group A, B and C.

Body mass index of boys and girls were measured. Prevalence of anemia, iron deficiency, *H. pylori* infection and parasitic infestation were determined among study populations by standard tests[6,9,10,13,14]. Based on the prevalence of anemia, iron deficiency, *H. pylori* infection and parasitic infestation, a well-designed interventional program was executed.

Intervention Study: A total of 140 anemic children out of 147 anemia were selected for the intervention study and were randomly divided into seven groups. Each group comprised of 20 children.

Group 1 (20 numbers): Children were kept as a control group with no iron supplementation, no treatment for H. pylori and with no deworming, for up to 3 months.

Group 2 (20 numbers): Iron supplementation by giving iron tablet to all the 20 children for three months (3mg/kg/day – not to exceed 60mg daily).

Group 3 (20 numbers): Treatment for H. pylori was given for 2 weeks with no iron supplementation for 3 months. A triple drug therapy: lansoprazole (0.6mg/kg per day, once daily), clarithromycin (15mg/kg per day, divided into 2 doses) and metronidazole (20mg/kg per day, divided into 2 doses) was administered for the period of 2 weeks.

Group 4 (20 numbers): Deworming was done by a single dose of albendazole 400mg was for the worms that are transmitted through contaminated soil.

Group 5 (20 numbers): Children were treated for H. pylori infection for 2 weeks (Treatment same as Group 3) along with iron supplementation for 3 months (Iron supplementation same as Group 2).

Group 6 (20 numbers): Deworming (Same as Group 4) along with iron supplementation for 3 months (Iron supplementation same as Group 2).

Group 7 (20 numbers): Children were supplemented with iron for 3 months (Iron supplementation same as Group 2) along with both the treatment for H.pylori up to 2 weeks (Treatment same as Group 3) and deworming by a single dose (Same as Group 4).

The investigation for hemoglobin, serum ferritin levels, worm infestation and breath test for *H.pylori* was done before the intervention study and after the intervention period to assess the impact of intervention.

Results

Screening: A total of 484 children were enrolled for the study from three different schools from rural area of Davangere district. Age wise distribution of the children is given in the table-1. 26.0% of the children were of the age group 11-12 years and 25.8% were of the age 9-10 years. Preponderance of girl child (51.2%) was seen when compared with boys (48.8%)

Anthropometric Measurements: Among 236 boys, 15 (6.4%) were underweight, 3 (1.3%) obese and 218 (92.4%) were normal.

Out of 248 girls, 34 (13.7%) were underweight, 11 (4.4%) obese and 203 (81.9%) girls were normal (Table 2).

Prevalence of Anemia: WHO criteria was used to categorize anemia among children of 5-12 year age group. Of the 484 children, 147 (30.4%) were found to

be anemic and 337 (69.6%) were non-anemic. Among anemic children, mild anemia was found in 62 (42.2%), moderate anemia in 53 (36.1%) and 32(21.8%) were severely anemic. The prevalence of anemia was found to be highest in 5-6y age group (36.7%). Among 7-8y age group 43 (29.2%) were anemic and 29 (19.7%) among 9-10y. The anemia was more prevalent among girls (57.8%) when compared to boys (42.2%) (Table-3).

Prevalence of Iron-Deficiency: Not all anemic children were iron deficient and iron deficiency may occur without anemia. Out of 484 children studied 91 (18.8%) were iron deficient. Among these 17 (5.0%) were non-anemic and 74 (50.3%) were found to be anemic (Table-4).

Prevalence of H. pylori infection: Out of 484 children studied, 64 (13.2%) children were found positive for H. pylori infection by breath test. Among these 19 (17.0%) were positive in 5-6y age group, 16 (13.0%) in 7-8y, 17 (14.0%) in 9-10y and 12 (10.0%) in11-12y age group were found positive for H. pylori infection (Table-5).

Association between Anemia, Iron Deficiency (ID), Iron Deficiency Anemia (IDA) and H. pylori: The prevalence of H. pylori among non-anemic children was 36 (10.7%), of which 17 were positive for both Iron Deficiency and H. pylori infection, whereas other 19 were positive only for *H.pylori* infection.

In mild anemic children, 6 of them were positive for H.pylori. Similarly among mild anemic children, 8 were positive for H.pylori and in severely anemic children, 14 were positive for H.pylori. The relationship among anemia, IDA and H. pylori infection is depicted in the Table 5.

Prevalence of Parasitic Infestation: Parasitic infestation was examined in 474 children. 237 (50.0%) were found infested with potentially pathogenic parasites. The most common parasitic seen are; *Ascaris lumbricoides* excreted by 44 (18.6%) children, followed by *Enterobius vermicular* by 41 (17.3), *Ancylostoma duodenale* by 39 (16.5), *Trichuris trichiura* by 37 (15.6%), *Hymenolepis nana* by 35 (14.8%), *Giardia lamblia* by 33 (13.9%) and *Entamoeba histolytica* excreted by 8 (3.4%) children. The parasitic infestation was found more in girls (53.2%) compared to boys (46.8%). The prevalence of parasitic infestation was found highest among 5-6y age group (35.0%), followed by 31.2% in 7-8y children, 21.1% in 9-10y and 12.7% was infested among 11-12y age group.

Comparison of hemoglobin and serum ferritin levels before and after the intervention program

After the intervention program 73 (52.1%) children showed increase in the hemoglobin and serum ferritin levels which was highly significant.

Group 1: Increase in hemoglobin and serum ferritin level was seen in only one child (5.0%) who was not supplemented with iron nor treated for H. pylori and deworming. They were kept as control.

Group 2: Increase in hemoglobin concentration and serum ferritin was seen in 6 (30.0%) children who were supplemented only with iron tablets.

Group 3: Rise in hemoglobin concentration and serum ferritin was seen in 13 (65.0%) children who were treated only for H. pylori infection.

Group 4: Hemoglobin and serum ferritin level was increased in 9 (45.0%) children for whom only deworming was done.

Group 5: Hemoglobin and serum ferritin concentration was raised in 15 (75.0%) children who were treated for H. pylori infection along with iron supplementation.

Group 6: Increase in hemoglobin and serum ferritin level was observed in 11 (55.0%) children who were supplemented with iron tablets along with deworming.

Group 7: Hemoglobin and serum ferritin concentration was well improved in 18 (90.0%) children of this group who were treated for H. pylori and deworming along with iron supplementation.

Table 1: Age wise distribution of children among different schools

Age (Years)	Group			Total Number (%)
	A Number (%)	B Number (%)	C Number (%)	
5-6	41(23.7)	33 (22.4)	38 (23.2)	112 (23.1)
7-8	45(26.0)	35(23.8)	41(25.0)	121(25.0)
9-10	42(24.3)	40(27.2)	43(26.2)	125(25.8)
11-12	45(26.0)	39(26.5)	42(25.6)	126(26.0)
Total	173	147	164	484

Table 2: Body mass index of the boys and girls among different schools

Age (Years)	Group						Total Number (%)
	Underweight		Normal		Obese		
	Boys	Girls	Boys	Girls	Boys	Girls	
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	
5-6	8(15.4)	12(23.7)	44 (84.6)	48(23.7)	-	-	112 (23.1)
7-8	5(9.3)	9(26.0)	49(23.8)	57(26.0)	-	1(26.0)	121(25.0)
9-10	2(3.0)	8(24.3)	62(27.2)	47(24.3)	2(26.2)	4(24.3)	125(25.8)
11-12	-	5(26.0)	63(26.5)	51(26.0)	1(25.6)	6(26.0)	126(26.0)
Total	**15**	**34**	**218**	**203**	**3**	**11**	**484**

Table 3: Prevalence of anemia among children of different schools

Age (Years)	Anemia						Total Number (%)
	Mild		Moderate		Severe		
	Boys	Girls	Boys	Girls	Boys	Girls	
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	
5-6	10(35.7)	14(41.2)	6 (84.6)	12(37.5)	5(38.5)	7(36.8)	54 (36.7)
7-8	12(42.9)	8(23.5)	5(23.8)	9(28.1)	4(30.8)	5(26.3)	43(29.2)
9-10	3(10.7)	7(20.6)	6(27.2)	5(15.6)	3(23.1)	5(26.3)	29(19.7)
11-12	3(10.7)	5(14.7)	4(26.5)	6(18.8)	1(7.7)	2(10.5)	21(14.3)
Total	**15**	**34**	**218**	**203**	**3**	**11**	**147**

Table 4: Prevalence of Iron deficiency among children of different schools

Group	Serum ferritin (SF) levels among different age group				Total
	5-6 years Number (%)	7-8 years Number (%)	9-10 years Number (%)	11-12 years Number (%)	
Non-Anemic	2 (11.8)	3 (11.8)	5 (11.8)	7 (11.8)	17
Mild anemic	4 (11.8)	2 (11.8)	7 (11.8)	6 (11.8)	19
Moderate anemic	8 (11.8)	11 (11.8)	7 (11.8)	7 (11.8)	33
Severe Anemic	10 (11.8)	5(11.8)	5 (11.8)	2 (11.8)	22
Total	24(11.8)	21(11.8)	24 (11.8)	22 (11.8)	91

Table 5: Association among anemia, iron deficiency, iron deficiency anemia and Helicobacter pylori infection

Anaemic Status	Iron Deficiency	Helicobacter Pylori Positivity
Non Anaemic (n=337)	17 (5.0)	36(10.7)
Anaemic (n=147)	74 (50.3)	28(19)
Mild (n=62)	19 (30.6)	6(9.7)
Moderate (53)	33 (62.2)	8(15.1)
Severe (n=32)	22 (68.8)	14(43.8)
Total	**91(18.8%)**	**64(13.2%)**

Discussion

In view of the above findings, it is highly recommended that measures to reduce worm infestation including mass chemotherapy; should deserve high priority because of the known harmful effects of these worms. Worm infestation may also influence anemia to a large extent & calls for a deworming campaign along with IFA distribution in control program for anemia in children. It was found to be a strong predictor of anemia in the present study too. Stoltzfus et al [4] found that 25% of all anemia, 35% of iron deficiency anemia and 73% of severe anemia was attributable to hookworm infection.

Emerging evidence seems to place *H. pylori* infection next to helminthiasis as a communicable cause of anemia[17] . Therefore, new initiatives designed to further decrease prevalence of iron deficiency and IDA in high-risk groups may need to address the eradication of *H. pylori* infection. Different epidemiological studies conducted all over the world have demonstrated an association between *H. pylori* infection and IDA[17-18]. In the present study the prevalence of *H. pylori* infection in IDA was 28 (19%) this is in concurrence to the other studies[16-18]. The prevalence of *H. pylori* was 13.2% in the present study. The rate of *H. pylori* infection was significantly higher in IDA (19%) when compared to non IDA group (10.7%). A significant association between *H. pylori* and IDA was found in children. Treatment for *H. pylori* infection showed increase in hemoglobin level in 13 (65%) children without iron supplementation. *H. pylori* eradication therapy combined with iron administration showed increase in hemoglobin level in 15 (75%) children which is more effective than iron administration alone for the treatment of IDA where only 6 (30%) children showed the improvement. *H. pylori* infection may lead to IDA by impairing iron uptake or increasing the demand for iron[18]. These findings and those from the current study suggest that eradication of *H. pylori* infection is a promising approach for achieving long term recovery from IDA in certain children.

After deworming, 9 (45%) children showed increase in hemoglobin level whereas deworming combined with iron supplementation showed increase in 11 (55%) children. Children who were treated for *H. pylroi* and deworming along with iron supplementation showed a very good improvement where 18 (90%) children showed rise in hemoglobin and serum ferritin concentration.

In the present study, age, education status, socio-economic status and BMI was not significantly related with anemia. Mehta M and Kotecha et al., also reported that age is not a significant correlation of anemia[18]. Educational and socioeconomic status alone may not have any significant effect on anemia.

To conclude, childhood anemia continues to be a significant public health problem in school children and iron deficiency either alone or in combination (Iron deficiency, worm infestation and H.pylori infection) is the commonest nutritional cause of anemia in school children aged 5-12y in the community. Improvement in knowledge regarding anemia and factors associated with it and life style management can be taught through educational programs and through the media.

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Assessment of Respiratory Muscle Strength in Obese Young Adults

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Abstract

Introduction: Obesity is also called as disease of 21st century. Obesity is defined by WHO as "A Medical condition in which excess body fat has accumulated to the extent that it may have adverse effects on health consequences". The BMI is an attempt to quantify the amount of fatty mass in an individual.

Various complications of obesity on respiratory functions were studied by many researchers. Few studies are conducted in India on obesity to assess the respiratory muscle strength, obtained controversial findings.

Objectives: To assess the respiratory muscle strength in obese and non obese young adults.

Material and Method: After getting clearance from ethics committee, experiments were performed as per study protocol in the Department of Physiology, Narayana medical College, Nellore.

Based on BMI values subjects were classified as borderline obese (BMI more than 25) and non obese groups (34 in each group, age group between 18 to 25 yrs) .

Anthropometric measures were taken along with the total body fat % using Bio-impedance instrument.

PIP & PEP were recorded by using digital manometer device capable of measuring both negative and positive pressures along withthe mouth piece, which was in house built and calibrated by using mercury manometer.

Results: In our study, PIP & PEP of non obese is 111.7 ± 17.3 mmHg & 61.8 ± 12.5 mmHg respectively. Similarly PIP & PEP of borderline obese was found to be 121.2 ± 17.3 mmHg & 62.3 ± 12.2 mmHg respectively. There is an increase in PIP values which is statistically significant in borderline obese group. Similar findings were observed in other studies.

Conclusion: We conclude that, PIP increased in borderline obese subjects but not in PEP . According to previous studies, obesity enhances the strength of respiratory muscles. This continuous overburden adapts the respiratory muscles to generate more pressure during respiration . This we could observe only in inspiratory group of muscles in borderline obese subjects.

Keywords: *Peak Inspiratory Pressure (PIP), Peak Expiratory Pressure (PEP), Hand grip strength.*

Introduction

The lifestyle of society is changing from agricultural life to industrial life, where sedentary works are more. Along with that eating habits, frequency & fat content of food has increased which will increases the prevalence of obesity.

So obesity is a fast growing global health, social and economical problem. It is also called as disease

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of 21st century. According to WHO obesity is defined as "A Medical condition in which excess body fat has accumulated to the extent that it may have adverse effects on health consequences". The BMI is an attempt to quantify the amount of fatty mass in an individual

So change in life style and lack of physical activity are two main factors of obesity which impairs quality of life and number of obesity cases may still increase in 21st century[1].

Respiratory muscle strength (RMS) is responsible for respiratory mechanics. Expansion during inspiration & recoiling during expiration is totally depends on the respiratory muscle strength[1].

Obesity is important risk factor for diabetes, hypertension, atherosclerosis, cancer etc. It also causes respiratory muscle strength disturbances. It may be due to an increase in tensile strength caused by excessive adipose tissue in the thoracic cage and abdomen[2]. So assessment of respiratory muscle strength in the form of pressure is a simple, rapid, inexpensive, accurate, portable & ideal for bedside patients .

Aim: To assess the respiratory muscle strength in obese young adults

Material and Method

After getting clearance from ethics committee, informed consent was taken from all the participants and different parameters including peak inspiratory and expiratory pressures were recorded as per study protocol. Data collection was done in the Department of Physiology, Narayana Medical College, Nellore.

Participants: Based on BMI values subjects were divided into 2 groups. Borderline obese and non obese. (34 in each group).

Test Group: 34 borderline obese (BMI < 25 - 29>) aged between 18 - 25yrs

Control Group: 34 non obese (BMI < 25), aged between 18 - 25yrs

Inclusion Criteria:

- Subject aged between 18 - 25 yrs
- No H/O DM & Hypertension
- No H/O medication

Exclusion Criteria:

- Subject aged <18 or> 25 yrs
- H/O DM & Hypertension
- H/O medication

Parameters:

- Height & Weight were measured by using Stadiometer & Digital weighing balance.
- Total body fat % was measured by using body fat analyser based on Bio-impedance principle.
- Body Mass Index was calculated by formula (Weight in Kgs/Height in meter square).
- Peak Inspiratory & Expiratory Pressure were recorded by digital PI & PE pressure monitoring device which was a custom built, calibrated by using mercury manometer.

Methodolgy: It's a simple age & height matched case control study .Subjects were asked to come to the Laboratory between 9 am to 11 ambecause PI & EP shows diurnal variations i.e it increases in morning after 10am. After 10 minutes rest Height & Weight were recorded to calculate BMI. Subjects were asked to exhale air completely (with out device), nose clip was applied & instructed to inspire through the mouthpiece of the device to get PIP.Subjects were asked to take deep breath (with out device), nose clip was applied & instructed to exhale into the mouthpiece of the device to get PEP[3].

Three readings were taken with a gap of one minute rest & highest value is selected for analysis.

Results

Table 1: General characteristics

Parameters	Non Obese Mean ± SD	Border Line Obese Mean ± SD
Age (yrs)	19.2 ± 1.0	19.3 ± 1.3
Height (cms)	165.7 ± 6.8	166.7 ± 7.2
Weight (Kgs)	64.4 ± 6.7	77.2 ± 7.01
BMI	23.3 ± 2.3	27.9 ± 1. 7

Table 2: Respiratory pressures

Parameters	Non Obese Mean ± SD	Borderline Obese Mean ± SD
PIP (mmHg)	111.7 ± 17.3	121.2 ± 17.3
PEP (mmHg)	61.8 ± 12.5	62.3 ± 12.2

In our Study: There was an increase in PIP values which is statistically significant (p= 0.027) in borderline obese group.

Discussion

Obesity is a risk factor for various diseases, including respiratory system. It mainly decreases lung compliance. Obesity increases respiratory muscle strength because muscles have to work constantly against decreased lung compliance and high airway resistance, due to fat deposition which requires more force for mechanism of ventilation. Increase in respiratory muscle strength may be due to adaptation to the chronic overload which could generate more pressures[2]. Pressure generated by respiratory muscles is measured as peak inspiratory & expiratory pressures . The respiratory muscles are as vital as the heart and on long term muscle strength decreases and leads to other complications. So assessment of respiratory muscle strength in the form of pressure is a simple, rapid, inexpensive, accurate, portable & ideal for bedside patients .

Conclusion

Adolescent obesity can be prevented by takling childhood obesity because it is very difficult to reduce the weight once it is gained by young individuals of present generation with modern life style .

So we conclude that,

- Childhood obesity can be controlled by awareness programs such as school health programs and regulation of junk food marketing.
- Recording of PIP & PEP in obesity might be helpful in early diagnosis and prevention of respiratory complications.
- In general, obesity can be prevented if active measures are taken to reduce weight by change in lifestyle & food habits.

Ethical clearance taken from the committee.

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Conflict of Interest: Nil

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